



June 15, 2022

Tasman Geosciences

Andy Sagen

6855 West 119th Avenue

Broomfield CO 80020

Project Name - KMG - Ludwig 17-1 WH

Project Number - -

Attached are your analytical results for KMG - Ludwig 17-1 WH received by Origins Laboratory, Inc. June 02, 2022. This project is associated with Origins project number Y206068-01.

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: -  
Project: KMG - Ludwig 17-1 WH

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
WH-B03@12'	Y206068-01	Soil	June 2, 2022 13:00	06/02/2022 15:18
WH-N03@10'	Y206068-02	Soil	June 2, 2022 13:02	06/02/2022 15:18
WH-S03@10'	Y206068-03	Soil	June 2, 2022 13:04	06/02/2022 15:18
WH-E03@10'	Y206068-04	Soil	June 2, 2022 13:06	06/02/2022 15:18
WH-W03@10'	Y206068-05	Soil	June 2, 2022 13:08	06/02/2022 15:18
BG-01@10'	Y206068-06	Soil	June 2, 2022 13:10	06/02/2022 15:18
BG-01@12'	Y206068-07	Soil	June 2, 2022 13:12	06/02/2022 15:18
BG-02@10'	Y206068-08	Soil	June 2, 2022 13:14	06/02/2022 15:18
BG-02@12'	Y206068-09	Soil	June 2, 2022 13:16	06/02/2022 15:18

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

# ORIGINS LABORATORY, INC

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH



www.originslaboratory.com

page 1 of 1

Client: OKY  
 Project Manager: Andy Sagen  
 Project Name: Ludwig 17-1 WH  
 Project Number:  
 Samples Collected By: P. Dawis  
 Telephone Number:  
 Email Address: ASagen@tasman-geo.com

Reinquisition By:	Date:	Time:	# of Containers			Preservative			Matrix			Analysis			Sample Instructions	Turnaround Time:
			Date:	Time:	Date:	Time:	Date:	Time:	Date:	Time:	Date:	Time:	Date:	Time:		
P. Dawis	6-2-22	1605	2	X	HCl	Other	Soil	X	Other	X	Other	PH	X	X	24 Hr	
					Unpreserved	Other	Groundwater					PAHs	X	X	48 Hr	
					HNO <sub>3</sub>	Other						TMBs	X	X	Standard	
												Dechloro	X	X		

725 Elk Place | Denver, CO 80211 | Phone: 303.435.1322 | Fax: 303.265.9445

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

# ORIGINS LABORATORY, INC

Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

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

**Sample Receipt Checklist**

Origins Work Order: VI06065 Client: TASMAN  
Client Project ID: Ludwig 17-1 WH

Checklist Completed by: JH Shipped Via: HD  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)  
Date/time completed: 10/2/22 Airbill #: NA

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

Cooler Number/Temperature: 1 13.5 °C  °C  °C  °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 (> ¼ 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 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)		—		
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 be in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) [Signature] Date/Time Reviewed 10/2/22

Origins Laboratory, Inc.

*J. Bynon*

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-B03@12'**  
**6/2/2022 1:00:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Origins Laboratory, Inc.**  
**Y206068-01 (Soil)**

**DRO/ORO by EPA 8015D**

Diesel (C10-C28)	ND		25.0	mg/kg	1	B2F0220	06/02/2022	06/02/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: *o*-Terphenyl 81.4% 50-150 " " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2F0222	06/02/2022	06/02/2022	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	109%		70-130	"	"	"	"	"	
Surrogate: Toluene-d8	94.0%		70-130	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	98.1%		70-130	"	"	"	"	"	

**PAH by 8270D SIM**

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-B03@12'**  
**6/2/2022 1:00:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Waypoint Analytical, Inc.**  
**Y206068-01 (Soil)**

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.000364	0.00067	mg/Kg	1	L620534	06/08/2022	06/09/2022	
2-Methylnaphthalene	ND	0.000645	0.00067	"	"	"	"	"	"
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	"	"	"	"	"	"
Fluorene	ND	0.000286	0.00067	"	"	"	"	"	"
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	"
Naphthalene	ND	0.000484	0.00067	"	"	"	"	"	"
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	57 %		33-115	"	"	"	"	"	"
Surrogate: 4-Terphenyl-d14	69.7 %		33-122	"	"	"	"	"	"
Surrogate: Nitrobenzene-d5	73 %		29-110	"	"	"	"	"	"

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

WH-B03@12'  
6/2/2022 1:00:00PM

Origins Laboratory, Inc.  
Y206068-01 (Soil)

**pH in Soil by 9045D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
pH	8.30			pH Units	1	B2F0310	06/03/2022	06/09/2022	

**Total Metals by 6020B**

Arsenic	2.29	0.0855	0.25	mg/Kg	5	L619997	06/06/2022	06/13/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-N03@10'**  
**6/2/2022 1:02:00PM**

