

**FOURTH QUARTER 2019
SITE MONITORING DATA
DUNCAN D20-12, 20-13**

COGCC SPILL TRACKING # 459804
COGCC REMEDIATION # 12461

Prepared for:



2115 117th Avenue
Greeley, CO 80631

Prepared by:



6855 West 119th Avenue
Broomfield, Colorado 80020

TABLE 1
GROUNDWATER ELEVATION DATA
NOBLE ENERGY, INC. - DUNCAN D20-12, 20-13

Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.) ⁽¹⁾	Depth to LNAPL (ft.) ⁽¹⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)
BH01	08/23/19	4772.46	21.77	5.32	ND	ND	4765.17
BH01	11/15/19	4772.46	21.68	5.73	ND	ND	4764.76
BH02	08/23/19	4773.47	17.30	5.47	ND	ND	4765.14
BH02	11/15/19	4773.47	17.23	5.89	ND	ND	4764.72
BH03	08/23/19	4770.68	14.10	5.83	ND	ND	4765.26
BH03	11/15/19	4770.68	13.92	6.27	ND	ND	4764.82
BH04	08/23/19	4773.76	20.74	5.62	ND	ND	4765.20
BH04	11/15/19	4773.76	19.76	6.02	ND	ND	4764.80
BH05	08/23/19	4772.36	20.15	5.56	ND	ND	4765.12
BH05	11/15/19	4772.36	19.69	5.93	ND	ND	4764.75
BH06	08/23/19	4772.64	16.63	5.53	ND	ND	4765.18
BH06	11/15/19	4772.64	16.59	5.90	ND	ND	4764.81

ft. = Feet

AMSL = Above mean sea level

BTOC = Below top of casing

LNAPL = Light non-aqueous phase liquid

ND = No LNAPL detected

1) Depth to water measurements were collected from top of casing and adjusted using survey data to reflect depth of water from ground surface.

* Groundwater elevation was corrected for product thickness (when present) using the following calculation:

Groundwater elevation = (TOC Elevation - Measured Depth to Water)+(LNAPL Thickness in Well x LNAPL Relative Density)

LNAPL relative density was estimated to be approximately 0.75

TABLE 2
GROUNDWATER ANALYTICAL DATA
NOBLE ENERGY, INC. - DUNCAN D20-12, 20-13

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
COGCC Standard		5	560	700	1,400
GW01	12/10/18	970	3.2	560	3,800
BH01	08/23/19	440	<1.0	490	1,400
BH01	11/15/19	840	<1.0	420	1,200
BH02	08/23/19	<1.0	<1.0	<1.0	<2.0
BH02	11/15/19	<1.0	<1.0	<1.0	<2.0
BH03	08/23/19	<1.0	<1.0	<1.0	<2.0
BH03	11/15/19	<1.0	<1.0	<1.0	<2.0
BH04	08/23/19	<1.0	<1.0	<1.0	<2.0
BH04	11/15/19	<1.0	<1.0	<1.0	<2.0
BH05	08/23/19	340	<1.0	500	1,700
BH05	11/15/19	530	<1.0	490	1,600
BH06	08/23/19	<1.0	<1.0	<1.0	<2.0
BH06	11/15/19	<1.0	<1.0	<1.0	<2.0

Notes:

