



Tasman Geosciences

Andy Sagen

6855 West 119th Avenue

Broomfield CO 80020

January 27, 2025

Project Name - KMG - Ludwig H 6-31D

Project Number - [none]

Attached are your analytical results for KMG - Ludwig H 6-31D received by Origins Laboratory January 06, 2025. This project is associated with Origins project number E5A0056-01.

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  
303.433.1322  
projectmanager@originslab.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 H 6-31D

### CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FL-B01@4'	E5A0056-01	Soil	January 6, 2025 10:30	01/06/2025 14:32
FL-B02@4'	E5A0056-02	Soil	January 6, 2025 9:59	01/06/2025 14:32

Origins Laboratory

Jen Pellegrini, Project Manager

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# ORIGINS LABORATORY

Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

# ORIGINS

LABORATORY INC

Client: TASMAN/OXY

Address: 6855 W 119th Ave, Broomfield, CO 80020

Telephone Number: PM Contact # (720) 939-3631

Email Address: [OXY@tasman-distribution.com](mailto:OXY@tasman-distribution.com)

Project Manager: Andy Sagen

Project Name: Ludwig H 6-31D

Project Number:

Collected By: [Signature]

Invoice Billing Info:

S=Soil | SO=Solid | O=Oil | A=Air | G=Gas | U=UHP=ultrapure | HCl=Hydrochloric | HNO3=Nitric | H2SO4=Sulfuric | NaOH=Sodium Hydroxide

L=Liquid

W=Water

SW=Surface Water

GW=Groundwater

Key:

Page \_\_\_ of \_\_\_

#	Sample ID	Date Sampled	Time Sampled	# of Containers	Matrix	Preservative	Analysis						Comments	
							GBTEXN+ TMBS	DRO/ORO	PAH	pH/EC/SAR	Boron	915 Metals		
1	FL 801 @ 11/6	11/6	10:30	3	S									
2	FL 802 @ 11/6	11/6	9:59	3	S						X			
3														
4														
5														
6														
7														
8														
9														
10														

Reinforced By: [Signature]  
Date: 11/6/25  
Time: 14:32  
Received By: [Signature]  
Date: 11/6/25  
Time: 14:32

Temp Received - 5.6°C Received On Ice?  Yes  No

Turnaround Time:  SAME DAY  24 Hr  48 Hr  72 Hr

Standard

Origins Laboratory  
  
Jen Pellegrini, Project Manager

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6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

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

**Sample Receipt Checklist**

Origins Work Order: F.SAC056 Client: Tasman

Checklist Completed by: [Signature] Client Project ID: Ludwig

Date/time completed: 1/10/25 Shipped Via: HO

Matrix(s) Received: (Check all that apply):  Soil/Solid  Water  Other: \_\_\_\_\_  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Cooler Number/Temperature: 1150 °C  / \_\_\_\_\_ °C  / \_\_\_\_\_ °C  / \_\_\_\_\_ °C

Thermometer ID: 107 Airbill #: N/A

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> ?	<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 <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present <sup>(1)</sup> ?			<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded <sup>(1)</sup> ?	<input checked="" type="checkbox"/>			
For volatiles in water - is there headspace (> 1/4 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 <sup>(1)</sup> ? (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 HNO3, HCL, H2SO4) (pH > 10 for samples preserved with NaAsO2+NaOH, ZnAc+NaOH)			<input checked="" type="checkbox"/>	
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) [Signature]

Date/Time Reviewed 1/10/25

Origins Laboratory

[Signature]

Jen Pellegrini, Project Manager

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Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**FL-B01@4'**

**1/6/2025 10:30:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory  
E5A0056-01 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND	0.0984	mg/L	1	B5A0709	01/07/2025	01/08/2025	U
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**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND	25.0	mg/kg	1	B5A0621	01/06/2025	01/06/2025	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: <i>o</i> -Terphenyl	85.6 %	50-150	"	"	"	"	"	"
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**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND	0.00200	mg/kg	1	B5A0622	01/06/2025	01/06/2025	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	99.6 %	70-130	"	"	"	"	"	"
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Origins Laboratory



