



February 16, 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 02, 2024. This project is associated with Origins project number Y402081-01.

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-B06@4'	Y402081-01	Soil	February 2, 2024 11:30	02/02/2024 15:30
FL-B09@4'	Y402081-02	Soil	February 2, 2024 11:32	02/02/2024 15:30
FL-B11@4'	Y402081-03	Soil	February 2, 2024 11:36	02/02/2024 15:30
FL-B12@4'	Y402081-04	Soil	February 2, 2024 11:38	02/02/2024 15:30
FL-BG01@4'	Y402081-05	Soil	February 2, 2024 13:00	02/02/2024 15:30
FL-BG02@4'	Y402081-06	Soil	February 2, 2024 13:02	02/02/2024 15:30
FL-BG03@4'	Y402081-07	Soil	February 2, 2024 13:04	02/02/2024 15:30

Origins Laboratory, Inc.



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www.originslaboratory.com

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative			Matrix			Analysis			Please contact your analyst regarding sample collection and/or storage. See the attached file for details.
				HCl	HNO <sub>3</sub>	Other	Groundwater	Soil	Air Summa Canister #	Other	TEST/ANALYSIS	Full Table 915	
FC-B06041	02-03-21	1135	3	X			X						
FC-B09041		1132	1										
FC-B10041		1134	1										
FC-B10041		1138	1										
FC-B10041		1300	2										
FC-B10041		1302	1										
FC-B10041		1304	1										

Requisitioned By: S. Madhus  
 Date: 02-02-24  
 Time: 1530  
 Received By: [Signature]  
 Date: 2/22/24  
 Time: 1530  
 Turnaround Time:  48 Hr  24 Hr  72 Hr  
 Standard

Client: Andy Sagen  
 Address: 6855 W 119th Ave, Broomfield, CO 80020  
 Project Manager: Andy Sagen  
 Project Name: Ludwig 17-1  
 Project Number: [none]  
 Samples Collected By: S. Madhus  
 Telephone Number: 303.433.1322  
 Email Address: davis@originslab.com  
 Date Results Needed: 2/22/24

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: 14102021 Client: Tasman

Client Project ID: Ludwig 17-1

Checklist Completed by: JAW/ELS Shipped Via: HLV  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 2/2/24 Airbill #: N/A

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

Cooler Number/Temperature: 15.8 °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 <sup>(1)</sup> ?	/			
Is there ice present (document if blue ice is used)		/		
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		/		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		/		
Were all samples received intact <sup>(1)</sup> ?	/			
Was adequate sample volume provided <sup>(1)</sup> ?	/			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?		/		
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?		/		
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?		/		
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?		/		
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?		/		
For volatiles in water – is there headspace (> 1/4 inch bubble) present? If yes, contact client and note in narrative.		/		
Are samples preserved that require preservation and was it checked <sup>(1)</sup> ? (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 HNO3, HCL, H2SO4) / (pH > 10 for samples preserved with NaAsO2+NaOH, ZnAc+NaOH)		/		
Additional Comments (if any):				

<sup>(1)</sup>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) AS Date/Time Reviewed 2/2/24

Origins Laboratory, Inc.  
*J. Bynon*

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

**FL-B06@4'**  
**2/2/2024 11:30:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-01 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	0.254		0.101	mg/L	1	B4B0506	02/05/2024	02/06/2024	
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**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND		25.0	mg/kg	1	B4B0225	02/02/2024	02/02/2024	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl	75.4 %		50-150	"	"	"	"	"	
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**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B4B0230	"	02/02/2024	U
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	U
Benzene	ND		0.00200	"	"	"	"	"	U
Ethylbenzene	ND		0.00200	"	"	"	"	"	U
Toluene	ND		0.00200	"	"	"	"	"	U
Xylenes, total	ND		0.00200	"	"	"	"	"	U
Gasoline Range Hydrocarbons	ND		0.200	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	101 %		70-130	"	"	"	"	"	
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**FL-B06@4'**  
**2/2/2024 11:30:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-01 (Soil)**

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	102 %		70-130			B4B02 30	02/02/2024	02/02/2024	
Surrogate: 4-Bromofluorobenzene	105 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	<b>2.29</b>		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	<b>2.52</b>		0.435	"	"	"	"	"	

**PAH by EPA 8270E**

1-Methylnaphthalene	ND		0.002	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
2-Methylnaphthalene	ND		0.002	"	"	"	"	"	U
Acenaphthene	ND		0.020	"	"	"	"	"	U
Anthracene	ND		0.020	"	"	"	"	"	U
Benzo (a) anthracene	ND		0.005	"	"	"	"	"	U
Benzo (a) pyrene	ND		0.020	"	"	"	"	"	U
Benzo (b) fluoranthene	ND		0.020	"	"	"	"	"	U
Benzo (g,h,i) perylene	ND		0.020	"	"	"	"	"	U
Benzo (k) fluoranthene	ND		0.020	"	"	"	"	"	U
Chrysene	ND		0.020	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND		0.020	"	"	"	"	"	U

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**FL-B06@4'**

**2/2/2024 11:30:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-01 (Soil)**

**PAH by EPA 8270E**

Fluoranthene	ND		0.020	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
Fluorene	ND		0.020	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND		0.020	"	"	"	"	"	U
Naphthalene	ND		0.002	"	"	"	"	"	U
Phenanthrene	ND		0.020	"	"	"	"	"	U
Pyrene	ND		0.020	"	"	"	"	"	U