**Origins Laboratory, Inc.**  
**Y206068-02 (Soil)**

**DRO/ORO by EPA 8015D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Diesel (C10-C28)	ND		25.0	mg/kg	1	B2F0220	06/02/2022	06/02/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: *o*-Terphenyl 81.3% 50-150 " " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2F0222	06/02/2022	06/02/2022	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	108%		70-130	"	"	"	"	"	
Surrogate: Toluene-d8	95.2%		70-130	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	97.6%		70-130	"	"	"	"	"	

**PAH by 8270D SIM**

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-N03@10'**  
**6/2/2022 1:02:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Waypoint Analytical, Inc.**  
**Y206068-02 (Soil)**

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.000364	0.00067	mg/Kg	1	L620534	06/08/2022	06/09/2022	
2-Methylnaphthalene	ND	0.000645	0.00067	"	"	"	"	"	
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	"	"	"	"	"	
Fluorene	ND	0.000286	0.00067	"	"	"	"	"	
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	
Naphthalene	ND	0.000484	0.00067	"	"	"	"	"	
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	

Surrogate: 2-Fluorobiphenyl	50.8 %		33-115						
Surrogate: 4-Terphenyl-d14	61.3 %		33-122						
Surrogate: Nitrobenzene-d5	63.7 %		29-110						

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

WH-N03@10'  
6/2/2022 1:02:00PM

Origins Laboratory, Inc.  
Y206068-02 (Soil)

**pH in Soil by 9045D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
pH	8.35			pH Units	1	B2F0310	06/03/2022	06/09/2022	

**Total Metals by 6020B**

Arsenic	2.01	0.0855	0.25	mg/Kg	5	L619997	06/06/2022	06/13/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-S03@10'**  
**6/2/2022 1:04:00PM**

**Origins Laboratory, Inc.**  
**Y206068-03 (Soil)**

**DRO/ORO by EPA 8015D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Diesel (C10-C28)	ND		25.0	mg/kg	1	B2F0220	06/02/2022	06/02/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl 80.5% 50-150 " " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2F0222	06/02/2022	06/02/2022	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	109%		70-130	"	"	"	"	"	
Surrogate: Toluene-d8	95.4%		70-130	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	99.2%		70-130	"	"	"	"	"	

**PAH by 8270D SIM**

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-S03@10'**  
**6/2/2022 1:04:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Waypoint Analytical, Inc.**  
**Y206068-03 (Soil)**

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.000364	0.00067	mg/Kg	1	L620601	06/09/2022	06/14/2022	
2-Methylnaphthalene	ND	0.000645	0.00067	"	"	"	"	"	"
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	"	"	"	"	"	"
Fluorene	ND	0.000286	0.00067	"	"	"	"	"	"
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	"
Naphthalene	ND	0.000484	0.00067	"	"	"	"	"	"
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	53.5 %		33-115	"	"	"	"	"	"
Surrogate: 4-Terphenyl-d14	80.4 %		33-122	"	"	"	"	"	"
Surrogate: Nitrobenzene-d5	62.2 %		29-110	"	"	"	"	"	"

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

WH-S03@10'  
6/2/2022 1:04:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

Origins Laboratory, Inc.  
Y206068-03 (Soil)

**pH in Soil by 9045D**

pH	8.33			pH Units	1	B2F0310	06/03/2022	06/09/2022	
----	------	--	--	----------	---	---------	------------	------------	--

**Total Metals by 6020B**

Arsenic	1.16	0.0855	0.25	mg/Kg	5	L619997	06/06/2022	06/13/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-E03@10'**  
**6/2/2022 1:06:00PM**

**Origins Laboratory, Inc.**  
**Y206068-04 (Soil)**

**DRO/ORO by EPA 8015D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Diesel (C10-C28)	ND		25.0	mg/kg	1	B2F0220	06/02/2022	06/02/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl 84.7% 50-150 " " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2F0222	06/02/2022	06/02/2022	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	110%		70-130	"	"	"	"	"	
Surrogate: Toluene-d8	94.1%		70-130	"	"	"	"	"	
Surrogate: 4-Bromofluorobenzene	99.5%		70-130	"	"	"	"	"	

**PAH by 8270D SIM**

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-E03@10'**  
**6/2/2022 1:06:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Waypoint Analytical, Inc.**  
**Y206068-04 (Soil)**

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.00182	0.00335	mg/Kg	5	L620601	06/09/2022	06/14/2022	
2-Methylnaphthalene	ND	0.00323	0.00335	"	"	"	"	"	"
Acenaphthene	ND	0.00152	0.00335	"	"	"	"	"	"
Anthracene	ND	0.00167	0.00335	"	"	"	"	"	"
Benzo(a)anthracene	ND	0.00247	0.00335	"	"	"	"	"	"
Benzo(a)pyrene	ND	0.00234	0.00335	"	"	"	"	"	"
Benzo(b)fluoranthene	ND	0.00293	0.00335	"	"	"	"	"	"
Benzo(k)fluoranthene	ND	0.00219	0.00335	"	"	"	"	"	"
Chrysene	ND	0.00312	0.00335	"	"	"	"	"	"
Dibenz(a,h)anthracene	ND	0.00307	0.00335	"	"	"	"	"	"
Fluoranthene	ND	0.00197	0.00335	"	"	"	"	"	"
Fluorene	ND	0.00143	0.00335	"	"	"	"	"	"
Indeno(1,2,3-cd)pyrene	ND	0.00314	0.00335	"	"	"	"	"	"
Naphthalene	ND	0.00242	0.00335	"	"	"	"	"	"
Pyrene	ND	0.00322	0.00335	"	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	54.7 %		33-115		"	"	"	"	"
Surrogate: 4-Terphenyl-d14	79 %		33-122		"	"	"	"	"
Surrogate: Nitrobenzene-d5	65.2 %		29-110		"	"	"	"	"

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

WH-E03@10'  
6/2/2022 1:06:00PM

Origins Laboratory, Inc.  
Y206068-04 (Soil)

**pH in Soil by 9045D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
pH	8.30			pH Units	1	B2F0310	06/03/2022	06/09/2022	

**Total Metals by 6020B**

Arsenic	1.23	0.0855	0.25	mg/Kg	5	L619997	06/06/2022	06/13/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-W03@10'**  
**6/2/2022 1:08:00PM**

**Origins Laboratory, Inc.**  
**Y206068-05 (Soil)**

**DRO/ORO by EPA 8015D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
Diesel (C10-C28)	ND		25.0	mg/kg	1	B2F0220	06/02/2022	06/02/2022	U
Residual Range Organics (C28-C40)	ND		100	"	"	"	"	"	U

Surrogate: o-Terphenyl 82.7% 50-150 " " " "

**GBTEX+TMBs by 8260D**

1,2,4-Trimethylbenzene	ND		0.00200	mg/kg	1	B2F0222	06/02/2022	06/02/2022	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 111% 70-130 " " " "  
 Surrogate: Toluene-d8 93.8% 70-130 " " " "  
 Surrogate: 4-Bromofluorobenzene 97.0% 70-130 " " " "

**PAH by 8270D SIM**

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**WH-W03@10'**  
**6/2/2022 1:08:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Waypoint Analytical, Inc.**  
**Y206068-05 (Soil)**

**PAH by 8270D SIM**

1-Methylnaphthalene	ND	0.000364	0.00067	mg/Kg	1	L620601	06/09/2022	06/14/2022	
2-Methylnaphthalene	ND	0.000645	0.00067	"	"	"	"	"	"
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	"	"	"	"	"	"
Fluorene	ND	0.000286	0.00067	"	"	"	"	"	"
Indeno(1,2,3-cd)pyrene	ND	0.000627	0.00067	"	"	"	"	"	"
Naphthalene	ND	0.000484	0.00067	"	"	"	"	"	"
Pyrene	ND	0.000643	0.00067	"	"	"	"	"	"

Surrogate: 2-Fluorobiphenyl	48.8 %		33-115	"	"	"	"	"	"
Surrogate: 4-Terphenyl-d14	72.1 %		33-122	"	"	"	"	"	"
Surrogate: Nitrobenzene-d5	57.4 %		29-110	"	"	"	"	"	"

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

WH-W03@10'  
6/2/2022 1:08:00PM

Origins Laboratory, Inc.  
Y206068-05 (Soil)

**pH in Soil by 9045D**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
pH	8.31			pH Units	1	B2F0310	06/03/2022	06/09/2022	

**Total Metals by 6020B**

Arsenic	2.15	0.0855	0.25	mg/Kg	5	L619997	06/06/2022	06/13/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**BG-01@10'**

**6/2/2022 1:10:00PM**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**Origins Laboratory, Inc.**  
**Y206068-06 (Soil)**

**pH in Soil by 9045D**

pH	8.38			pH Units	1	B2F0310	06/03/2022	06/09/2022	
----	------	--	--	----------	---	---------	------------	------------	--

**Total Metals by 6020B**

Arsenic	0.724	0.0855	0.25	mg/Kg	5	L620711	06/09/2022	06/11/2022	
---------	-------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**BG-01@12'**

**6/2/2022 1:12:00PM**

**Origins Laboratory, Inc.**  
**Y206068-07 (Soil)**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**pH in Soil by 9045D**

pH	8.01			pH Units	1	B2F0310	06/03/2022	06/09/2022	
----	------	--	--	----------	---	---------	------------	------------	--

**Total Metals by 6020B**

Arsenic	1.54	0.0855	0.25	mg/Kg	5	L620711	06/09/2022	06/11/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

BG-02@10'

6/2/2022 1:14:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

Origins Laboratory, Inc.  
Y206068-08 (Soil)