Jen Pellegrini, Project Manager

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Project Number: [none]  
Project: KMG - Ludwig H 6-31D

FL-B01@4'

1/6/2025 10:30:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory**  
E5A0056-01 (Soil)

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	102 %		70-130			B5A06 22	01/06/2025	01/06/2025	
Surrogate: 4-Bromofluorobenzene	97.7 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	ND		0.499	meq/L	10	[CALC]	01/07/2025	01/08/2025	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	ND		0.435	"	"	"	"	"	

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.00109	0.00201	mg/Kg	1	L794727	01/15/2025	01/16/2025	
2-Methylnaphthalene	ND	0.00194	0.00201	"	"	"	"	"	
Acenaphthene	ND	0.000304	0.00067	"	"	"	"	"	
Anthracene	ND	0.000334	0.00067	"	"	"	"	"	
Benzo(a)anthracene	ND	0.000493	0.00067	"	"	"	"	"	
Benzo(a)pyrene	ND	0.000468	0.00067	"	"	"	"	"	
Benzo(b)fluoranthene	ND	0.000585	0.00067	"	"	"	"	"	
Benzo(k)fluoranthene	ND	0.000437	0.00067	"	"	"	"	"	
Chrysene	ND	0.000624	0.00067	"	"	"	"	"	
Dibenz(a,h)anthracene	ND	0.000614	0.00067	"	"	"	"	"	
Fluoranthene	ND	0.000394	0.00067	"	"	"	"	"	

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Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**FL-B01@4'**  
**1/6/2025 10:30:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, LLC.**  
**E5A0056-01 (Soil)**

**PAH by 8270D SIM**

Fluorene	ND	0.000286	0.00067	mg/Kg	1	L794727	01/15/2025	01/16/2025	
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	"
Naphthalene	ND	0.00145	0.00201	"	"	"	"	"	"
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	37.7 %		33-115			"	"	"	"
Surrogate: 4-Terphenyl-d14	50.6 %		33-122			"	"	"	"
Surrogate: Nitrobenzene-d5	65.3 %		29-110			"	"	"	"

**pH in Soil by 9045D**

pH	<b>8.01</b>			pH Units	1	B5A0713	01/07/2025	01/08/2025	
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**SAR by 20B Saturated Paste**

SAR	<b>0.121</b>		0.0100	SAR	1	B5A0705	01/07/2025	01/08/2025	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	<b>0.0801</b>		0.00500	mmhos/cm	1	B5A0713	01/07/2025	01/08/2025	
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**Table 915 metals by EPA 6020B**

Arsenic	<b>1.15</b>		0.289	mg/kg	10	B5A0615	01/06/2025	01/07/2025	
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Project: KMG - Ludwig H 6-31D

FL-B01@4'

1/6/2025 10:30:00AM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory**  
E5A0056-01 (Soil)

**Table 915 metals by EPA 6020B**

Barium	46.7		9.97	mg/kg	10	B5A0615	01/06/2025	01/07/2025	
Cadmium	ND		0.0997	"	"	"	"	"	U
Copper	ND		9.97	"	"	"	"	"	U
Lead	3.09		0.997	"	"	"	"	"	
Nickel	3.43		0.997	"	"	"	"	"	
Selenium	ND		0.259	"	"	"	"	"	U
Silver	ND		0.0997	"	"	"	"	"	U
Zinc	ND		36.9	"	"	"	"	"	U

**Total Metals by 7196A**

Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L793673	01/06/2025	01/08/2025	
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6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**FL-B02@4'**

