

SS01@3'  
 B - <0.0020 mg/kg  
 T - <0.0050 mg/kg  
 E - <0.0050 mg/kg  
 X - <0.010 mg/kg  
 TPH - <50 mg/kg  
 N - <0.010 mg/kg  
 SAR - 0.0394  
 EC - 0.0801 mmhos/cm  
 pH - 7.70

SS05@5'  
 B - <0.0020 mg/kg  
 T - <0.0050 mg/kg  
 E - <0.0050 mg/kg  
 X - <0.010 mg/kg  
 TPH - <50 mg/kg  
 N - <0.010 mg/kg

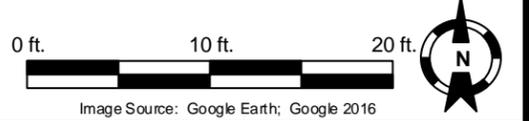
**Legend**

-  Excavation Sample Location
-  Excavation Sample Location (Not Submitted for Laboratory Analysis)
-  Excavation Extent

**Notes**

- 1) All locations are approximate unless otherwise noted
  - 2) **RED** value indicates concentration greater than COGCC table 910-1 soil standard (see table below).
- GPS – Global Positioning System  
 mg/kg – Milligrams Per Kilogram  
 mmhos/cm – Millimhos Per Centimeter

Contaminant of Concern	COGCC Concentration Standard
B - Benzene	0.17 mg/kg
T - Toluene	85 mg/kg
E - Ethylbenzene	100 mg/kg
X – Total Xylenes	175 mg/kg
TPH- Total Petroleum Hydrocarbons	500 mg/kg
N - Naphthalene	23 mg/kg
SAR – Sodium Absorption Ratio	<12 <sup>5</sup>
EC – Electrical Conductivity	<4mmhos/cm or 2x background
pH	6-9



DATE: 09/07/2017  
 DESIGNED BY: JW  
 DRAWN BY: JW



**TASMAN GEOSCIENCES**  
 Tasman Geosciences, Inc.  
 6899 Pecos Street – Unit C  
 Denver, CO 80221

**Noble Energy, Inc. – DJ Basin**  
**Rothe BB 30-23 Vault Removal – Facility ID:419148**  
 NWSE, Section 30, Township 5 North, Range 63 West  
 Weld County, Colorado

Excavation Soil Analytical  
 Results Map  
 (08/02/2017)

# Summit Scientific

---

741 Corporate Circle – Suite I ♦ Golden, Colorado 80401

303.277.9310 - laboratory ♦ 303.277.9531 - fax

August 10, 2017

Brandon Bruns  
Tasman Geosciences  
6899 Pecos Street  
Denver, CO 80221  
RE: Rothe BB 30-23

Enclosed are the results of analyses for samples received by Summit Scientific on 08/03/17 09:30. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to be 'Ben Shrewsbury', with a long, sweeping horizontal stroke extending to the right.

Ben Shrewsbury  
Laboratory Manager



Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/10/17 13:28

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@3'	1708028-01	Soil	08/02/17 15:15	08/03/17 09:30
SS05@6.5'	1708028-02	Soil	08/02/17 15:30	08/03/17 09:30

Summit Scientific

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# Summit Scientific

1708028

741 Corporate Circle Suite I ♦ Golden, Colorado 80401  
303-277-9310 ♦ 303-374-5933 Fax

Page 1 of 1

Client: Noble/Tasman  
Address: -  
City/State/Zip: -  
Phone: 303-489-1228 Fax: -  
Sampler Name: JW

Project Manager: Brandon Bruns, Invoice: Jacob Evans  
E-Mail: Bbruns@tasman-geo.com  
Project Name: Rothe BB 30-23  
Project Number: -