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

< = Analytical result is less than the indicated laboratory reporting limit

Groundwater standards referenced from COGCC Table 910-1

Highlighted results are equal to or exceed the COGCC Table 910-1 standard

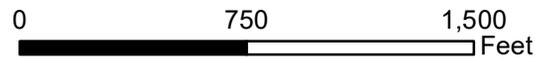
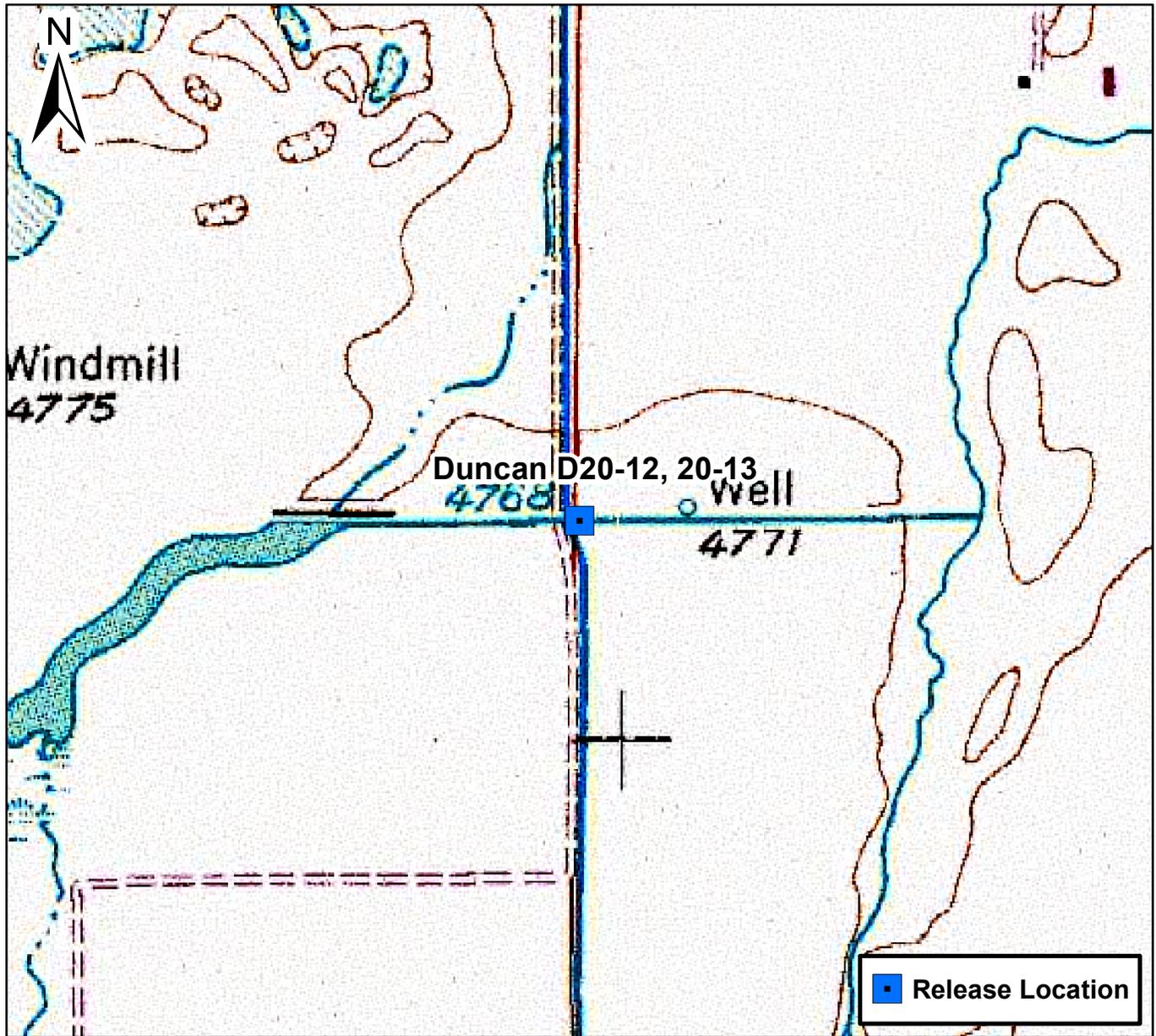
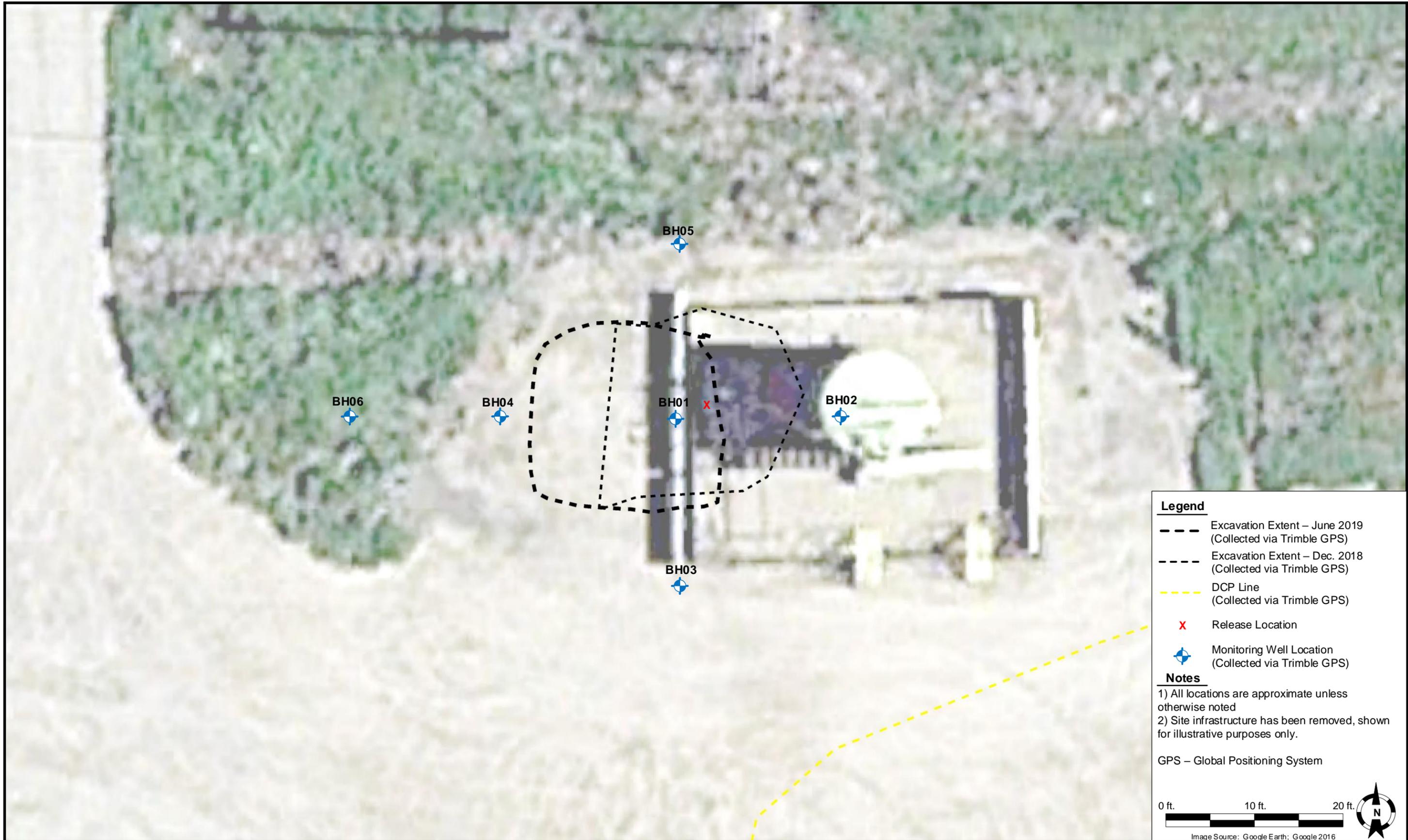