**pH in Soil by 9045D**

pH	8.25			pH Units	1	B2F0310	06/03/2022	06/09/2022	
----	------	--	--	----------	---	---------	------------	------------	--

**Total Metals by 6020B**

Arsenic	1.55	0.0855	0.25	mg/Kg	5	L620711	06/09/2022	06/11/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**BG-02@12'**

**6/2/2022 1:16:00PM**

**Origins Laboratory, Inc.**  
**Y206068-09 (Soil)**

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
---------	--------	---------------------	-----------------	-------	----------	-------	----------	----------	-------

**pH in Soil by 9045D**

pH	8.44			pH Units	1	B2F0310	06/03/2022	06/09/2022	
----	------	--	--	----------	---	---------	------------	------------	--

**Total Metals by 6020B**

Arsenic	1.61	0.0855	0.25	mg/Kg	5	L620711	06/09/2022	06/11/2022	
---------	------	--------	------	-------	---	---------	------------	------------	--

Origins Laboratory, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Batch B2F0220 - EPA 3550B**

Prepared: 06/02/2022 Analyzed: 06/02/2022

**Blank (B2F0220-BLK1)**

Diesel (C10-C28)	ND	25.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	100	"							U
Surrogate: o-Terphenyl	27		"	24.9		109	50-150			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B2F0220 - EPA 3550B

LCS (B2F0220-BS1)

Prepared: 06/02/2022 Analyzed: 06/02/2022

Diesel (C10-C28)	987	50.0	mg/kg	1000		98.7	70-130			
Residual Range Organics (C28-C40)	1020	200	"	1000		102	70-130			
Surrogate: o-Terphenyl	44		"	49.8		88.7	50-150			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B2F0220 - EPA 3550B

LCS Dup (B2F0220-BSD1)

Prepared: 06/02/2022 Analyzed: 06/02/2022

Diesel (C10-C28)	888	50.0	mg/kg	1000		88.8	70-130	10.5	35	
Residual Range Organics (C28-C40)	897	200	"	1000		89.7	70-130	12.7	35	
Surrogate: o-Terphenyl	36		"	49.8		73.1	50-150			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B2F0222 - EPA 5030 (soil)

Blank (B2F0222-BLK1)

Prepared: 06/02/2022 Analyzed: 06/02/2022

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	0.0100	"							U
Toluene	ND	0.00200	"							U
Xylenes, total	ND	0.00200	"							U
Gasoline Range Hydrocarbons	ND	0.200	"							U
Surrogate: 1,2-Dichloroethane-d4	0.15		"	0.125		122	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		95.7	70-130			
Surrogate: 4-Bromofluorobenzene	0.12		"	0.125		97.6	70-130			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

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

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

Batch B2F0222 - EPA 5030 (soil)

LCS (B2F0222-BS1)

Prepared: 06/02/2022 Analyzed: 06/02/2022

1,2,4-Trimethylbenzene	0.102	0.00200	mg/kg	0.100		102	70-130			
1,3,5-Trimethylbenzene	0.103	0.00200	"	0.100		103	70-130			
Benzene	0.0992	0.00200	"	0.100		99.2	70-130			
Ethylbenzene	0.106	0.00200	"	0.100		106	70-130			
Naphthalene	0.103	0.0100	"	0.100		103	70-130			
Toluene	0.0994	0.00200	"	0.100		99.4	70-130			
o-Xylene	0.102	0.00200	"	0.100		102	70-130			
m,p-Xylene	0.215	0.00400	"	0.200		108	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		95.1	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		94.5	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		107	70-130			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

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

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

Batch B2F0222 - EPA 5030 (soil)

Matrix Spike (B2F0222-MS1)

Source: Y206068-01

Prepared: 06/02/2022 Analyzed: 06/02/2022

1,2,4-Trimethylbenzene	0.0980	0.00200	mg/kg	0.100	ND	98.0	70-130			
1,3,5-Trimethylbenzene	0.0979	0.00200	"	0.100	ND	97.9	70-130			
Benzene	0.0973	0.00200	"	0.100	ND	97.3	70-130			
Ethylbenzene	0.0992	0.00200	"	0.100	ND	99.2	70-130			
Naphthalene	0.108	0.0100	"	0.100	0.00148	106	70-130			
Toluene	0.0956	0.00200	"	0.100	ND	95.6	70-130			
o-Xylene	0.0973	0.00200	"	0.100	ND	97.3	70-130			
m,p-Xylene	0.204	0.00400	"	0.200	ND	102	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.12		"	0.125		99.8	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		93.6	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		106	70-130			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

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

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

Batch B2F0222 - EPA 5030 (soil)

Matrix Spike Dup (B2F0222-MSD1)