Surrogate: Fluorene-d10	104 %		60-130			"	"	"	
Surrogate: Anthracene-d10	95.4 %		60-130			"	"	"	
Surrogate: Pyrene-d10	109 %		60-130			"	"	"	
Surrogate: Benzo (a) pyrene-d12	105 %		60-130			"	"	"	

**pH in Soil by 9045D**

pH	8.32			pH Units	1	B4B0308	02/03/2024	02/05/2024	
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**SAR by 20B Saturated Paste**

SAR	2.08		0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.482		0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024	
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**FL-B06@4'**  
**2/2/2024 11:30:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-01 (Soil)**

**Table 915 metals by EPA 6020B**

Arsenic	2.51		0.0889	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	188		8.89	"	"	"	"	"	
Cadmium	0.115		0.0889	"	"	"	"	"	
Copper	ND		8.89	"	"	"	"	"	
Lead	6.52		0.889	"	"	"	"	"	
Nickel	4.33		0.889	"	"	"	"	"	
Selenium	ND		0.0889	"	"	"	"	02/07/2024	
Silver	ND		0.0889	"	"	"	"	02/07/2024	
Zinc	22.7		8.89	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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**FL-B09@4'**  
**2/2/2024 11:32:00AM**

**Origins Laboratory, Inc.**  
**Y402081-02 (Soil)**

**Boron (DTPA Sorbitol)**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Boron	ND		0.0998	mg/L	1	B4B0506	02/05/2024	02/06/2024	

**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND		25.0	mg/kg	1	B4B0225	02/02/2024	02/02/2024	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl	81.7%		50-150	"	"	"	"	"	"
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**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B4B0230	"	02/02/2024	U
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	U
Benzene	ND		0.00200	"	"	"	"	"	U
Ethylbenzene	ND		0.00200	"	"	"	"	"	U
Toluene	ND		0.00200	"	"	"	"	"	U
Xylenes, total	ND		0.00200	"	"	"	"	"	U
Gasoline Range Hydrocarbons	ND		0.200	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	101%		70-130	"	"	"	"	"	"
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Andy Sagen  
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 Project: KMG - Ludwig 17-1

FL-B09@4'  
 2/2/2024 11:32:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
 Y402081-02 (Soil)

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	103 %		70-130			B4B02 30	02/02/2024	02/02/2024	
Surrogate: 4-Bromofluorobenzene	101 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	ND		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	3.29		0.435	"	"	"	"	"	

**PAH by EPA 8270E**

1-Methylnaphthalene	ND		0.002	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
2-Methylnaphthalene	ND		0.002	"	"	"	"	"	U
Acenaphthene	ND		0.020	"	"	"	"	"	U
Anthracene	ND		0.020	"	"	"	"	"	U
Benzo (a) anthracene	ND		0.005	"	"	"	"	"	U
Benzo (a) pyrene	ND		0.020	"	"	"	"	"	U
Benzo (b) fluoranthene	ND		0.020	"	"	"	"	"	U
Benzo (g,h,i) perylene	ND		0.020	"	"	"	"	"	U
Benzo (k) fluoranthene	ND		0.020	"	"	"	"	"	U
Chrysene	ND		0.020	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND		0.020	"	"	"	"	"	U

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 Project: KMG - Ludwig 17-1

**FL-B09@4'**

**2/2/2024 11:32:00AM**

**Origins Laboratory, Inc.**  
**Y402081-02 (Soil)**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
<b>PAH by EPA 8270E</b>									
Fluoranthene	ND		0.020	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
Fluorene	ND		0.020	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND		0.020	"	"	"	"	"	U
Naphthalene	ND		0.002	"	"	"	"	"	U
Phenanthrene	ND		0.020	"	"	"	"	"	U
Pyrene	ND		0.020	"	"	"	"	"	U

Surrogate: Fluorene-d10	93.9 %	60-130	"	"	"
Surrogate: Anthracene-d10	97.3 %	60-130	"	"	"
Surrogate: Pyrene-d10	98.4 %	60-130	"	"	"
Surrogate: Benzo (a) pyrene-d12	105 %	60-130	"	"	"

**pH in Soil by 9045D**


pH	8.34	pH Units	1	B4B0308	02/03/2024	02/05/2024
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**SAR by 20B Saturated Paste**

SAR	9.40	0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.321	0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024
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 Broomfield CO 80020

Andy Sagen  
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 Project: KMG - Ludwig 17-1

**FL-B09@4'**  
**2/2/2024 11:32:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-02 (Soil)**

**Table 915 metals by EPA 6020B**

Arsenic	1.82		0.0937	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	41.9		9.37	"	"	"	"	"	
Cadmium	ND		0.0937	"	"	"	"	"	
Copper	ND		9.37	"	"	"	"	"	
Lead	3.93		0.937	"	"	"	"	"	
Nickel	2.93		0.937	"	"	"	"	"	
Selenium	ND		0.0937	"	"	"	"	"	
Silver	ND		0.0937	"	"	"	"	"	
Zinc	15.6		9.37	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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 6855 West 119th Avenue  
 Broomfield CO 80020

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

FL-B11@4'  
 2/2/2024 11:36:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-03 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	0.105		0.0997	mg/L	1	B4B0506	02/05/2024	02/06/2024	
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**DRO/ORO by EPA 8015D**


