



Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

November 29, 2018

Brandon Bruns

Tasman Geosciences

6899 Pecos St, Unit C

Denver, CO 80221

RE: Noble - Shable 22-23,24,25

Enclosed are the results of analyses for samples received by Summit Scientific on 11/20/18 18:50. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul Shrewsbury', with a stylized, cursive script.

Paul Shrewsbury For Ben Shrewsbury

Laboratory Manager



Tasman Geosciences
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Shable 22-23,24,25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/29/18 11:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS01@3'	1811257-01	Soil	11/20/18 09:35	11/20/18 18:50
SS05@7'	1811257-05	Soil	11/20/18 09:45	11/20/18 18:50
SS06@3'	1811257-06	Soil	11/20/18 10:00	11/20/18 18:50
SS10@7'	1811257-10	Soil	11/20/18 10:10	11/20/18 18:50

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1811257

Page 1 of 1

Project Manager: Brandon Bruns, Invoice: ~~Jacob Evans~~ *Howard Arnold*
E-Mail: bbruns@tasman-geo.com
Project Name: *Shale 22-23, 24, 25*
Project Number:

www.s2scientific.com

1811257

Sample Receipt Checklist

S2 Work Order _____

Client: Noble/Tasman Client Project ID: Shable 22-23, 24, 25Shipped Via: H.D./P.U./FedEx/UPS/USPS/Other P.U. Airbill #: _____Matrix (check all that apply): Air ✓ Soil/Solid Water Other: _____
(Describe)

Temp (°C)	<u>4.5</u>
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Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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 ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If custody seals are present, are they intact ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
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 ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Record the pH in Comments.				
If dissolved metals are requested, were samples field filtered?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Additional Comments (if any):				

⁽¹⁾ If NO, then contact the client before proceeding with analysis and note in case narrative.UP
Custodian Printed Name or Initials[Signature]
Signature of Custodian11-20-18 1850
Date/Time



Tasman Geosciences
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Shable 22-23,24,25

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11/29/18 11:39

SS01@3'
1811257-01 (Soil)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0020	mg/kg	1	1811284	11/21/18	11/22/18	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Naphthalene	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		105 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.4 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.2 %	21-167		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1811283	11/21/18	11/23/18	EPA 8015M	

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		83.6 %	30-150		"	"	"	"	

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

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	809	10.7	mg/kg dry	1	1811282	"	11/22/18	EPA 6020B	

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Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/29/18 11:39

SS01@3'
1811257-01 (Soil)

Summit Scientific

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

Magnesium	173	5.35	mg/kg dry	1	1811282	11/21/18	11/22/18	EPA 6020B
Sodium	12.5	5.35	"	"	"	"	"	"

Calculated Analysis

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	0.104	0.100	units	1	1811324	11/27/18	11/27/18	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	93.5		%	1	1811275	11/21/18	11/21/18	Calculation	
pH	8.10		pH Units	"	1811321	11/26/18	11/27/18	EPA 9045D	

Specific Conductance by EPA Method 120.1

Date Sampled: **11/20/18 09:35**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.471	0.0100	mmhos/cm	1	1811279	11/21/18	11/21/18	EPA 120.1	

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Project Number: [none]
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SS05@7'
1811257-05 (Soil)

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Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/20/18 09:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	1811284	11/21/18	11/22/18	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Naphthalene	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **11/20/18 09:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		109 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.4 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.9 %	21-167		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **11/20/18 09:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	1811283	11/21/18	11/23/18	EPA 8015M	

Date Sampled: **11/20/18 09:45**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		83.8 %	30-150		"	"	"	"	

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Project: Noble - Shable 22-23,24,25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
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SS06@3'
1811257-06 (Soil)

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Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	ND	0.0020	mg/kg	1	1811284	11/21/18	11/22/18	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Naphthalene	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		109 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		97.1 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.1 %	21-167		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C10-C28 (DRO)	ND	50	mg/kg	1	1811283	11/21/18	11/23/18	EPA 8015M	

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: o-Terphenyl		85.7 %	30-150		"	"	"	"	

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

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Calcium	1100	10.7	mg/kg dry	1	1811282	"	11/22/18	EPA 6020B	
Magnesium	184	5.37	"	"	"	"	"	"	

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SS06@3'
1811257-06 (Soil)

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

Sodium	12.9	5.37	mg/kg dry	1	1811282	11/21/18	11/22/18	EPA 6020B
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Calculated Analysis