Source: Y206068-01

Prepared: 06/02/2022 Analyzed: 06/02/2022

1,2,4-Trimethylbenzene	0.0918	0.00200	mg/kg	0.100	ND	91.8	70-130	6.56	20	
1,3,5-Trimethylbenzene	0.0919	0.00200	"	0.100	ND	91.9	70-130	6.34	20	
Benzene	0.0946	0.00200	"	0.100	ND	94.6	70-130	2.86	20	
Ethylbenzene	0.0931	0.00200	"	0.100	ND	93.1	70-130	6.41	20	
Naphthalene	0.111	0.0100	"	0.100	0.00148	110	70-130	3.31	20	
Toluene	0.0910	0.00200	"	0.100	ND	91.0	70-130	4.91	20	
o-Xylene	0.0914	0.00200	"	0.100	ND	91.4	70-130	6.29	20	
m,p-Xylene	0.190	0.00400	"	0.200	ND	95.2	70-130	6.65	20	
Surrogate: 1,2-Dichloroethane-d4	0.13		"	0.125		106	70-130			
Surrogate: Toluene-d8	0.12		"	0.125		92.5	70-130			
Surrogate: 4-Bromofluorobenzene	0.13		"	0.125		105	70-130			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**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
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Saturated Paste - Quality Control**  
**Origins Laboratory, Inc.**

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

**Batch B2F0310 - NO PREP**

Blank (B2F0310-BLK1)

Prepared: 06/03/2022 Analyzed: 06/09/2022

pH 0.00 pH Units

Duplicate (B2F0310-DUP1)

Source: Y206068-02

Prepared: 06/03/2022 Analyzed: 06/09/2022

pH 8.25 pH Units 8.35 1.20 25

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620601 - 3550B**

**MSD (L 90390-MSD-L620601)**

**Source: 90390**

Prepared: 06/09/2022 Analyzed: 06/14/2022

Chrysene	0.143	0.000624	mg/Kg	0.165	<0.000624	86.6	30-130	55.4	30	
Fluoranthene	0.173	0.000394	"	0.165	<0.000394	105	30-130	54.5	30	
Fluorene	0.145	0.000286	"	0.165	<0.000286	87.8	30-130	51	30	
Dibenz(a,h)anthracene	0.166	0.000614	"	0.165	<0.000614	101	30-130	55.3	30	
Naphthalene	0.119	0.000484	"	0.165	<0.000484	72.1	30-130	48.6	30	
Indeno(1,2,3-cd)pyrene	0.184	0.000627	"	0.165	<0.000627	112	30-130	46.9	30	
Benzo(b)fluoranthene	0.14	0.000585	"	0.165	<0.000585	84.8	30-130	46.4	30	
Benzo(a)pyrene	0.179	0.000468	"	0.165	<0.000468	108	30-130	53.9	30	
Benzo(a)anthracene	0.159	0.000493	"	0.165	<0.000493	96.3	30-130	50.8	30	
Acenaphthene	0.128	0.000304	"	0.165	<0.000304	77.5	30-130	50.3	30	
2-Methylnaphthalene	0.126	0.000645	"	0.165	<0.000645	76.3	30-130	47.3	30	
1-Methylnaphthalene	0.12	0.000364	"	0.165	<0.000364	72.7	30-130	51.4	30	
Pyrene	0.172	0.000643	"	0.165	<0.000643	104	30-130	55.1	30	
Anthracene	0.143	0.000334	"	0.165	<0.000334	86.6	30-130	50.3	30	
Benzo(k)fluoranthene	0.151	0.000437	"	0.165	<0.000437	91.5	30-130	65.7	30	
Surrogate: 4-Terphenyl-d14	119		"	0.33	244	119	33-122			
Surrogate: Nitrobenzene-d5	99.3		"	0.33	202	99.3	29-110			
Surrogate: 2-Fluorobiphenyl	83.6		"	0.33	169	83.6	33-115			

**MS (L 90390-MS-L620601)**

**Source: 90390**

Prepared: 06/09/2022 Analyzed: 06/14/2022

Anthracene	0.0855	0.000334	mg/Kg	0.165	<0.000334	51.8	30-130			
1-Methylnaphthalene	0.0709	0.000364	"	0.165	<0.000364	42.9	30-130			
2-Methylnaphthalene	0.0778	0.000645	"	0.165	<0.000645	47.1	30-130			
Acenaphthene	0.0765	0.000304	"	0.165	<0.000304	46.3	30-130			
Benzo(a)anthracene	0.0945	0.000493	"	0.165	<0.000493	57.2	30-130			
Benzo(a)pyrene	0.103	0.000468	"	0.165	<0.000468	62.4	30-130			
Benzo(b)fluoranthene	0.0872	0.000585	"	0.165	<0.000585	52.8	30-130			