Figure 1

Site Location Map
 Duncan D20-12, 20-13
 NWSW S20 T3N R64W
 Weld County, Colorado





Legend

- Excavation Extent – June 2019 (Collected via Trimble GPS)
- ... Excavation Extent – Dec. 2018 (Collected via Trimble GPS)
- - - DCP Line (Collected via Trimble GPS)
- X Release Location
- Monitoring Well Location (Collected via Trimble GPS)

Notes

- 1) All locations are approximate unless otherwise noted
- 2) Site infrastructure has been removed, shown for illustrative purposes only.

GPS – Global Positioning System

0 ft. 10 ft. 20 ft.

Image Source: Google Earth; Google 2016

DATE:	9/10/2019
DESIGNED BY:	JW
DRAWN BY:	MG



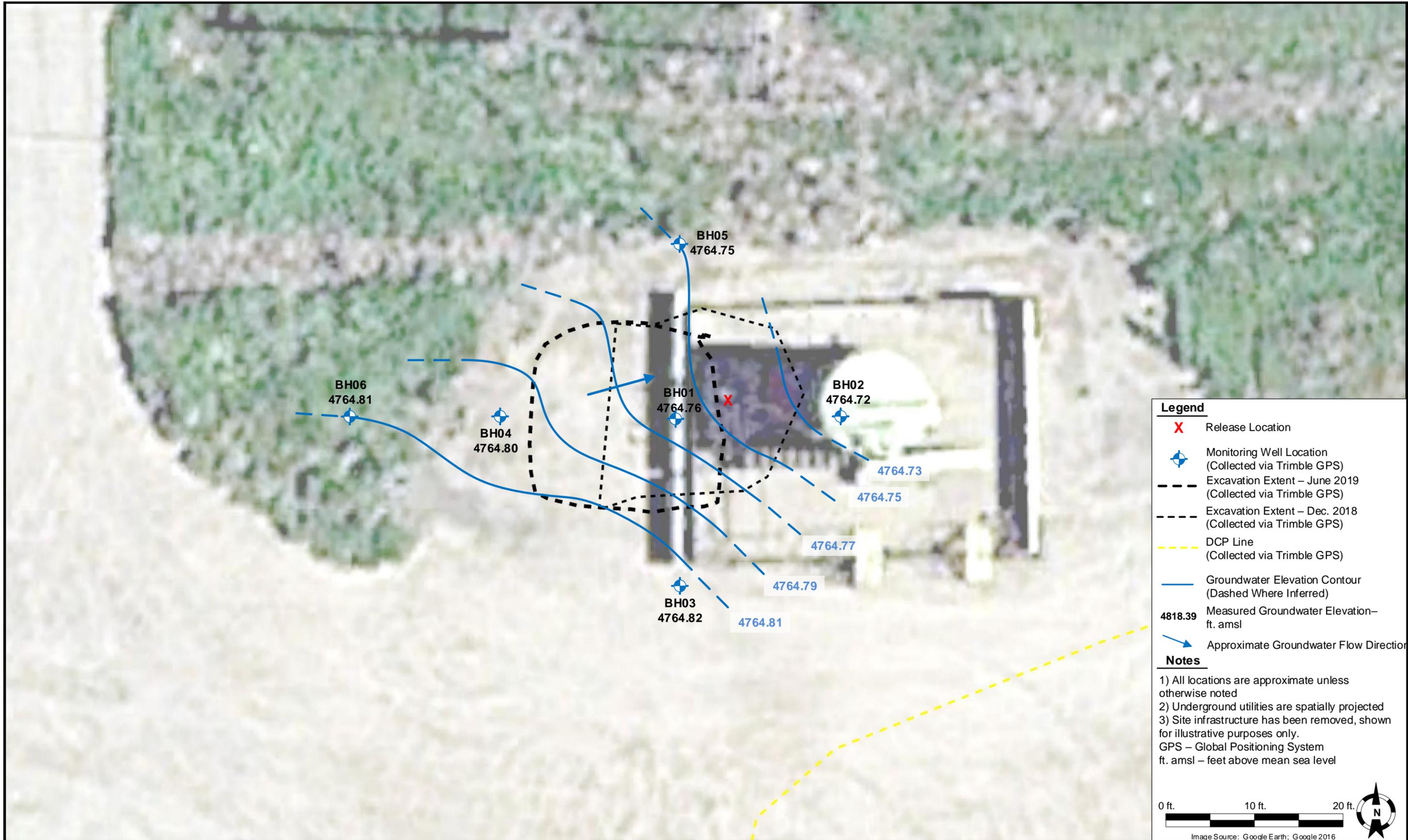
TASMAN
GEOSCIENCES

Tasman Geosciences, Inc.
6855 W. 119th Avenue
Broomfield, CO 80020

Noble Energy, Inc. – DJ Basin
Duncan D20-12, 20-13
 NWSW, Section 20, Township 3 North, Range 64 West