**1/6/2025 9:59:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory  
E5A0056-02 (Soil)**

**Boron (DTPA Sorbitol)**

Boron	ND	0.100	mg/L	1	B5A0709	01/07/2025	01/08/2025	U
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**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND	25.0	mg/kg	1	B5A0621	01/06/2025	01/06/2025	U
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: <i>o</i> -Terphenyl	91.3 %	50-150	"	"	"	"	"	"
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**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND	0.00200	mg/kg	1	B5A0622	01/06/2025	01/06/2025	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	100 %	70-130	"	"	"	"	"	"
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Project: KMG - Ludwig H 6-31D

**FL-B02@4'**

**1/6/2025 9:59:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory**  
**E5A0056-02 (Soil)**

**GBTEX+TMBs by 8260D**

Surrogate: Toluene-d8	101 %		70-130			B5A06 22	01/06/2025	01/06/2025	
Surrogate: 4-Bromofluorobenzene	96.3 %		70-130			"	"	"	

**Metals by Saturated Paste by EPA 6010**

Calcium	<b>0.529</b>		0.499	meq/L	10	[CALC]	01/07/2025	01/08/2025	
Magnesium	ND		0.823	"	"	"	"	"	
Sodium	ND		0.435	"	"	"	"	"	

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.00109	0.00201	mg/Kg	1	L794727	01/15/2025	01/16/2025	
2-Methylnaphthalene	ND	0.00194	0.00201	"	"	"	"	"	
Acenaphthene	ND	0.000304	0.00067	"	"	"	"	"	
Anthracene	ND	0.000334	0.00067	"	"	"	"	"	
Benzo(a)anthracene	ND	0.000493	0.00067	"	"	"	"	"	
Benzo(a)pyrene	ND	0.000468	0.00067	"	"	"	"	"	
Benzo(b)fluoranthene	ND	0.000585	0.00067	"	"	"	"	"	
Benzo(k)fluoranthene	ND	0.000437	0.00067	"	"	"	"	"	
Chrysene	ND	0.000624	0.00067	"	"	"	"	"	
Dibenz(a,h)anthracene	ND	0.000614	0.00067	"	"	"	"	"	
Fluoranthene	ND	0.000394	0.00067	"	"	"	"	"	

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Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**FL-B02@4'**

**1/6/2025 9:59:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Waypoint Analytical, LLC.  
E5A0056-02 (Soil)**

**PAH by 8270D SIM**

Fluorene	ND	0.000286	0.00067	mg/Kg	1	L794727	01/15/2025	01/16/2025	
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	"
Naphthalene	ND	0.00145	0.00201	"	"	"	"	"	"
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	39.6 %		33-115			"	"	"	"
Surrogate: 4-Terphenyl-d14	53.4 %		33-122			"	"	"	"
Surrogate: Nitrobenzene-d5	70.1 %		29-110			"	"	"	"

**pH in Soil by 9045D**

pH	7.43			pH Units	1	B5A0713	01/07/2025	01/08/2025	
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**SAR by 20B Saturated Paste**

SAR	0.128		0.0100	SAR	1	B5A0705	01/07/2025	01/08/2025	
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**Specific Conductance Mod. 9050A**

Specific Conductance (EC)	0.108		0.00500	mmhos/cm	1	B5A0713	01/07/2025	01/08/2025	
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**Table 915 metals by EPA 6020B**

Arsenic	1.86		0.262	mg/kg	10	B5A0615	01/06/2025	01/07/2025	
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6855 West 119th Avenue  
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Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**FL-B02@4'**

**1/6/2025 9:59:00AM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory**  
**E5A0056-02 (Soil)**

**Table 915 metals by EPA 6020B**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Barium	63.5	9.05	9.05	mg/kg	10	B5A0615	01/06/2025	01/07/2025	
Cadmium	ND	0.0905	0.0905	"	"	"	"	"	U
Copper	ND	9.05	9.05	"	"	"	"	"	U
Lead	4.97	0.905	0.905	"	"	"	"	"	
Nickel	5.96	0.905	0.905	"	"	"	"	"	
Selenium	ND	0.235	0.235	"	"	"	"	"	U
Silver	ND	0.0905	0.0905	"	"	"	"	"	U
Zinc	ND	33.5	33.5	"	"	"	"	"	U