Diesel (C10-C28)	ND		25.0	mg/kg	1	B4B0225	02/02/2024	02/03/2024	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl	73.8%		50-150	"	"	"	"	"	
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**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B4B0230	"	02/02/2024	U
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	U
Benzene	ND		0.00200	"	"	"	"	"	U
Ethylbenzene	ND		0.00200	"	"	"	"	"	U
Toluene	ND		0.00200	"	"	"	"	"	U
Xylenes, total	ND		0.00200	"	"	"	"	"	U
Gasoline Range Hydrocarbons	ND		0.200	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	103%		70-130	"	"	"	"	"	
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 6855 West 119th Avenue  
 Broomfield CO 80020

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

FL-B11@4'  
 2/2/2024 11:36:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
 Y402081-03 (Soil)

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	103 %		70-130			B4B02 30	02/02/2024	02/02/2024	
Surrogate: 4-Bromofluorobenzene	101 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	ND		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	2.16		0.435	"	"	"	"	"	

**PAH by EPA 8270E**

1-Methylnaphthalene	ND		0.002	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
2-Methylnaphthalene	ND		0.002	"	"	"	"	"	U
Acenaphthene	ND		0.020	"	"	"	"	"	U
Anthracene	ND		0.020	"	"	"	"	"	U
Benzo (a) anthracene	ND		0.005	"	"	"	"	"	U
Benzo (a) pyrene	ND		0.020	"	"	"	"	"	U
Benzo (b) fluoranthene	ND		0.020	"	"	"	"	"	U
Benzo (g,h,i) perylene	ND		0.020	"	"	"	"	"	U
Benzo (k) fluoranthene	ND		0.020	"	"	"	"	"	U
Chrysene	ND		0.020	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND		0.020	"	"	"	"	"	U

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Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

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

**FL-B11@4'**  
**2/2/2024 11:36:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-03 (Soil)**

**PAH by EPA 8270E**

Fluoranthene	ND		0.020	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
Fluorene	ND		0.020	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND		0.020	"	"	"	"	"	U
Naphthalene	ND		0.002	"	"	"	"	"	U
Phenanthrene	ND		0.020	"	"	"	"	"	U
Pyrene	ND		0.020	"	"	"	"	"	U

Surrogate: Fluorene-d10	92.9 %		60-130			"	"	"	
Surrogate: Anthracene-d10	96.9 %		60-130			"	"	"	
Surrogate: Pyrene-d10	111 %		60-130			"	"	"	
Surrogate: Benzo (a) pyrene-d12	101 %		60-130			"	"	"	

**pH in Soil by 9045D**

pH	7.97			pH Units	1	B4B0308	02/03/2024	02/05/2024	
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**SAR by 20B Saturated Paste**

SAR	5.81		0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.304		0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024	
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 Broomfield CO 80020

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

FL-B11@4'  
 2/2/2024 11:36:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
 Y402081-03 (Soil)

**Table 915 metals by EPA 6020B**

Arsenic	2.05		0.0942	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	39.9		9.42	"	"	"	"	"	
Cadmium	ND		0.0942	"	"	"	"	"	
Copper	ND		9.42	"	"	"	"	"	
Lead	4.57		0.942	"	"	"	"	"	
Nickel	3.14		0.942	"	"	"	"	"	
Selenium	ND		0.0942	"	"	"	"	"	
Silver	ND		0.0942	"	"	"	"	"	
Zinc	16.4		9.42	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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 Project: KMG - Ludwig 17-1

**FL-B12@4'**  
**2/2/2024 11:38:00AM**

**Origins Laboratory, Inc.**  
**Y402081-04 (Soil)**

**Boron (DTPA Sorbitol)**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Boron	ND		0.101	mg/L	1	B4B0507	02/05/2024	02/06/2024	

**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND		25.0	mg/kg	1	B4B0225	02/02/2024	02/03/2024	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl	76.9 %		50-150	"	"	"	"	"	"
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**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B4B0230	"	02/02/2024	U
1,3,5-Trimethylbenzene	ND		0.00200	"	"	"	"	"	U
Benzene	ND		0.00200	"	"	"	"	"	U
Ethylbenzene	ND		0.00200	"	"	"	"	"	U
Toluene	ND		0.00200	"	"	"	"	"	U
Xylenes, total	ND		0.00200	"	"	"	"	"	U
Gasoline Range Hydrocarbons	ND		0.200	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4	102 %		70-130	"	"	"	"	"	"
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 6855 West 119th Avenue  
 Broomfield CO 80020

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

**FL-B12@4'**  
**2/2/2024 11:38:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-04 (Soil)**

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	103 %		70-130			B4B02 30	02/02/2024	02/02/2024	
Surrogate: 4-Bromofluorobenzene	103 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	1.57		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	1.76		0.435	"	"	"	"	"	

**PAH by EPA 8270E**

1-Methylnaphthalene	ND		0.002	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
2-Methylnaphthalene	ND		0.002	"	"	"	"	"	U
Acenaphthene	ND		0.020	"	"	"	"	"	U
Anthracene	ND		0.020	"	"	"	"	"	U
Benzo (a) anthracene	ND		0.005	"	"	"	"	"	U
Benzo (a) pyrene	ND		0.020	"	"	"	"	"	U
Benzo (b) fluoranthene	ND		0.020	"	"	"	"	"	U
Benzo (g,h,i) perylene	ND		0.020	"	"	"	"	"	U
Benzo (k) fluoranthene	ND		0.020	"	"	"	"	"	U
Chrysene	ND		0.020	"	"	"	"	"	U
Dibenz (a,h) anthracene	ND		0.020	"	"	"	"	"	U