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix				Analyze For:				Special Instructions		
				HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	8260 BTEX	8260B GBTEXN	8015 DRO	pH, EC, SAR			
<u>SS01@3'</u>	<u>8/2/17</u>	<u>1515</u>	<u>1</u>			<u>X</u>			<u>✓</u>					<u>X</u>	<u>X</u>	<u>X</u>		
<u>SS05@6.5'</u>	<u>8/2/17</u>	<u>1530</u>	<u>1</u>			<u>X</u>			<u>✓</u>					<u>X</u>	<u>X</u>	<u>X</u>		
Relinquished by: <u>[Signature]</u> Date/Time: <u>8/3/17 930</u>				Received by: <u>[Signature]</u> Date/Time: <u>8/3/17 930</u>				Turn Around Time (Check)				Notes:						
Relinquished by: _____ Date/Time: _____				Received by: _____ Date/Time: _____				Same Day <input type="checkbox"/> 72 Hours <input type="checkbox"/>				Standard <input checked="" type="checkbox"/>						
Relinquished by: _____ Date/Time: _____				Received in Lab by: _____ Date/Time: _____				48 Hours <input type="checkbox"/>				Sample Integrity: Temperature Upon Receipt: <u>5.5°C</u>						
								Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				on ice						

1708028

Sample Receipt Checklist

S2 Work Order: \_\_\_\_\_

Client: Noble/Tasman Client Project ID: Rothe BB 30-23

Shipped Via: P/U Airbill #: \_\_\_\_\_  
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Matrix (check all that apply):  Air  Soil/Solid  Water  Other: \_\_\_\_\_  
(Describe)

Cooler ID				
Temp (°C)	5.5			

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C <sup>(1)</sup> ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	✓			
Were all samples received intact <sup>(1)</sup> ?	✓			
Was adequate sample volume provided <sup>(1)</sup> ?	✓			
If custody seals are present, are they intact <sup>(1)</sup> ?			✓	
Are short holding time analytes or samples with HTs due within 48 hours present?			✓	
Is a chain-of-custody (COC) form 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 w/ date and time recorded <sup>(1)</sup> ?	✓			
For volatiles in water – is there headspace present? <b>If yes, contact client and note in narrative.</b>			✓	
Are samples preserved that require preservation (excluding cooling) <sup>(1)</sup> ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			✓	
If samples are acid preserved for metals, is the pH ≤ 2 <sup>(1)</sup> ? Record the pH in Comments.			✓	
If dissolved metals are requested, were samples field filtered?			✓	
Additional Comments (if any):				

<sup>(1)</sup> If NO, then contact the client before proceeding with analysis and note in case narrative.

Nakita  
Custodian Printed Name

[Signature]  
Signature or Initials of Custodian

8/3/17  
Date/Time



Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/10/17 13:28

**SS01@3'**  
**1708028-01 (Soil)**

**Summit Scientific**

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **08/02/17 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1708054	08/04/17	08/05/17	8015M	

Date Sampled: **08/02/17 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		110 %	30-150		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **08/02/17 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1708053	08/04/17	08/05/17	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **08/02/17 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		100 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		100 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.5 %	21-167		"	"	"	"	

**Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis**

Date Sampled: **08/02/17 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	<b>468</b>	10.7	mg/kg dry	1	1708067	08/07/17	08/07/17	EPA 6020/Mod. USDA60 6(2, 3A)	

Summit Scientific

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/10/17 13:28

**SS01@3'**  
**1708028-01 (Soil)**

**Summit Scientific**

**Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis**

Analyte	Result	Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Magnesium	200	5.34	mg/kg dry	1	1708067	08/07/17	08/07/17	EPA 6020/Mod. USDA60 6(2, 3A)
Sodium	47.9	5.34	"	"	"	"	"	"
Sodium Adsorption Ratio	0.467		units	"	1708087	08/08/17	08/08/17	"

**Physical Parameters by APHA/ASTM/EPA Methods**

Date Sampled: **08/02/17 15:15**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
pH	8.55	0.100	pH Units	1	1708059	08/04/17	08/04/17	EPA 9045	
Specific Conductance (EC)	0.420	0.0100	mmhos/cm	"	1708058	08/04/17	08/04/17	SM 2510B	
% Solids	93.7		%	"	1708060	08/04/17	08/04/17	% calculation	

Summit Scientific

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/10/17 13:28

**SS05@6.5'**  
**1708028-02 (Soil)**

**Summit Scientific**

**Extractable Petroleum Hydrocarbons by 8015**

Date Sampled: **08/02/17 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1708054	08/04/17	08/05/17	8015M	

Date Sampled: **08/02/17 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: <i>o</i> -Terphenyl		107 %	30-150		"	"	"	"	

**Volatile Organic Compounds by EPA Method 8260B**

Date Sampled: **08/02/17 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Naphthalene	ND	0.010	mg/kg	1	1708053	08/04/17	08/05/17	EPA 8260B	
Benzene	ND	0.0020	"	"	"	"	"	"	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **08/02/17 15:30**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		104 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.8 %	21-167		"	"	"	"	