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Sodium Adsorption Ratio	ND	0.100	units	1	1811324	11/27/18	11/27/18	Calculation	

Physical Parameters by APHA/ASTM/EPA Methods

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
% Solids	93.1		%	1	1811275	11/21/18	11/21/18	Calculation	
pH	8.50		pH Units	"	1811321	11/26/18	11/27/18	EPA 9045D	

Specific Conductance by EPA Method 120.1

Date Sampled: **11/20/18 10:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Specific Conductance (EC)	0.322	0.0100	mmhos/cm	1	1811279	11/21/18	11/21/18	EPA 120.1	

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Project Number: [none]
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Reported:
11/29/18 11:39

SS10@7'
1811257-10 (Soil)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/20/18 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	0.0020	mg/kg	1	1811284	11/21/18	11/22/18	EPA 8260B	
Toluene	ND	0.0050	"	"	"	"	"	"	
Ethylbenzene	ND	0.0050	"	"	"	"	"	"	
Xylenes (total)	ND	0.010	"	"	"	"	"	"	
Naphthalene	ND	0.010	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	50	"	"	"	"	"	"	

Date Sampled: **11/20/18 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		105 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		95.6 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		93.4 %	21-167		"	"	"	"	

Extractable Petroleum Hydrocarbons by 8015

Date Sampled: **11/20/18 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
C10-C28 (DRO)	ND	50	mg/kg	1	1811283	11/21/18	11/23/18	EPA 8015M	

Date Sampled: **11/20/18 10:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: o-Terphenyl		82.7 %	30-150		"	"	"	"	

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Project Number: [none]
Project Manager: Brandon Brun

Reported:
11/29/18 11:39

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1811284 - EPA 5030 Soil MS

Blank (1811284-BLK1)

Prepared: 11/21/18 Analyzed: 11/27/18

Benzene	ND	0.0020	mg/kg							
Toluene	ND	0.0050	"							
Ethylbenzene	ND	0.0050	"							
Xylenes (total)	ND	0.010	"							
Naphthalene	ND	0.010	"							
Gasoline Range Hydrocarbons	ND	50	"							
Surrogate: 1,2-Dichloroethane-d4	0.0413		"	0.0396	104	23-173				
Surrogate: Toluene-d8	0.0374		"	0.0400	93.5	20-170				
Surrogate: 4-Bromofluorobenzene	0.0401		"	0.0400	100	21-167				

LCS (1811284-BS1)

Prepared: 11/21/18 Analyzed: 11/27/18

Benzene	0.0810	0.0020	mg/kg	0.100	81.0	70-130				
Toluene	0.0922	0.0050	"	0.100	92.2	70-130				
Ethylbenzene	0.109	0.0050	"	0.100	109	70-130				
m,p-Xylene	0.212	0.010	"	0.200	106	70-130				
o-Xylene	0.101	0.0050	"	0.100	101	70-130				
Surrogate: 1,2-Dichloroethane-d4	0.0418		"	0.0396	106	23-173				
Surrogate: Toluene-d8	0.0401		"	0.0400	100	20-170				
Surrogate: 4-Bromofluorobenzene	0.0412		"	0.0400	103	21-167				

Matrix Spike (1811284-MS1)

Source: 1811248-01

Prepared: 11/21/18 Analyzed: 11/27/18

Benzene	0.0769	0.0020	mg/kg	0.100	ND	76.9	70-130			
Toluene	0.0905	0.0050	"	0.100	ND	90.5	70-130			
Ethylbenzene	0.110	0.0050	"	0.100	ND	110	70-130			
m,p-Xylene	0.214	0.010	"	0.200	ND	107	70-130			
o-Xylene	0.103	0.0050	"	0.100	ND	103	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0440		"	0.0396	111	23-173				
Surrogate: Toluene-d8	0.0388		"	0.0400	97.1	20-170				
Surrogate: 4-Bromofluorobenzene	0.0416		"	0.0400	104	21-167				

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Project Number: [none]
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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 1811284 - EPA 5030 Soil MS

Matrix Spike Dup (1811284-MSD1)		Source: 1811248-01			Prepared: 11/21/18 Analyzed: 11/27/18					
Benzene	0.0791	0.0020	mg/kg	0.100	ND	79.1	70-130	2.85	30	
Toluene	0.0923	0.0050	"	0.100	ND	92.3	70-130	1.97	30	
Ethylbenzene	0.108	0.0050	"	0.100	ND	108	70-130	2.26	30	
m,p-Xylene	0.211	0.010	"	0.200	ND	106	70-130	1.12	30	
o-Xylene	0.101	0.0050	"	0.100	ND	101	70-130	1.44	30	
Surrogate: 1,2-Dichloroethane-d4	0.0415		"	0.0396		105	23-173			
Surrogate: Toluene-d8	0.0393		"	0.0400		98.2	20-170			
Surrogate: 4-Bromofluorobenzene	0.0400		"	0.0400		99.9	21-167			