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 Project: KMG - Ludwig 17-1

**FL-B12@4'**  
**2/2/2024 11:38:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-04 (Soil)**

**PAH by EPA 8270E**

Fluoranthene	ND		0.020	mg/kg	1	B4B0233	02/02/2024	02/02/2024	U
Fluorene	ND		0.020	"	"	"	"	"	U
Indeno (1,2,3-cd) pyrene	ND		0.020	"	"	"	"	"	U
Naphthalene	ND		0.002	"	"	"	"	"	U
Phenanthrene	ND		0.020	"	"	"	"	"	U
Pyrene	ND		0.020	"	"	"	"	"	U

Surrogate: Fluorene-d10	95.1 %		60-130			"	"	"	
Surrogate: Anthracene-d10	102 %		60-130			"	"	"	
Surrogate: Pyrene-d10	103 %		60-130			"	"	"	
Surrogate: Benzo (a) pyrene-d12	95.1 %		60-130			"	"	"	

**pH in Soil by 9045D**

pH	8.19			pH Units	1	B4B0308	02/03/2024	02/05/2024	
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**SAR by 20B Saturated Paste**

SAR	1.73		0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.448		0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024	
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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig 17-1

**FL-B12@4'**  
**2/2/2024 11:38:00AM**


**Origins Laboratory, Inc.**  
**Y402081-04 (Soil)**

**Table 915 metals by EPA 6020B**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Arsenic	2.26		0.0910	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	49.3		9.10	"	"	"	"	"	
Cadmium	ND		0.0910	"	"	"	"	"	
Copper	ND		9.10	"	"	"	"	"	
Lead	5.37		0.910	"	"	"	"	"	
Nickel	3.60		0.910	"	"	"	"	"	
Selenium	ND		0.0910	"	"	"	"	"	
Silver	ND		0.0910	"	"	"	"	"	
Zinc	18.1		9.10	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig 17-1

**FL-BG01@4'**  
**2/2/2024 1:00:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-05 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND		0.0992	mg/L	1	B4B0507	02/05/2024	02/06/2024	
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**Metals by Saturated Paste by EPA 6010**

Calcium	0.984		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	1.36		0.435	"	"	"	"	"	

**pH in Soil by 9045D**

pH	8.08			pH Units	1	B4B0308	02/03/2024	02/05/2024	
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**SAR by 20B Saturated Paste**

SAR	1.69		0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.299		0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024	
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**Table 915 metals by EPA 6020B**

Arsenic	1.59		0.0868	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	34.8		8.68	"	"	"	"	"	
Cadmium	0.0868		0.0868	"	"	"	"	"	
Copper	ND		8.68	"	"	"	"	"	

Origins Laboratory, Inc.



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 Broomfield CO 80020

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

**FL-BG01@4'**  
**2/2/2024 1:00:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-05 (Soil)**

**Table 915 metals by EPA 6020B**

Lead	3.55		0.868	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Nickel	2.55		0.868	"	"	"	"	"	"
Selenium	ND		0.0868	"	"	"	"	"	"
Silver	ND		0.0868	"	"	"	"	"	"
Zinc	14.2		8.68	"	"	"	"	"	"

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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 Broomfield CO 80020

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

**FL-BG02@4'**  
**2/2/2024 1:02:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-06 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	0.142		0.100	mg/L	1	B4B0507	02/05/2024	02/06/2024	
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**Metals by Saturated Paste by EPA 6010**

Calcium	1.81		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	5.32		0.435	"	"	"	"	"	

**pH in Soil by 9045D**

pH	8.14			pH Units	1	B4B0308	02/03/2024	02/05/2024	
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**SAR by 20B Saturated Paste**

SAR	4.90		0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.876		0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024	
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**Table 915 metals by EPA 6020B**

Arsenic	1.85		0.0919	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	72.1		9.19	"	"	"	"	"	
Cadmium	ND		0.0919	"	"	"	"	"	
Copper	ND		9.19	"	"	"	"	"	

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

**FL-BG02@4'**  
**2/2/2024 1:02:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-06 (Soil)**

**Table 915 metals by EPA 6020B**

Lead	4.40		0.919	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Nickel	3.34		0.919	"	"	"	"	"	
Selenium	ND		0.0919	"	"	"	"	"	
Silver	ND		0.0919	"	"	"	"	"	
Zinc	17.6		9.19	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig 17-1

**FL-BG03@4'**  
**2/2/2024 1:04:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-07 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND		0.100	mg/L	1	B4B0507	02/05/2024	02/06/2024	
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**Metals by Saturated Paste by EPA 6010**

Calcium	0.806		0.499	meq/L	10	[CALC]	02/03/2024	02/05/2024	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	2.07		0.435	"	"	"	"	"	

**pH in Soil by 9045D**

pH	7.94			pH Units	1	B4B0308	02/03/2024	02/05/2024	
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**SAR by 20B Saturated Paste**

SAR	2.87		0.0100	SAR	1	B4B0304	02/03/2024	02/05/2024	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.366		0.00500	mmhos/cm	1	B4B0308	02/03/2024	02/05/2024	
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**Table 915 metals by EPA 6020B**