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620601 - 3550B**

**MS (L 90390-MS-L620601)**

**Source: 90390**

Prepared: 06/09/2022 Analyzed: 06/14/2022

Benzo(k)fluoranthene	0.0763	0.000437	mg/Kg	0.165	<0.000437	46.2	30-130			
Chrysene	0.0809	0.000624	"	0.165	<0.000624	49	30-130			
Dibenz(a,h)anthracene	0.094	0.000614	"	0.165	<0.000614	56.9	30-130			
Fluorene	0.086	0.000286	"	0.165	<0.000286	52.1	30-130			
Indeno(1,2,3-cd)pyrene	0.114	0.000627	"	0.165	<0.000627	69	30-130			
Naphthalene	0.0724	0.000484	"	0.165	<0.000484	43.8	30-130			
Pyrene	0.0976	0.000643	"	0.165	<0.000643	59.1	30-130			
Fluoranthene	0.0989	0.000394	"	0.165	<0.000394	59.9	30-130			
Surrogate: 2-Fluorobiphenyl	47.2		"	0.33	169	47.2	33-115			
Surrogate: Nitrobenzene-d5	55.7		"	0.33	202	55.7	29-110			
Surrogate: 4-Terphenyl-d14	66.3		"	0.33	244	66.3	33-122			

**LCS (LCS-L620601)**

Prepared: 06/09/2022 Analyzed: 06/14/2022

Naphthalene	0.0869	0.000484	mg/Kg	0.167		52	30-130			
Fluorene	0.1	0.000286	"	0.167		59.8	30-130			
Indeno(1,2,3-cd)pyrene	0.125	0.000627	"	0.167		74.8	30-130			
Fluoranthene	0.113	0.000394	"	0.167		67.6	30-130			
2-Methylnaphthalene	0.0927	0.000645	"	0.167		55.5	30-130			
Benzo(a)pyrene	0.117	0.000468	"	0.167		70	30-130			
1-Methylnaphthalene	0.0821	0.000364	"	0.167		49.1	30-130			
Dibenz(a,h)anthracene	0.11	0.000614	"	0.167		65.8	30-130			
Chrysene	0.092	0.000624	"	0.167		55	30-130			
Benzo(b)fluoranthene	0.103	0.000585	"	0.167		61.6	30-130			
Acenaphthene	0.0905	0.000304	"	0.167		54.1	30-130			
Anthracene	0.102	0.000334	"	0.167		61	30-130			
Pyrene	0.112	0.000643	"	0.167		67	30-130			
Benzo(a)anthracene	0.107	0.000493	"	0.167		64	30-130			

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620601 - 3550B**

**LCS (LCS-L620601)**

Prepared: 06/09/2022 Analyzed: 06/14/2022

Benzo(k)fluoranthene	0.0923	0.000437	mg/Kg	0.167		55.2	30-130			
Surrogate: 2-Fluorobiphenyl	64.2		"	0.333		64.2	33-115			
Surrogate: Nitrobenzene-d5	71.4		"	0.333		71.4	29-110			
Surrogate: 4-Terphenyl-d14	84.6		"	0.333		84.6	33-122			

**LRB (LRB-L620601)**

Prepared: 06/09/2022 Analyzed: 06/14/2022

Acenaphthene	ND	0.00067	mg/Kg							
Indeno(1,2,3-cd)pyrene	ND	0.00067	"							
Pyrene	ND	0.00067	"							
2-Methylnaphthalene	ND	0.00067	"							
Naphthalene	ND	0.00067	"							
1-Methylnaphthalene	ND	0.00067	"							
Fluorene	ND	0.00067	"							
Fluoranthene	ND	0.00067	"							
Dibenz(a,h)anthracene	ND	0.00067	"							
Chrysene	ND	0.00067	"							
Benzo(b)fluoranthene	ND	0.00067	"							
Benzo(a)pyrene	ND	0.00067	"							
Benzo(a)anthracene	ND	0.00067	"							
Anthracene	ND	0.00067	"							
Benzo(k)fluoranthene	ND	0.00067	"							
Surrogate: 4-Terphenyl-d14	70.8		"	0.333		70.8	33-122			
Surrogate: 2-Fluorobiphenyl	50.1		"	0.333		50.1	33-115			
Surrogate: Nitrobenzene-d5	59.1		"	0.333		59.1	29-110			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Jordan A. Bynon For Jen Pellegrini, Project Manager

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620534 - 3550B**

**MSD (L 90159-MSD-L620534)**

**Source: 90159**

Prepared: 06/08/2022 Analyzed: 06/09/2022

Chrysene	0.102	0.000624	mg/Kg	0.163	<0.000624	62.5	30-130	22.6	30	
Benzo(k)fluoranthene	0.0928	0.000437	"	0.163	<0.000437	56.9	30-130	16.9	30	
Benzo(b)fluoranthene	0.1	0.000585	"	0.163	<0.000585	61.3	30-130	24.5	30	
Benzo(a)pyrene	0.112	0.000468	"	0.163	<0.000468	68.7	30-130	14.8	30	
Benzo(a)anthracene	0.11	0.000493	"	0.163	<0.000493	67.4	30-130	13.5	30	
Anthracene	0.116	0.000334	"	0.163	<0.000334	71.1	30-130	18	30	
Acenaphthene	0.11	0.000304	"	0.163	<0.000304	67.4	30-130	17.4	30	
2-Methylnaphthalene	0.0916	0.000645	"	0.163	<0.000645	56.1	30-130	17.3	30	
1-Methylnaphthalene	0.0923	0.000364	"	0.163	<0.000364	56.6	30-130	15.6	30	
Fluorene	0.105	0.000286	"	0.163	<0.000286	64.4	30-130	18.9	30	
Dibenz(a,h)anthracene	0.124	0.000614	"	0.163	<0.000614	76	30-130	13.5	30	
Indeno(1,2,3-cd)pyrene	0.0976	0.000627	"	0.163	<0.000627	59.8	30-130	20.5	30	
Naphthalene	0.0906	0.000484	"	0.163	<0.000484	55.5	30-130	17.5	30	
Pyrene	0.129	0.000643	"	0.163	<0.000643	79.1	30-130	17	30	
Fluoranthene	0.131	0.000394	"	0.163	<0.000394	80.3	30-130	16.7	30	
Surrogate: 2-Fluorobiphenyl	60.1		"	0.326	204	60.1	33-115			
Surrogate: 4-Terphenyl-d14	83.7		"	0.326	228	83.7	33-122			
Surrogate: Nitrobenzene-d5	65.9		"	0.326	259	65.9	29-110			

**MS (L 90159-MS-L620534)**

**Source: 90159**

Prepared: 06/08/2022 Analyzed: 06/09/2022

Pyrene	0.153	0.000643	mg/Kg	0.166	<0.000643	92.1	30-130			
Naphthalene	0.108	0.000484	"	0.166	<0.000484	65	30-130			
Indeno(1,2,3-cd)pyrene	0.12	0.000627	"	0.166	<0.000627	72.2	30-130			
Fluorene	0.127	0.000286	"	0.166	<0.000286	76.5	30-130			
Fluoranthene	0.155	0.000394	"	0.166	<0.000394	93.3	30-130			
Dibenz(a,h)anthracene	0.142	0.000614	"	0.166	<0.000614	85.5	30-130			
Chrysene	0.128	0.000624	"	0.166	<0.000624	77.1	30-130			

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620534 - 3550B**

**MS (L 90159-MS-L620534)**

**Source: 90159**

Prepared: 06/08/2022 Analyzed: 06/09/2022

Benzo(k)fluoranthene	0.11	0.000437	mg/Kg	0.166	<0.000437	66.2	30-130			
Benzo(a)pyrene	0.13	0.000468	"	0.166	<0.000468	78.3	30-130			
Benzo(a)anthracene	0.126	0.000493	"	0.166	<0.000493	75.9	30-130			
Anthracene	0.139	0.000334	"	0.166	<0.000334	83.7	30-130			
Acenaphthene	0.131	0.000304	"	0.166	<0.000304	78.9	30-130			
2-Methylnaphthalene	0.109	0.000645	"	0.166	<0.000645	65.6	30-130			
1-Methylnaphthalene	0.108	0.000364	"	0.166	<0.000364	65	30-130			
Benzo(b)fluoranthene	0.128	0.000585	"	0.166	<0.000585	77.1	30-130			
Surrogate: Nitrobenzene-d5	73.4		"	0.332	259	73.4	29-110			
Surrogate: 2-Fluorobiphenyl	68.6		"	0.332	204	68.6	33-115			
Surrogate: 4-Terphenyl-d14	100		"	0.332	228	100	33-122			

**LCS (LCS-L620534)**

Prepared: 06/08/2022 Analyzed: 06/09/2022

Benzo(a)pyrene	0.125	0.000468	mg/Kg	0.167		74.8	30-130			
2-Methylnaphthalene	0.102	0.000645	"	0.167		61	30-130			
Benzo(b)fluoranthene	0.107	0.000585	"	0.167		64	30-130			
Benzo(k)fluoranthene	0.116	0.000437	"	0.167		69.4	30-130			
Chrysene	0.118	0.000624	"	0.167		70.6	30-130			
Dibenz(a,h)anthracene	0.135	0.000614	"	0.167		80.8	30-130			
Fluorene	0.119	0.000286	"	0.167		71.2	30-130			
Indeno(1,2,3-cd)pyrene	0.106	0.000627	"	0.167		63.4	30-130			
Fluoranthene	0.146	0.000394	"	0.167		87.4	30-130			
Benzo(a)anthracene	0.119	0.000493	"	0.167		71.2	30-130			
Acenaphthene	0.124	0.000304	"	0.167		74.2	30-130			
Naphthalene	0.102	0.000484	"	0.167		61	30-130			
Pyrene	0.144	0.000643	"	0.167		86.2	30-130			
1-Methylnaphthalene	0.102	0.000364	"	0.167		61	30-130			

Origins Laboratory, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**PAH by 8270D SIM - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620534 - 3550B**

**LCS (LCS-L620534)**

Prepared: 06/08/2022 Analyzed: 06/09/2022

Anthracene	0.134	0.000334	mg/Kg	0.167		80.2	30-130			
Surrogate: 4-Terphenyl-d14	104		"	0.333		104	33-122			
Surrogate: 2-Fluorobiphenyl	72.9		"	0.333		72.9	33-115			
Surrogate: Nitrobenzene-d5	78		"	0.333		78	29-110			

**LRB (LRB-L620534)**

Prepared: 06/08/2022 Analyzed: 06/09/2022

Naphthalene	ND	0.00067	mg/Kg				-			
2-Methylnaphthalene	ND	0.00067	"				-			
Pyrene	ND	0.00067	"				-			
Anthracene	ND	0.00067	"				-			
1-Methylnaphthalene	ND	0.00067	"				-			
Acenaphthene	ND	0.00067	"				-			
Indeno(1,2,3-cd)pyrene	ND	0.00067	"				-			
Benzo(a)anthracene	ND	0.00067	"				-			
Benzo(a)pyrene	ND	0.00067	"				-			
Benzo(b)fluoranthene	ND	0.00067	"				-			
Benzo(k)fluoranthene	ND	0.00067	"				-			
Chrysene	ND	0.00067	"				-			
Dibenz(a,h)anthracene	ND	0.00067	"				-			
Fluoranthene	ND	0.00067	"				-			
Fluorene	ND	0.00067	"				-			
Surrogate: Nitrobenzene-d5	78.6		"	0.333		78.6	29-110			
Surrogate: 4-Terphenyl-d14	89.7		"	0.333		89.7	33-122			
Surrogate: 2-Fluorobiphenyl	64.8		"	0.333		64.8	33-115			

Origins Laboratory, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**Total Metals by 6020B - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L620711 - 3050B**

**MSD (L 90398-MSD-L620711)**

**Source: 90398**

Prepared: 06/09/2022 Analyzed: 06/11/2022

Arsenic	2.88	0.0855	mg/Kg	2.48	0.845	82	75-125	5.7	80	
---------	------	--------	-------	------	-------	----	--------	-----	----	--

**MS (L 90398-MS-L620711)**

**Source: 90398**

Prepared: 06/09/2022 Analyzed: 06/11/2022

Arsenic	3.05	0.0855	mg/Kg	2.49	0.845	89	75-125			
---------	------	--------	-------	------	-------	----	--------	--	--	--

**LCS (LCS-L620711)**


Prepared: 06/09/2022 Analyzed: 06/11/2022

Arsenic	2.48	0.0855	mg/Kg	2.5		99	80-120			
---------	------	--------	-------	-----	--	----	--------	--	--	--

**LRB (LRB-L620711)**

Prepared: 06/09/2022 Analyzed: 06/11/2022

Arsenic	ND	0.25	mg/Kg							
---------	----	------	-------	--	--	--	--	--	--	--

Origins Laboratory, Inc.  


*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*

Tasman Geosciences  
 6855 West 119th Avenue  
 Broomfield CO 80020

Andy Sagen  
 Project Number: -  
 Project: KMG - Ludwig 17-1 WH

**Total Metals by 6020B - Quality Control**  
**Waypoint Analytical, Inc.**

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

**Batch L619997 - 3050B**

**MSD (L 90378-MSD-L619997)**

**Source: Y206068-05**

Prepared: 06/06/2022 Analyzed: 06/13/2022

Arsenic	3.82	0.0855	mg/Kg	2.34	2.15	71	75-125	3.7	80	*
---------	------	--------	-------	------	------	----	--------	-----	----	---

**MS (L 90378-MS-L619997)**

**Source: Y206068-05**

Prepared: 06/06/2022 Analyzed: 06/13/2022

Arsenic	3.68	0.0855	mg/Kg	2.4	2.15	64	75-125			*
---------	------	--------	-------	-----	------	----	--------	--	--	---

**LCS (LCS-L619997)**


Prepared: 06/06/2022 Analyzed: 06/13/2022

Arsenic	2.45	0.0855	mg/Kg	2.5		98	80-120			
---------	------	--------	-------	-----	--	----	--------	--	--	--

**LRB (LRB-L619997)**

Prepared: 06/06/2022 Analyzed: 06/13/2022

Arsenic	ND	0.25	mg/Kg							
---------	----	------	-------	--	--	--	--	--	--	--

Origins Laboratory, Inc.  



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Tasman Geosciences  
6855 West 119th Avenue  
Broomfield CO 80020

Andy Sagen  
Project Number: -  
Project: KMG - Ludwig 17-1 WH

## Notes and Definitions

- U Sample is Non-Detect.
  - \* QC Failure
  - ND Analyte NOT DETECTED at or above the reporting limit
  - RPD Relative Percent Difference
- All soil results are reported on a wet weight basis.

Origins Laboratory, Inc.  


*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*