**Total Metals by 7196A**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Chromium, Hexavalent	ND	0.244	0.5	mg/Kg	1	L793673	01/06/2025	01/08/2025	

Origins Laboratory



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 Broomfield CO 80020

Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B5A0621 - EPA 3550B

Blank (B5A0621-BLK1)

Prepared: 01/06/2025 Analyzed: 01/06/2025

Diesel (C10-C28)	ND	25.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	100	"							U
Surrogate: o-Terphenyl	22		"	24.9		89.1	50-150			

Origins Laboratory

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 Project: KMG - Ludwig H 6-31D

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B5A0621 - EPA 3550B

LCS (B5A0621-BS1)

Prepared: 01/06/2025 Analyzed: 01/06/2025

Diesel (C10-C28)	1110	50.0	mg/kg	1000		111	70-130			
Residual Range Organics (C28-C40)	1150	200	"	1000		115	70-130			
Surrogate: o-Terphenyl	50		"	49.8		101	50-150			

Origins Laboratory

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 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B5A0621 - EPA 3550B

Matrix Spike (B5A0621-MS1)

Source: E5A0056-01

Prepared: 01/06/2025 Analyzed: 01/06/2025

Diesel (C10-C28)	997	50.0	mg/kg	1000	ND	99.7	70-130			
Residual Range Organics (C28-C40)	1030	200	"	1000	ND	103	70-130			
Surrogate: o-Terphenyl	42		"	49.8		85.4	50-150			

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B5A0621 - EPA 3550B

Matrix Spike Dup (B5A0621-MSD1)

Source: E5A0056-01

Prepared: 01/06/2025 Analyzed: 01/06/2025

Diesel (C10-C28)	975	50.0	mg/kg	1000	ND	97.5	70-130	2.16	35	
Residual Range Organics (C28-C40)	1010	200	"	1000	ND	101	70-130	2.28	35	
Surrogate: o-Terphenyl	41		"	49.8		82.8	50-150			

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Extractable Petroleum Hydrocarbons by 8015D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B5A0622 - EPA 5030 (soil)

Blank (B5A0622-BLK1)

Prepared: 01/06/2025 Analyzed: 01/06/2025

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	0.13		"	0.125		101	70-130			
Surrogate: Toluene-d8	0.13		"	0.125		100	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		97.6	70-130			

Origins Laboratory

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0622 - EPA 5030 (soil)**

**LCS (B5A0622-BS1)**

Prepared: 01/06/2025 Analyzed: 01/06/2025

1,2,4-Trimethylbenzene	0.0921	0.00200	mg/kg	0.100		92.1	70-130			
1,3,5-Trimethylbenzene	0.0931	0.00200	"	0.100		93.1	70-130			
Benzene	0.106	0.00200	"	0.100		106	70-130			
Ethylbenzene	0.0940	0.00200	"	0.100		94.0	70-130			
Naphthalene	0.0814	0.00380	"	0.100		81.4	70-130			
Toluene	0.0941	0.00200	"	0.100		94.1	70-130			
o-Xylene	0.0925	0.00200	"	0.100		92.5	70-130			
m,p-Xylene	0.188	0.00400	"	0.200		93.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		95.2	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		95.7	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		101	70-130			

Origins Laboratory

Jen Pellegrini, Project Manager

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0622 - EPA 5030 (soil)**

**Matrix Spike (B5A0622-MS1)**

**Source: E5A0056-01**

Prepared: 01/06/2025 Analyzed: 01/06/2025

1,2,4-Trimethylbenzene	0.0918	0.00200	mg/kg	0.100	ND	91.8	70-130			
1,3,5-Trimethylbenzene	0.0938	0.00200	"	0.100	ND	93.8	70-130			
Benzene	0.0959	0.00200	"	0.100	ND	95.9	70-130			
Ethylbenzene	0.0944	0.00200	"	0.100	ND	94.4	70-130			
Naphthalene	0.0851	0.00380	"	0.100	ND	85.1	70-130			
Toluene	0.0877	0.00200	"	0.100	ND	87.7	70-130			
o-Xylene	0.0933	0.00200	"	0.100	ND	93.3	70-130			
m,p-Xylene	0.184	0.00400	"	0.200	ND	92.1	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		95.6	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		97.8	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		104	70-130			