Arsenic	1.66		0.0982	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Barium	39.4		9.82	"	"	"	"	"	
Cadmium	ND		0.0982	"	"	"	"	"	

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 Broomfield CO 80020

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

**FL-BG03@4'**  
**2/2/2024 1:04:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**Y402081-07 (Soil)**

**Table 915 metals by EPA 6020B**

Copper	ND		9.82	mg/kg	10	B4B0228	02/02/2024	02/07/2024	
Lead	<b>3.65</b>		0.982	"	"	"	"	"	
Nickel	<b>2.78</b>		0.982	"	"	"	"	"	
Selenium	ND		0.0982	"	"	"	"	"	
Silver	ND		0.0982	"	"	"	"	"	
Zinc	<b>16.1</b>		9.82	"	"	"	"	"	

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L732409	02/02/2024	02/12/2024	
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 Project Number: [none]  
 Project: KMG - Ludwig 17-1

**Extractable Petroleum Hydrocarbons by 8015D - 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 B4B0225 - EPA 3550B**

Prepared: 02/02/2024 Analyzed: 02/02/2024

**Blank (B4B0225-BLK1)**

Diesel (C10-C28)	ND	25.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	100	"							U
Surrogate: o-Terphenyl	20		"	24.9		78.8	50-150			

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

**Extractable Petroleum Hydrocarbons by 8015D - 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 B4B0225 - EPA 3550B**

**LCS (B4B0225-BS1)**

Prepared: 02/02/2024 Analyzed: 02/02/2024

Diesel (C10-C28)	763	50.0	mg/kg	1000		76.3	70-130			
Residual Range Organics (C28-C40)	865	200	"	1000		86.5	70-130			
Surrogate: o-Terphenyl	48		"	49.8		95.8	50-150			

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

**Extractable Petroleum Hydrocarbons by 8015D - 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 B4B0225 - EPA 3550B

Matrix Spike (B4B0225-MS1)

Source: Y402076-01

Prepared: 02/02/2024 Analyzed: 02/02/2024

Diesel (C10-C28)	754	50.0	mg/kg	1000	ND	75.4	70-130			
Residual Range Organics (C28-C40)	812	200	"	1000	ND	81.2	70-130			
Surrogate: o-Terphenyl	38		"	49.8		77.3	50-150			

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

**Extractable Petroleum Hydrocarbons by 8015D - 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 B4B0225 - EPA 3550B**

**Matrix Spike Dup (B4B0225-MSD1)**

**Source: Y402076-01**

Prepared: 02/02/2024 Analyzed: 02/02/2024

Diesel (C10-C28)	766	50.0	mg/kg	1000	ND	76.6	70-130	1.54	35	
Residual Range Organics (C28-C40)	837	200	"	1000	ND	83.7	70-130	3.04	35	
Surrogate: o-Terphenyl	39		"	49.8		78.5	50-150			

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 Project: KMG - Ludwig 17-1

**Extractable Petroleum Hydrocarbons by 8015D - 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 B4B0230 - EPA 5030 (soil)

Blank (B4B0230-BLK1)

Prepared: 02/02/2024 Analyzed: 02/02/2024

1,2,4-Trimethylbenzene	ND	0.00200	mg/kg							U
1,3,5-Trimethylbenzene	ND	0.00200	"							U
Benzene	ND	0.00200	"							U
Ethylbenzene	ND	0.00200	"							U
Naphthalene	ND	0.00380	"							U
Toluene	ND	0.00200	"							U
Xylenes, total	ND	0.00200	"							U
Gasoline Range Hydrocarbons	ND	0.200	"							U
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		96.0	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		104	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		103	70-130			

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

**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 B4B0230 - EPA 5030 (soil)

LCS (B4B0230-BS1)

Prepared: 02/02/2024 Analyzed: 02/02/2024

1,2,4-Trimethylbenzene	0.108	0.00200	mg/kg	0.100		108	70-130			
1,3,5-Trimethylbenzene	0.111	0.00200	"	0.100		111	70-130			
Benzene	0.101	0.00200	"	0.100		101	70-130			
Ethylbenzene	0.106	0.00200	"	0.100		106	70-130			
Naphthalene	0.113	0.00380	"	0.100		113	70-130			
Toluene	0.106	0.00200	"	0.100		106	70-130			
o-Xylene	0.0924	0.00200	"	0.100		92.4	70-130			
m,p-Xylene	0.209	0.00400	"	0.200		104	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		98.3	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		104	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		93.9	70-130			

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

**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 B4B0230 - EPA 5030 (soil)

Matrix Spike (B4B0230-MS1)

Source: Y402076-01

Prepared: 02/02/2024 Analyzed: 02/02/2024

1,2,4-Trimethylbenzene	0.0997	0.00200	mg/kg	0.100	ND	99.7	70-130			
1,3,5-Trimethylbenzene	0.102	0.00200	"	0.100	ND	102	70-130			
Benzene	0.0940	0.00200	"	0.100	ND	94.0	70-130			
Ethylbenzene	0.101	0.00200	"	0.100	ND	101	70-130			
Naphthalene	0.0979	0.00380	"	0.100	ND	97.9	70-130			
Toluene	0.0984	0.00200	"	0.100	ND	98.4	70-130			
o-Xylene	0.0872	0.00200	"	0.100	ND	87.2	70-130			
m,p-Xylene	0.198	0.00400	"	0.200	ND	99.1	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		95.4	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		104	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		95.1	70-130			