 Weld County, Colorado

Site Overview

FIGURE
2



Legend

- X Release Location
- Monitoring Well Location (Collected via Trimble GPS)
- Excavation Extent – June 2019 (Collected via Trimble GPS)
- Excavation Extent – Dec. 2018 (Collected via Trimble GPS)
- DCP Line (Collected via Trimble GPS)
- Groundwater Elevation Contour (Dashed Where Inferred)
- 4818.39** Measured Groundwater Elevation–ft. amsl
- Approximate Groundwater Flow Direction

Notes

- 1) All locations are approximate unless otherwise noted
- 2) Underground utilities are spatially projected
- 3) Site infrastructure has been removed, shown for illustrative purposes only.

GPS – Global Positioning System
ft. amsl – feet above mean sea level

0 ft. 10 ft. 20 ft.

Image Source: Google Earth; Google 2016

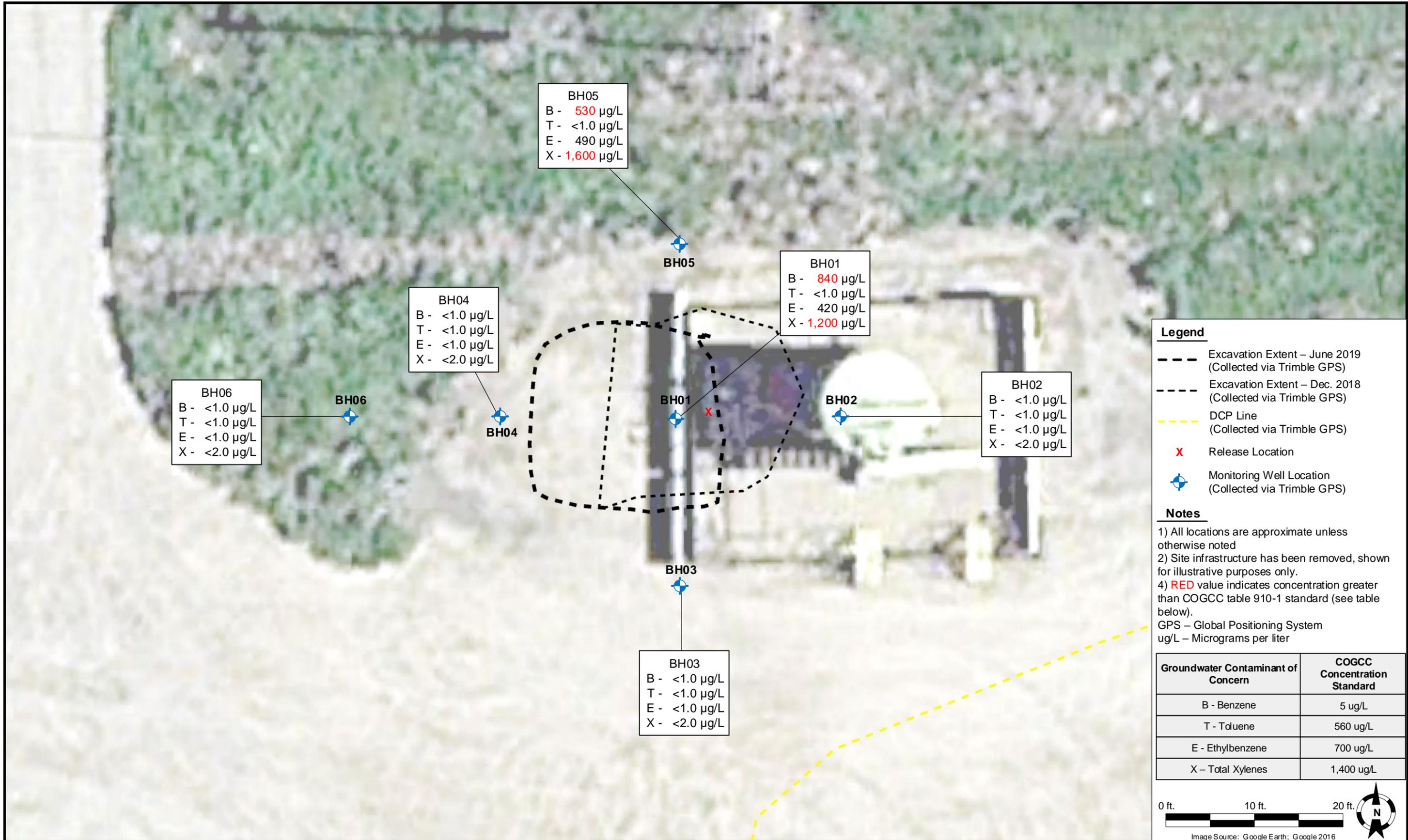
DATE:	11/27/2019
DESIGNED BY:	JW
DRAWN BY:	TC