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0622 - EPA 5030 (soil)**

**Matrix Spike Dup (B5A0622-MSD1)**

**Source: E5A0056-01**

Prepared: 01/06/2025 Analyzed: 01/06/2025

1,2,4-Trimethylbenzene	0.0869	0.00200	mg/kg	0.100	ND	86.9	70-130	5.53	20	
1,3,5-Trimethylbenzene	0.0888	0.00200	"	0.100	ND	88.8	70-130	5.54	20	
Benzene	0.0926	0.00200	"	0.100	ND	92.6	70-130	3.50	20	
Ethylbenzene	0.0888	0.00200	"	0.100	ND	88.8	70-130	6.14	20	
Naphthalene	0.0840	0.00380	"	0.100	ND	84.0	70-130	1.21	20	
Toluene	0.0845	0.00200	"	0.100	ND	84.5	70-130	3.74	20	
o-Xylene	0.0880	0.00200	"	0.100	ND	88.0	70-130	5.80	20	
m,p-Xylene	0.176	0.00400	"	0.200	ND	88.2	70-130	4.35	20	
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		98.6	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		97.1	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		102	70-130			

Origins Laboratory

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Volatile Organic Compounds by GC/MS SW846 8260D - Quality Control**  
**Origins Laboratory**

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**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0615 - EPA 3050B**

**Blank (B5A0615-BLK1)**

Prepared: 01/06/2025 Analyzed: 01/07/2025

Arsenic	ND	0.290	mg/kg							U
Barium	ND	10.0	"							U
Cadmium	ND	0.100	"							U
Copper	ND	10.0	"							U
Lead	ND	1.00	"							U
Nickel	ND	1.00	"							U
Selenium	ND	0.260	"							U
Silver	ND	0.100	"							U
Zinc	ND	37.0	"							U

**LCS (B5A0615-BS1)**

Prepared: 01/06/2025 Analyzed: 01/07/2025

Arsenic	5.05	0.290	mg/kg	5.00		101	80-120			
Barium	544	10.0	"	500		109	80-120			
Cadmium	5.40	0.100	"	5.00		108	80-120			
Copper	52.9	10.0	"	50.0		106	80-120			
Lead	5.33	1.00	"	5.00		107	80-120			
Nickel	5.24	1.00	"	5.00		105	80-120			
Selenium	5.50	0.260	"	5.00		110	80-120			
Silver	5.24	0.100	"	5.00		105	80-120			
Zinc	49.9	37.0	"	50.0		99.7	80-120			

**Matrix Spike (B5A0615-MS1)**

Source: E5A0056-01

Prepared: 01/06/2025 Analyzed: 01/07/2025

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Jen Pellegrini, Project Manager

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 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Metals by EPA 6000/7000 Series Methods - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0615 - EPA 3050B**

**Matrix Spike (B5A0615-MS1)**

**Source: E5A0056-01**

Prepared: 01/06/2025 Analyzed: 01/07/2025

Arsenic	6.59	0.284	mg/kg	4.89	1.15	111	75-125			
Barium	632	9.78	"	489	46.7	120	75-125			
Cadmium	5.30	0.0978	"	4.89	0.0359	108	75-125			
Copper	61.5	9.78	"	48.9	3.12	119	75-125			
Lead	8.90	0.978	"	4.89	3.09	119	75-125			
Nickel	9.11	0.978	"	4.89	3.43	116	75-125			
Selenium	5.66	0.254	"	4.89	ND	116	75-125			
Silver	5.12	0.0978	"	4.89	ND	105	75-125			
Zinc	67.5	36.2	"	48.9	14.1	109	75-125			