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

**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 B4B0230 - EPA 5030 (soil)

Matrix Spike Dup (B4B0230-MSD1)

Source: Y402076-01

Prepared: 02/02/2024 Analyzed: 02/02/2024

1,2,4-Trimethylbenzene	0.0957	0.00200	mg/kg	0.100	ND	95.7	70-130	4.11	20	
1,3,5-Trimethylbenzene	0.0990	0.00200	"	0.100	ND	99.0	70-130	3.46	20	
Benzene	0.0933	0.00200	"	0.100	ND	93.3	70-130	0.683	20	
Ethylbenzene	0.0980	0.00200	"	0.100	ND	98.0	70-130	2.91	20	
Naphthalene	0.0964	0.00380	"	0.100	ND	96.4	70-130	1.52	20	
Toluene	0.0955	0.00200	"	0.100	ND	95.5	70-130	2.93	20	
o-Xylene	0.0855	0.00200	"	0.100	ND	85.5	70-130	1.95	20	
m,p-Xylene	0.193	0.00400	"	0.200	ND	96.6	70-130	2.62	20	
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		96.3	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		102	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		95.5	70-130			

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

**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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**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 B4B0228 - EPA 3050B**

**Blank (B4B0228-BLK1)**

Prepared: 02/02/2024 Analyzed: 02/09/2024

Arsenic	ND	0.0100	mg/kg							
Barium	ND	1.00	"							
Cadmium	ND	0.0100	"							
Copper	ND	1.00	"							
Lead	ND	0.100	"							
Nickel	ND	0.100	"							
Selenium	ND	0.0100	"							
Silver	ND	0.0100	"							
Zinc	ND	1.00	"							

**LCS (B4B0228-BS1)**

Prepared: 02/02/2024 Analyzed: 02/07/2024

Arsenic	4.46	0.0100	mg/kg	5.00		89.2	80-120			
Barium	519	1.00	"	500		104	80-120			
Cadmium	4.82	0.0100	"	5.00		96.3	80-120			
Copper	48.3	1.00	"	50.0		96.6	80-120			
Lead	4.83	0.100	"	5.00		96.6	80-120			
Nickel	5.04	0.100	"	5.00		101	80-120			
Selenium	4.42	0.0100	"	5.00		88.3	80-120			
Silver	5.09	0.0100	"	5.00		102	80-120			
Zinc	43.6	1.00	"	50.0		87.3	80-120			

**Matrix Spike (B4B0228-MS1)**

Source: Y402077-09

Prepared: 02/02/2024 Analyzed: 02/07/2024

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 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 B4B0228 - EPA 3050B**

**Matrix Spike (B4B0228-MS1)**

**Source: Y402077-09**

Prepared: 02/02/2024 Analyzed: 02/07/2024

Arsenic	5.57	0.0845	mg/kg	4.22	1.71	91.4	75-125			
Barium	444	8.45	"	422	59.3	91.1	75-125			
Cadmium	4.00	0.0845	"	4.22	0.0604	93.3	75-125			
Copper	47.2	8.45	"	42.2	3.54	103	75-125			
Lead	8.79	0.845	"	4.22	4.90	92.1	75-125			
Nickel	10.4	0.845	"	4.22	6.43	92.8	75-125			
Selenium	3.73	0.0845	"	4.22	0.0403	87.2	75-125			
Silver	3.88	0.0845	"	4.22	0.0123	91.5	75-125			
Zinc	54.4	8.45	"	42.2	16.4	89.8	75-125			

**Matrix Spike Dup (B4B0228-MSD1)**

**Source: Y402077-09**

Prepared: 02/02/2024 Analyzed: 02/07/2024

Arsenic	6.19	0.0905	mg/kg	4.52	1.71	98.9	75-125	10.4	20	
Barium	504	9.05	"	452	59.3	98.3	75-125	12.7	20	
Cadmium	4.69	0.0905	"	4.52	0.0604	102	75-125	15.9	20	
Copper	46.1	9.05	"	45.2	3.54	94.2	75-125	2.25	20	
Lead	8.64	0.905	"	4.52	4.90	82.7	75-125	1.70	20	
Nickel	12.3	0.905	"	4.52	6.43	129	75-125	16.8	20	QM-07
Selenium	4.22	0.0905	"	4.52	0.0403	92.3	75-125	12.3	20	
Silver	4.45	0.0905	"	4.52	0.0123	98.1	75-125	13.8	20	
Zinc	59.7	9.05	"	45.2	16.4	95.7	75-125	9.37	20	

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

**EPA 8270E (SW846) - Semivolatile Organic Compounds - 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 B4B0233 - EPA 3580**

**Blank (B4B0233-BLK1)**

Prepared: 02/02/2024 Analyzed: 02/02/2024

1-Methylnaphthalene	ND	0.002	mg/kg							U
2-Methylnaphthalene	ND	0.002	"							U
Acenaphthene	ND	0.020	"							U
Anthracene	ND	0.020	"							U
Benzo (a) anthracene	ND	0.005	"							U
Benzo (a) pyrene	ND	0.020	"							U
Benzo (b) fluoranthene	ND	0.020	"							U
Benzo (g,h,i) perylene	ND	0.020	"							U
Benzo (k) fluoranthene	ND	0.020	"							U
Chrysene	ND	0.020	"							U
Dibenz (a,h) anthracene	ND	0.020	"							U
Fluoranthene	ND	0.020	"							U
Fluorene	ND	0.020	"							U
Indeno (1,2,3-cd) pyrene	ND	0.020	"							U
Naphthalene	ND	0.002	"							U
Phenanthrene	ND	0.020	"							U
Pyrene	ND	0.020	"							U
Surrogate: Fluorene-d10	200		ug/kg	200		98.5	60-130			
Surrogate: Anthracene-d10	200		"	200		101	60-130			
Surrogate: Pyrene-d10	190		"	200		95.0	60-130			
Surrogate: Benzo (a) pyrene-d12	210		"	200		105	60-130			