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GEOSCIENCES

Tasman Geosciences, Inc.
6855 W. 119th Avenue
Broomfield, CO, 80020

Noble Energy, Inc. – DJ Basin
Duncan D20-12, 20-13
NWSW, Section 20, Township 3 North, Range 64 West
Weld County, Colorado

Groundwater Potentiometric
Surface Contour Figure
(11/15/2019)



DATE: 11/27/2019

DESIGNED BY: JW

DRAWN BY: TC

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Tasman Geosciences, Inc.
 6855 W. 119th Avenue
 Broomfield, CO 80020

Noble Energy, Inc. – DJ Basin
Duncan D20-12, 20-13
 NWSW, Section 20, Township 3 North, Range 64 West
 Weld County, Colorado

Groundwater Analytical Results
 Map
 (11/15/2019)

FIGURE
 4

Figure 5
Duncan D20-12, 20-13
Average Benzene Concentration VS Quarterly Sampling Event Date



Notes

(µg/L) = Micrograms per liter

COGCC = Colorado Oil and Gas Conservation Commission

*Values below laboratory detection limits represented as 1.

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

November 21, 2019

Brandon Bruns

Tasman Geosciences

6855 W. 119th Ave.

Broomfield, CO 80020

RE: Noble - Duncan D20-12, 20-13

Work Order # 1911234

Enclosed are the results of analyses for samples received by Summit Scientific on 11/15/19 17:20. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Muri Premer". The signature is written in a cursive style with a large initial "M" and a long, sweeping underline.

Muri Premer For Paul Shrewsbury

President



Tasman Geosciences
6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1911234-01	Water	11/15/19 14:00	11/15/19 17:20
BH02	1911234-02	Water	11/15/19 13:35	11/15/19 17:20
BH03	1911234-03	Water	11/15/19 13:48	11/15/19 17:20
BH04	1911234-04	Water	11/15/19 14:02	11/15/19 17:20
BH05	1911234-05	Water	11/15/19 13:45	11/15/19 17:20
BH06	1911234-06	Water	11/15/19 13:35	11/15/19 17:20

Summit Scientific

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1911234

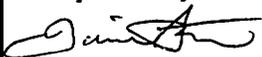
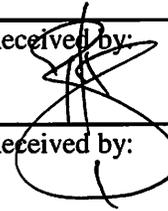
Summit Scientific

S₂

4653 Table Mountain Drive ♦ Golden, Colorado 80403
303-277-9310

Client: Noble / Tasman	Project Manager: Brandon Bruns, Invoice: Jacob Evans
Address: 6899 Pecos Street	E-Mail: Bbruns@tasman-geo.com
City/State/Zip: Denver / CO/ 80221	
Phone: 303-487-1228	Project Name: B. Duncan Duncan D20-12, 20-13
Sampler Name: GB, DS	Project Number:

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested					Special Instructions
					HCl	HNO3	None	Other	Water	Soil	Air-Canister #	Other	8260 BTEX	8260B GBTEXN	8015 DRO	pH, EC, SAR		
1	BH01	11/15/19	14:00	3			x		x				x					
2	BH02	11/15/19	13:35	3			x		x				x					
3	BH03	11/15/19	13:48	3			x		x				x					
4	BH04	11/15/19	14:02	3			x		x				x					
5	BH05	11/15/19	13:45	3			x		x				x					
6	BH06	11/15/19	13:35	3			x		x				x					
7																		
8																		
9																		
10																		

Relinquished by:  Date/Time: 11/15/19 15:20	Received by: Tasman's Lock Box Date/Time: 11/15/19 15:20	Turn Around Time (Check) Same Day <input type="checkbox"/> 72 hours <input type="checkbox"/> 24 hours <input type="checkbox"/> Standard <input checked="" type="checkbox"/> 48 hours <input type="checkbox"/>	Notes: Sample Integrity: Temperature Upon Receipt: <u>2.4</u> Samples Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Relinquished by: Tasman's Lock Box Date/Time: 11/15/19 17:20	Received by:  Date/Time: 11/15/19 17:20		
Relinquished by: Date/Time:	Received by: Date/Time:		

Sample Receipt Checklist

S2 Work Order 1911234

Client: Noble/Tasman Client Project ID: Duncan D20-12, 20-13

Shipped Via: H.D./P.U./FedEx/UPS/USPS/Other _____ Airbill #: _____

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

Temp (°C)	<u>2.4</u>
-----------	------------

Thermometer ID: 61857155-K

	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature at 4°C +/- 2°C ⁽¹⁾ ? NOTE: If samples are delivered the same day of sampling, this requirement is met provided that there is evidence that cooling has begun.	<input checked="" type="checkbox"/>			
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
If custody seals are present, are they intact ⁽¹⁾ ?			<input checked="" type="checkbox"/>	
Are samples with holding times due within 48 hours sample due within 48 hours present?		<input checked="" type="checkbox"/>		
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		<input checked="" type="checkbox"/>		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? Note the type of preservative in the Comments column – HCl, H2SO4, NaOH, HNO3, ect			<input checked="" type="checkbox"/>	
If samples are acid preserved for metals, is the pH ≤ 2 ⁽¹⁾ ? Record the pH in Comments.			<input checked="" type="checkbox"/>	
If dissolved metals are requested, were samples field filtered?			<input checked="" type="checkbox"/>	
Additional Comments (if any):				

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

RG
Custodian Printed Name or Initials

[Signature]
Signature of Custodian

11/15/19
Date/Time 1804



Tasman Geosciences
6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

BH01
1911234-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/15/19 14:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	840	100	ug/l	100	1911215	11/19/19	11/20/19	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
Ethylbenzene	420	100	"	100	"	"	"	"	
Xylenes (total)	1200	200	"	"	"	"	"	"	

Date Sampled: **11/15/19 14:00**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		117 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		93.6 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		138 %	21-167		"	"	"	"	

Summit Scientific

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Tasman Geosciences
6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

BH02
1911234-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/15/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1911215	11/19/19	11/20/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **11/15/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		106 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		96.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.7 %		21-167		"	"	"	"	

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Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

BH03
1911234-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/15/19 13:48**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1911215	11/19/19	11/20/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **11/15/19 13:48**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		102 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		94.3 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.0 %		21-167		"	"	"	"	

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6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

BH04
1911234-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/15/19 14:02**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1911215	11/19/19	11/20/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **11/15/19 14:02**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		103 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		95.1 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		106 %		21-167		"	"	"	"	

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Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

BH05
1911234-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/15/19 13:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Benzene	530	100	ug/l	100	1911215	11/19/19	11/20/19	EPA 8260B	
Toluene	ND	1.0	"	1	"	"	"	"	
Ethylbenzene	490	100	"	100	"	"	"	"	
Xylenes (total)	1600	200	"	"	"	"	"	"	

Date Sampled: **11/15/19 13:45**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Surrogate: 1,2-Dichloroethane-d4		125 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		96.2 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		123 %	21-167		"	"	"	"	

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6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

BH06
1911234-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **11/15/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1911215	11/19/19	11/20/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **11/15/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		106 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.6 %		21-167		"	"	"	"	

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Tasman Geosciences
6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

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 1911215 - EPA 5030 Water MS

Blank (1911215-BLK1)

Prepared & Analyzed: 11/19/19

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.2		"	13.3		99.1	23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.0	20-170			
Surrogate: 4-Bromofluorobenzene	12.3		"	13.3		92.4	21-167			

LCS (1911215-BS1)

Prepared & Analyzed: 11/19/19

Benzene	25.3	1.0	ug/l	33.3		76.0	51-132			
Toluene	26.5	1.0	"	33.3		79.6	51-138			
Ethylbenzene	27.5	1.0	"	33.3		82.6	58-146			
m,p-Xylene	54.8	2.0	"	66.7		82.1	57-144			
o-Xylene	25.4	1.0	"	33.3		76.3	53-146			
Surrogate: 1,2-Dichloroethane-d4	14.6		"	13.3		110	23-173			
Surrogate: Toluene-d8	13.3		"	13.3		99.5	20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.7	21-167			

Matrix Spike (1911215-MS1)

Source: 1911197-01

Prepared & Analyzed: 11/19/19

Benzene	25.6	1.0	ug/l	33.3	ND	76.8	34-141			
Toluene	27.0	1.0	"	33.3	ND	81.2	27-151			
Ethylbenzene	28.0	1.0	"	33.3	ND	83.9	29-160			
m,p-Xylene	56.4	2.0	"	66.7	ND	84.6	20-166			
o-Xylene	26.5	1.0	"	33.3	ND	79.6	33-159			
Surrogate: 1,2-Dichloroethane-d4	14.2		"	13.3		107	23-173			
Surrogate: Toluene-d8	13.1		"	13.3		98.0	20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		96.2	21-167			

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
6855 W. 119th Ave.
Broomfield CO, 80020

Project: Noble - Duncan D20-12, 20-13

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
11/21/19 16:00

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1911215 - EPA 5030 Water MS

Matrix Spike Dup (1911215-MSD1)	Source: 1911197-01			Prepared: 11/19/19 Analyzed: 11/20/19						
Benzene	25.2	1.0	ug/l	33.3	ND	75.6	34-141	1.61	30	
Toluene	26.2	1.0	"	33.3	ND	78.8	27-151	3.00	30	
Ethylbenzene	26.9	1.0	"	33.3	ND	80.7	29-160	3.87	30	
m,p-Xylene	53.9	2.0	"	66.7	ND	80.8	20-166	4.54	30	
o-Xylene	25.1	1.0	"	33.3	ND	75.4	33-159	5.46	30	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>14.6</i>		<i>"</i>	<i>13.3</i>		<i>109</i>	<i>23-173</i>			
<i>Surrogate: Toluene-d8</i>	<i>12.8</i>		<i>"</i>	<i>13.3</i>		<i>95.8</i>	<i>20-170</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>13.1</i>		<i>"</i>	<i>13.3</i>		<i>98.3</i>	<i>21-167</i>			

Summit Scientific

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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