**Matrix Spike Dup (B5A0615-MSD1)**

**Source: E5A0056-01**

Prepared: 01/06/2025 Analyzed: 01/07/2025

Arsenic	5.90	0.259	mg/kg	4.46	1.15	106	75-125	11.1	20	
Barium	505	8.93	"	446	46.7	103	75-125	22.4	20	QR-02
Cadmium	4.56	0.0893	"	4.46	0.0359	101	75-125	15.1	20	
Copper	53.3	8.93	"	44.6	3.12	112	75-125	14.4	20	
Lead	7.49	0.893	"	4.46	3.09	98.7	75-125	17.2	20	
Nickel	7.80	0.893	"	4.46	3.43	97.9	75-125	15.4	20	
Selenium	4.82	0.232	"	4.46	0.0389	107	75-125	16.1	20	
Silver	4.55	0.0893	"	4.46	ND	102	75-125	11.6	20	
Zinc	60.1	33.0	"	44.6	14.1	103	75-125	11.6	20	

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Jen Pellegrini, Project Manager

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Classical Chemistry Parameters - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0705 - Saturated Paste Metals**

**Blank (B5A0705-BLK1)**

Prepared: 01/07/2025 Analyzed: 01/08/2025

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

**Duplicate (B5A0705-DUP1)**

Source: E5A0056-01

Prepared: 01/07/2025 Analyzed: 01/08/2025

Calcium PPM	6.03	10.0	mg/L		6.46			6.89	50	U
SAR	ND	0.0100	SAR		0.121				200	U
Magnesium PPM	1.51	10.0	mg/L		1.68			10.7	50	U
Sodium PPM	1.35	10.0	"		1.33			1.49	50	U

**Batch B5A0709 - DTPA Sorbitol Preparation**

**Blank (B5A0709-BLK1)**

Prepared: 01/07/2025 Analyzed: 01/08/2025

Boron	ND	0.100	mg/L							U
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**Duplicate (B5A0709-DUP1)**

Source: E5A0056-01

Prepared: 01/07/2025 Analyzed: 01/08/2025

Boron	0.0506	0.0996	mg/L		0.0388			26.4	50	U
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Jen Pellegrini, Project Manager

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Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**Saturated Paste - Quality Control**  
**Origins Laboratory**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch B5A0713 - Saturated Paste pH/EC**

**Blank (B5A0713-BLK1)**

Prepared: 01/07/2025 Analyzed: 01/08/2025

Specific Conductance (EC)	ND	0.00500	mmhos/cm							U
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**Duplicate (B5A0713-DUP1)**

**Source: E5A0056-01**

Prepared: 01/07/2025 Analyzed: 01/08/2025

pH	7.83		pH Units		8.01			2.27	25	
Specific Conductance (EC)	0.0744	0.00500	mmhos/cm		0.0801			7.38	25	

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Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**PAH by 8270D SIM - 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 L794727 - 3550B

**MSD (L 85968-MSD-L794727)**

Source: E5A0056-01

Prepared: 01/15/2025 Analyzed: 01/16/2025

Dibenz(a,h)anthracene	0.135	0.00067	mg/Kg	0.164	<0.000614	82.3	30-130	1.4	30	
Pyrene	0.106	0.00067	"	0.164	<0.000643	64.6	30-130	0	30	
2-Methylnaphthalene	0.0766	0.00201	"	0.164	<0.00194	46.7	30-130	1.5	30	
Naphthalene	0.0747	0.00201	"	0.164	<0.00145	45.5	30-130	1	30	
Indeno(1,2,3-cd)pyrene	0.147	0.00067	"	0.164	<0.000627	89.6	30-130	0.6	30	
Fluorene	0.0915	0.00067	"	0.164	<0.000286	55.7	30-130	3.3	30	
Fluoranthene	0.105	0.00067	"	0.164	<0.000394	64	30-130	0	30	
Chrysene	0.0866	0.00067	"	0.164	<0.000624	52.8	30-130	0.2	30	
Benzo(k)fluoranthene	0.0891	0.00067	"	0.164	<0.000437	54.3	30-130	1.9	30	
Benzo(b)fluoranthene	0.119	0.00067	"	0.164	<0.000585	72.5	30-130	1.6	30	
Benzo(a)pyrene	0.105	0.00067	"	0.164	<0.000468	64	30-130	2.8	30	
Benzo(a)anthracene	0.102	0.00067	"	0.164	<0.000493	62.1	30-130	0.9	30	
Anthracene	0.105	0.00067	"	0.164	<0.000334	64	30-130	1.9	30	
1-Methylnaphthalene	0.0772	0.00201	"	0.164	<0.00109	47	30-130	1.3	30	
Acenaphthene	0.09	0.00067	"	0.164	<0.000304	54.8	30-130	2	30	
Surrogate: Nitrobenzene-d5	63.1		"	0.328	213	63.1	29-110			
Surrogate: 4-Terphenyl-d14	54.8		"	0.328	165	54.8	33-122			
Surrogate: 2-Fluorobiphenyl	35.6		"	0.328	123	35.6	33-115			

**MS (L 85968-MS-L794727)**

Source: E5A0056-01

Prepared: 01/15/2025 Analyzed: 01/16/2025

Benzo(k)fluoranthene	0.0874	0.00067	mg/Kg	0.167	<0.000437	52.3	30-130			
Benzo(b)fluoranthene	0.117	0.00067	"	0.167	<0.000585	70	30-130			
1-Methylnaphthalene	0.0762	0.00201	"	0.167	<0.00109	45.6	30-130			
Acenaphthene	0.0882	0.00067	"	0.167	<0.000304	52.8	30-130			
Anthracene	0.103	0.00067	"	0.167	<0.000334	61.6	30-130			
Benzo(a)anthracene	0.101	0.00067	"	0.167	<0.000493	60.4	30-130			
Dibenz(a,h)anthracene	0.137	0.00067	"	0.167	<0.000614	82	30-130			

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Jen Pellegrini, Project Manager

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Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

**PAH by 8270D SIM - 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 L794727 - 3550B**

**MS (L 85968-MS-L794727)**

**Source: E5A0056-01**

Prepared: 01/15/2025 Analyzed: 01/16/2025

Benzo(a)pyrene	0.108	0.00067	mg/Kg	0.167	<0.000468	64.6	30-130			
2-Methylnaphthalene	0.0754	0.00201	"	0.167	<0.00194	45.1	30-130			
Chrysene	0.0864	0.00067	"	0.167	<0.000624	51.7	30-130			
Fluoranthene	0.105	0.00067	"	0.167	<0.000394	62.8	30-130			
Fluorene	0.0885	0.00067	"	0.167	<0.000286	52.9	30-130			
Indeno(1,2,3-cd)pyrene	0.146	0.00067	"	0.167	<0.000627	87.4	30-130			
Naphthalene	0.0739	0.00201	"	0.167	<0.00145	44.2	30-130			
Pyrene	0.106	0.00067	"	0.167	<0.000643	63.4	30-130			
Surrogate: 2-Fluorobiphenyl	35.1		"	0.333	123	35.1	33-115			
Surrogate: 4-Terphenyl-d14	55.5		"	0.333	165	55.5	33-122			
Surrogate: Nitrobenzene-d5	62.1		"	0.333	213	62.1	29-110			

**LCS (LCS-L794727)**

Prepared: 01/15/2025 Analyzed: 01/16/2025

Benzo(b)fluoranthene	0.119	0.00067	mg/Kg	0.167		71.2	30-130			
Benzo(a)anthracene	0.102	0.00067	"	0.167		61	30-130			
Chrysene	0.0867	0.00067	"	0.167		51.9	30-130			
Indeno(1,2,3-cd)pyrene	0.147	0.00067	"	0.167		88	30-130			
Fluorene	0.0911	0.00067	"	0.167		54.5	30-130			
Fluoranthene	0.104	0.00067	"	0.167		62.2	30-130			
Dibenz(a,h)anthracene	0.135	0.00067	"	0.167		80.8	30-130			
Benzo(a)pyrene	0.108	0.00067	"	0.167		64.6	30-130			
Pyrene	0.105	0.00067	"	0.167		62.8	30-130			
Anthracene	0.105	0.00067	"	0.167		62.8	30-130			
Acenaphthene	0.0901	0.00067	"	0.167		53.9	30-130			
2-Methylnaphthalene	0.0769	0.00201	"	0.167		46	30-130			
1-Methylnaphthalene	0.0774	0.00201	"	0.167		46.3	30-130			
Benzo(k)fluoranthene	0.088	0.00067	"	0.167		52.6	30-130			

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Jen Pellegrini, Project Manager

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Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**PAH by 8270D SIM - 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 L794727 - 3550B**

**LCS (LCS-L794727)**

Prepared: 01/15/2025 Analyzed: 01/16/2025

Naphthalene	0.0744	0.00201	mg/Kg	0.167		44.5	30-130			
Surrogate: Nitrobenzene-d5	68.4		"	0.333		68.4	29-110			
Surrogate: 4-Terphenyl-d14	58.2		"	0.333		58.2	33-122			
Surrogate: 2-Fluorobiphenyl	38.4		"	0.333		38.4	33-115			

**LRB (LRB-L794727)**

Prepared: 01/15/2025 Analyzed: 01/16/2025

Benzo(b)fluoranthene	ND	0.00067	mg/Kg				-			
Pyrene	ND	0.00067	"				-			
Naphthalene	ND	0.00201	"				-			
Fluorene	ND	0.00067	"				-			
Fluoranthene	ND	0.00067	"				-			
Dibenz(a,h)anthracene	ND	0.00067	"				-			
Benzo(k)fluoranthene	ND	0.00067	"				-			
1-Methylnaphthalene	ND	0.00201	"				-			
Benzo(a)pyrene	ND	0.00067	"				-			
Benzo(a)anthracene	ND	0.00067	"				-			
Anthracene	ND	0.00067	"				-			
Acenaphthene	ND	0.00067	"				-			
2-Methylnaphthalene	ND	0.00201	"				-			
Indeno(1,2,3-cd)pyrene	ND	0.00067	"				-			
Chrysene	ND	0.00067	"				-			
Surrogate: Nitrobenzene-d5	74.1		"	0.333		74.1	29-110			
Surrogate: 4-Terphenyl-d14	63.9		"	0.333		63.9	33-122			
Surrogate: 2-Fluorobiphenyl	39		"	0.333		39	33-115			

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 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: [none]  
 Project: KMG - Ludwig H 6-31D

**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 L793673 -

**DUP (L 86002-DUP)**

Source: 86002

Prepared: Analyzed: 01/08/2025

Chromium, Hexavalent	ND	0.5	mg/Kg		<0.500	-		0	20	
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**MS (L 86002-MS)**

Source: 86002

Prepared: Analyzed: 01/08/2025

Chromium, Hexavalent	30.5	2.5	mg/Kg	39.7	< 0.244	77	75-125			
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**LCS (LCS)**

Prepared: Analyzed: 01/08/2025

Chromium, Hexavalent	6.43	0.5	mg/Kg	8		80	75-125			
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**LRB (LRB)**

Prepared: Analyzed: 01/08/2025

Chromium, Hexavalent	ND	0.5	mg/Kg			-				
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Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: [none]  
Project: KMG - Ludwig H 6-31D

## Notes and Definitions

- U Sample is Non-Detect.
  - QR-02 The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.
  - ND Analyte NOT DETECTED at or above the reporting limit
  - RPD Relative Percent Difference
- All soil results are reported on a wet weight basis.

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Jen Pellegrini, Project Manager

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