**LCS (B4B0233-BS1)**

Prepared: 02/02/2024 Analyzed: 02/02/2024

1-Methylnaphthalene	0.192	0.002	mg/kg	0.200		96.0	70-130			
2-Methylnaphthalene	0.198	0.002	"	0.200		99.0	70-130			
Acenaphthene	0.172	0.020	"	0.200		85.8	70-130			
Anthracene	0.186	0.020	"	0.200		92.8	70-130			

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

**EPA 8270E (SW846) - Semivolatile Organic Compounds - 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 B4B0233 - EPA 3580**

**LCS (B4B0233-BS1)**

Prepared: 02/02/2024 Analyzed: 02/02/2024

Benzo (a) anthracene	0.160	0.005	mg/kg	0.200		80.2	70-130			
Benzo (a) pyrene	0.166	0.020	"	0.200		83.1	70-130			
Benzo (b) fluoranthene	0.167	0.020	"	0.200		83.7	70-130			
Benzo (g,h,i) perylene	0.163	0.020	"	0.200		81.4	70-130			
Benzo (k) fluoranthene	0.164	0.020	"	0.200		82.1	70-130			
Chrysene	0.162	0.020	"	0.200		81.1	70-130			
Dibenz (a,h) anthracene	0.184	0.020	"	0.200		91.9	70-130			
Fluoranthene	0.166	0.020	"	0.200		82.8	70-130			
Fluorene	0.162	0.020	"	0.200		80.9	70-130			
Indeno (1,2,3-cd) pyrene	0.174	0.020	"	0.200		87.1	70-130			
Naphthalene	0.177	0.002	"	0.200		88.5	70-130			
Phenanthrene	0.172	0.020	"	0.200		86.0	70-130			
Pyrene	0.164	0.020	"	0.200		82.1	70-130			
Surrogate: Fluorene-d10	200		ug/kg	200		101	60-130			
Surrogate: Anthracene-d10	200		"	200		100	60-130			
Surrogate: Pyrene-d10	190		"	200		96.6	60-130			
Surrogate: Benzo (a) pyrene-d12	220		"	200		109	60-130			

**Matrix Spike (B4B0233-MS1)**

**Source: Y402077-01**

Prepared: 02/02/2024 Analyzed: 02/05/2024

1-Methylnaphthalene	0.173	0.002	mg/kg	0.200	0.010	81.6	70-130			
2-Methylnaphthalene	0.173	0.002	"	0.200	0.009	82.0	70-130			
Acenaphthene	0.164	0.020	"	0.200	0.002	81.0	70-130			
Anthracene	0.172	0.020	"	0.200	ND	86.0	70-130			
Benzo (a) anthracene	0.168	0.005	"	0.200	0.0005	83.9	70-130			
Benzo (a) pyrene	0.165	0.020	"	0.200	0.003	81.2	70-130			
Benzo (b) fluoranthene	0.167	0.020	"	0.200	0.0003	83.2	70-130			
Benzo (g,h,i) perylene	0.181	0.020	"	0.200	0.0005	90.0	70-130			

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 Broomfield CO 80020

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

**EPA 8270E (SW846) - Semivolatile Organic Compounds - 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 B4B0233 - EPA 3580**

**Matrix Spike (B4B0233-MS1)**

**Source: Y402077-01**

Prepared: 02/02/2024 Analyzed: 02/05/2024

Benzo (k) fluoranthene	0.176	0.020	mg/kg	0.200	ND	88.2	70-130			
Chrysene	0.172	0.020	"	0.200	ND	86.0	70-130			
Dibenz (a,h) anthracene	0.189	0.020	"	0.200	ND	94.6	70-130			
Fluoranthene	0.176	0.020	"	0.200	ND	88.1	70-130			
Fluorene	0.164	0.020	"	0.200	0.003	80.5	70-130			
Indeno (1,2,3-cd) pyrene	0.179	0.020	"	0.200	ND	89.6	70-130			
Naphthalene	0.168	0.002	"	0.200	0.002	83.1	70-130			
Phenanthrene	0.167	0.020	"	0.200	0.002	82.2	70-130			
Pyrene	0.175	0.020	"	0.200	ND	87.6	70-130			
Surrogate: Fluorene-d10	200		ug/kg	200		97.8	60-130			
Surrogate: Anthracene-d10	200		"	200		101	60-130			
Surrogate: Pyrene-d10	210		"	200		103	60-130			
Surrogate: Benzo (a) pyrene-d12	200		"	200		101	60-130			

**Matrix Spike Dup (B4B0233-MSD1)**

**Source: Y402077-01**

Prepared: 02/02/2024 Analyzed: 02/05/2024

1-Methylnaphthalene	0.168	0.002	mg/kg	0.200	0.010	78.9	70-130	3.22	20	
2-Methylnaphthalene	0.170	0.002	"	0.200	0.009	80.3	70-130	1.97	20	
Acenaphthene	0.164	0.020	"	0.200	0.002	80.8	70-130	0.334	20	
Anthracene	0.171	0.020	"	0.200	ND	85.5	70-130	0.557	20	
Benzo (a) anthracene	0.157	0.005	"	0.200	0.0005	78.3	70-130	6.90	20	
Benzo (a) pyrene	0.171	0.020	"	0.200	0.003	84.4	70-130	3.84	20	
Benzo (b) fluoranthene	0.170	0.020	"	0.200	0.0003	84.6	70-130	1.74	20	
Benzo (g,h,i) perylene	0.183	0.020	"	0.200	0.0005	91.5	70-130	1.59	20	
Benzo (k) fluoranthene	0.156	0.020	"	0.200	ND	78.1	70-130	12.1	20	
Chrysene	0.174	0.020	"	0.200	ND	86.9	70-130	1.02	20	
Dibenz (a,h) anthracene	0.187	0.020	"	0.200	ND	93.3	70-130	1.38	20	
Fluoranthene	0.184	0.020	"	0.200	ND	91.9	70-130	4.13	20	

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Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

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

**EPA 8270E (SW846) - Semivolatile Organic Compounds - 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 B4B0233 - EPA 3580

Matrix Spike Dup (B4B0233-MSD1)

Source: Y402077-01

Prepared: 02/02/2024 Analyzed: 02/05/2024

Fluorene	0.169	0.020	mg/kg	0.200	0.003	83.1	70-130	3.12	20	
Indeno (1,2,3-cd) pyrene	0.180	0.020	"	0.200	ND	90.1	70-130	0.590	20	
Naphthalene	0.168	0.002	"	0.200	0.002	83.0	70-130	0.150	20	
Phenanthrene	0.171	0.020	"	0.200	0.002	84.5	70-130	2.63	20	
Pyrene	0.176	0.020	"	0.200	ND	88.1	70-130	0.546	20	
Surrogate: Fluorene-d10	210		ug/kg	200		103	60-130			
Surrogate: Anthracene-d10	200		"	200		101	60-130			
Surrogate: Pyrene-d10	210		"	200		103	60-130			
Surrogate: Benzo (a) pyrene-d12	210		"	200		105	60-130			

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 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 B4B0304 - Saturated Paste Metals**

**Blank (B4B0304-BLK1)**

Prepared: 02/03/2024 Analyzed: 02/05/2024

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

**Duplicate (B4B0304-DUP1)**

Source: Y402048-21

Prepared: 02/03/2024 Analyzed: 02/05/2024

SAR	ND	0.0100	SAR	0.338				200		
Calcium PPM	60.3	10.0	mg/L	58.4				3.25	50	
Magnesium PPM	19.0	10.0	"	18.4				3.37	50	
Sodium PPM	10.1	10.0	"	11.6				13.4	50	

**Batch B4B0506 - DTPA Sorbitol Preparation**

**Blank (B4B0506-BLK1)**

Prepared: 02/05/2024 Analyzed: 02/06/2024

Boron	ND	0.100	mg/L							
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**Duplicate (B4B0506-DUP1)**

Source: Y402073-01

Prepared: 02/05/2024 Analyzed: 02/06/2024

Boron	1.33	0.0992	mg/L	1.36				2.39	50	
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**Batch B4B0507 - DTPA Sorbitol Preparation**

**Blank (B4B0507-BLK1)**

Prepared: 02/05/2024 Analyzed: 02/06/2024

Boron	ND	0.100	mg/L							
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**Duplicate (B4B0507-DUP1)**

Source: Y402081-04

Prepared: 02/05/2024 Analyzed: 02/06/2024

Boron	0.0694	0.0986	mg/L	0.0627				10.2	50	
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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig 17-1

**Saturated Paste - 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 B4B0308 - Saturated Paste pH/EC**

**Blank (B4B0308-BLK1)**

Prepared: 02/03/2024 Analyzed: 02/05/2024

Specific Conductance (EC) ND 0.00500 mmhos/cm

**Duplicate (B4B0308-DUP1)**

**Source: Y402048-21**

Prepared: 02/03/2024 Analyzed: 02/05/2024

pH	8.29		pH Units	8.11		2.20	25
Specific Conductance (EC)	0.444	0.00500	mmhos/cm	0.393		12.2	25

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

**Total Metals by 7196A - Quality Control**  
**Waypoint Analytical, LLC.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch L732409 -

**DUP (L 82323-DUP)**

Source: 82323

Prepared: Analyzed: 02/12/2024

Chromium, Hexavalent	ND	0.5	mg/Kg		<0.500	-	0	20	
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**MS (L 82323-MS)**

Source: 82323

Prepared: Analyzed: 02/12/2024

Chromium, Hexavalent	33.8	2.5	mg/Kg	39.1	< 0.244	86	75-125		
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**LCS (LCS)**

Prepared: Analyzed: 02/12/2024

Chromium, Hexavalent	6.15	0.5	mg/Kg	8		77	75-125		
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**LRB (LRB)**

Prepared: Analyzed: 02/12/2024

Chromium, Hexavalent	ND	0.5	mg/Kg			-			
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Tasman Geosciences  
6855 West 119th Avenue  
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Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig 17-1

## Notes and Definitions

U Sample is Non-Detect.

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

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported on a wet weight basis.

Calculated results may use J-flag data (instead of reported "ND") as part of calculation to provide a more accurate result.

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