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Project Number: [none]
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Extractable Petroleum Hydrocarbons by 8015 - Quality Control
Summit Scientific

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

Batch 1811283 - EPA 3550A

Blank (1811283-BLK1)

Prepared: 11/21/18 Analyzed: 11/22/18

C10-C28 (DRO) ND 50 mg/kg

LCS (1811283-BS1)

Prepared: 11/21/18 Analyzed: 11/22/18

C10-C28 (DRO) 606 50 mg/kg 500 121 70-130

Matrix Spike (1811283-MS1)

Source: 1811238-01

Prepared: 11/21/18 Analyzed: 11/22/18

C10-C28 (DRO) 607 50 mg/kg 500 37.5 114 70-130

Matrix Spike Dup (1811283-MSD1)

Source: 1811238-01

Prepared: 11/21/18 Analyzed: 11/22/18

C10-C28 (DRO) 631 50 mg/kg 500 37.5 119 70-130 3.93 20

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Project: Noble - Shable 22-23,24,25

Project Number: [none]
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Soluble Nutrients by EPA 6020/USDA60 6(2, 3A) - Dry Weight Basis - Quality Control

Summit Scientific

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

Batch 1811282 - General Preparation

Blank (1811282-BLK1)

Prepared & Analyzed: 11/21/18

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

LCS (1811282-BS1)

Prepared & Analyzed: 11/21/18

Calcium	281	10.0	mg/kg wet	250	112	70-130
Magnesium	311	5.00	"	250	124	70-130
Sodium	274	5.00	"	250	109	70-130

Duplicate (1811282-DUP1)

Source: 1811247-01

Prepared & Analyzed: 11/21/18

Calcium	227	11.2	mg/kg dry	234	3.19	20
Magnesium	118	5.59	"	125	5.81	20
Sodium	21.6	5.59	"	33.0	41.6	20

Matrix Spike (1811282-MS1)

Source: 1811247-01

Prepared & Analyzed: 11/21/18

Calcium	496	11.2	mg/kg dry	280	234	93.7	70-130
Magnesium	455	5.59	"	280	125	118	70-130
Sodium	324	5.59	"	280	33.0	104	70-130

Matrix Spike Dup (1811282-MSD1)

Source: 1811247-01

Prepared & Analyzed: 11/21/18

Calcium	507	11.2	mg/kg dry	280	234	97.4	70-130	2.07	25
Magnesium	431	5.59	"	280	125	109	70-130	5.58	25
Sodium	301	5.59	"	280	33.0	95.9	70-130	7.22	25

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Project: Noble - Shable 22-23,24,25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/29/18 11:39

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

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

Batch 1811275 - General Preparation

Duplicate (1811275-DUP1)		Source: 1811247-01			Prepared & Analyzed: 11/21/18						
% Solids	89.6		%		89.4			0.212		20	

Batch 1811321 - General Preparation

LCS (1811321-BS1)		Prepared: 11/26/18 Analyzed: 11/27/18									
pH	9.2		pH Units		9.18		100		95-105		
Duplicate (1811321-DUP1)		Source: 1811291-01			Prepared: 11/26/18 Analyzed: 11/27/18						
pH	8.5		pH Units		8.5			0.00		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 St, Unit C
Denver CO, 80221

Project: Noble - Shable 22-23,24,25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/29/18 11:39

Specific Conductance by EPA Method 120.1 - Quality Control
Summit Scientific

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

Batch 1811279 - General Preparation

Blank (1811279-BLK1)

Prepared & Analyzed: 11/21/18

Specific Conductance (EC) ND 0.0100 mmhos/cm

LCS (1811279-BS1)

Prepared & Analyzed: 11/21/18

Specific Conductance (EC) 0.761 0.0100 mmhos/cm 0.750 101 90-110

Duplicate (1811279-DUP1)

Source: 1811184-01

Prepared & Analyzed: 11/21/18

Specific Conductance (EC) 5.41 0.0100 mmhos/cm 6.27 14.7 20

Summit Scientific

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6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Shable 22-23,24,25

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/29/18 11:39

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