Summit Scientific

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/10/17 13:28

**Extractable Petroleum Hydrocarbons by 8015 - Quality Control**  
**Summit Scientific**

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

**Batch 1708054 - EPA 3550A**

<b>Blank (1708054-BLK1)</b>				Prepared & Analyzed: 08/04/17							
C10-C28 (DRO)	ND	50	mg/kg								
<i>Surrogate: o-Terphenyl</i>	13.2		"	12.5		106	30-150				
<b>LCS (1708054-BS1)</b>				Prepared & Analyzed: 08/04/17							
C10-C28 (DRO)	606	50	mg/kg	499		122	73-134				
<i>Surrogate: o-Terphenyl</i>	14.6		"	12.5		117	30-150				
<b>Matrix Spike (1708054-MS1)</b>				<b>Source: 1708027-01</b>		Prepared & Analyzed: 08/04/17					
C10-C28 (DRO)	606	50	mg/kg	499	37.2	114	50-148				
<i>Surrogate: o-Terphenyl</i>	14.4		"	12.5		116	30-150				
<b>Matrix Spike Dup (1708054-MSD1)</b>				<b>Source: 1708027-01</b>		Prepared & Analyzed: 08/04/17					
C10-C28 (DRO)	565	50	mg/kg	499	37.2	106	50-148	7.03		20	
<i>Surrogate: o-Terphenyl</i>	13.5		"	12.5		108	30-150				

Summit Scientific

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Brunns

Reported:  
08/10/17 13:28

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

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

**Batch 1708053 - EPA 5030 Soil MS**

**Blank (1708053-BLK1)**

Prepared & Analyzed: 08/04/17

Naphthalene	ND	0.010	mg/kg							
Benzene	ND	0.0020	"							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	50	"							
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0416</i>		<i>"</i>	<i>0.0400</i>		<i>104</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0403</i>		<i>"</i>	<i>0.0400</i>		<i>101</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0395</i>		<i>"</i>	<i>0.0400</i>		<i>98.7</i>	<i>21-167</i>			

**LCS (1708053-BS1)**

Prepared & Analyzed: 08/04/17

Naphthalene	ND	0.010	mg/kg				66-138			
Benzene	0.0874	0.0020	"	0.100		87.4	58-130			
Toluene	0.0938	0.0050	"	0.100		93.8	61-134			
Ethylbenzene	0.0943	0.0050	"	0.0992		95.1	74-139			
m,p-Xylene	0.181	0.010	"	0.200		90.9	73-137			
o-Xylene	0.0928	0.0050	"	0.0980		94.7	73-141			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0403</i>		<i>"</i>	<i>0.0400</i>		<i>101</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0411</i>		<i>"</i>	<i>0.0400</i>		<i>103</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0384</i>		<i>"</i>	<i>0.0400</i>		<i>96.1</i>	<i>21-167</i>			

**Matrix Spike (1708053-MS1)**

Source: 1708027-01

Prepared & Analyzed: 08/04/17

Naphthalene	ND	0.010	mg/kg		ND		10-158			
Benzene	0.0848	0.0020	"	0.100	ND	84.8	30-131			
Toluene	0.0891	0.0050	"	0.100	ND	89.1	30-134			
Ethylbenzene	0.0883	0.0050	"	0.0992	ND	89.0	22-153			
m,p-Xylene	0.171	0.010	"	0.200	ND	85.5	10-159			
o-Xylene	0.0859	0.0050	"	0.0980	ND	87.6	31-151			
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0420</i>		<i>"</i>	<i>0.0400</i>		<i>105</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0404</i>		<i>"</i>	<i>0.0400</i>		<i>101</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0375</i>		<i>"</i>	<i>0.0400</i>		<i>93.8</i>	<i>21-167</i>			

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Brunns

**Reported:**  
08/10/17 13:28

**Volatile Organic Compounds by EPA Method 8260B - Quality Control**  
**Summit Scientific**

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

**Batch 1708053 - EPA 5030 Soil MS**

<b>Matrix Spike Dup (1708053-MSD1)</b>	<b>Source: 1708027-01</b>			<b>Prepared &amp; Analyzed: 08/04/17</b>						
Naphthalene	ND	0.010	mg/kg	ND	ND	10-158			42	
Benzene	0.0761	0.0020	"	0.100	ND	76.1	30-131	10.9	34	
Toluene	0.0807	0.0050	"	0.100	ND	80.7	30-134	9.82	30	
Ethylbenzene	0.0807	0.0050	"	0.0992	ND	81.4	22-153	8.98	24	
m,p-Xylene	0.158	0.010	"	0.200	ND	79.4	10-159	7.49	68	
o-Xylene	0.0806	0.0050	"	0.0980	ND	82.3	31-151	6.27	38	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>0.0425</i>		<i>"</i>	<i>0.0400</i>		<i>106</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>0.0402</i>		<i>"</i>	<i>0.0400</i>		<i>100</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>0.0382</i>		<i>"</i>	<i>0.0400</i>		<i>95.5</i>	<i>21-167</i>			

Summit Scientific

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Brunns

Reported:  
08/10/17 13:28

**Soluble Nutrients by EPA 6020/Mod. USDA60 6(2, 3A) - Dry Weight Basis - Quality Control**  
**Summit Scientific**

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

**Batch 1708067 - General Preparation**

**Blank (1708067-BLK1)**

Prepared & Analyzed: 08/07/17

Calcium	ND	10.0	mg/kg wet						
Magnesium	ND	5.00	"						
Sodium	ND	5.00	"						

**LCS (1708067-BS1)**

Prepared & Analyzed: 08/07/17

Calcium	485	10.0	mg/kg wet	500		97.1	82.9-118		
Magnesium	460	5.00	"	500		92.0	77.1-123		
Sodium	466	5.00	"	500		93.3	71-129		

**Duplicate (1708067-DUP1)**

Source: 1708027-01

Prepared & Analyzed: 08/07/17

Calcium	1400	11.8	mg/kg dry		1400			0.0949	200
Magnesium	414	5.92	"		420			1.34	200
Sodium	24.2	5.92	"		30.3			22.3	200

**Matrix Spike (1708067-MS1)**

Source: 1708027-01

Prepared & Analyzed: 08/07/17

Calcium	1860	11.8	mg/kg dry	592	1400	78.7	75-125		
Magnesium	998	5.92	"	592	420	97.5	75-125		
Sodium	607	5.92	"	592	30.3	97.3	75-125		

**Matrix Spike Dup (1708067-MSD1)**

Source: 1708027-01

Prepared & Analyzed: 08/07/17

Calcium	1900	11.8	mg/kg dry	592	1400	85.4	75-125	2.12	25
Magnesium	923	5.92	"	592	420	85.0	75-125	7.74	25
Sodium	565	5.92	"	592	30.3	90.3	75-125	7.03	25

Summit Scientific

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Tasman Geosciences  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/10/17 13:28

**Physical Parameters by APHA/ASTM/EPA Methods - Quality Control**  
**Summit Scientific**

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

**Batch 1708058 - General Preparation**

<b>Blank (1708058-BLK1)</b>		Prepared & Analyzed: 08/04/17							
Specific Conductance (EC)	ND	0.0100	mmhos/cm						
<b>LCS (1708058-BS1)</b>		Prepared & Analyzed: 08/04/17							
Specific Conductance (EC)	0.750	0.0100	mmhos/cm	0.750	100	90-110			
<b>Duplicate (1708058-DUP1)</b>		<b>Source: 1708027-01</b>		Prepared & Analyzed: 08/04/17					
Specific Conductance (EC)	0.391	0.0100	mmhos/cm		0.392		0.243	20	

**Batch 1708059 - General Preparation**

<b>LCS (1708059-BS1)</b>		Prepared & Analyzed: 08/04/17							
pH	6.02	0.100	pH Units	6.00	100	95-105			
<b>Duplicate (1708059-DUP1)</b>		<b>Source: 1708027-01</b>		Prepared & Analyzed: 08/04/17					
pH	8.77	0.100	pH Units		8.80		0.341	20	

**Batch 1708060 - General Preparation**

<b>Duplicate (1708060-DUP1)</b>		<b>Source: 1708027-01</b>		Prepared & Analyzed: 08/04/17					
% Solids	83.1		%		84.4		1.55	20	

Summit Scientific

*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  
6899 Pecos Street  
Denver CO, 80221

Project: Rothe BB 30-23

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
08/10/17 13:28

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference