

**THIRD QUARTER 2019
SITE MONITORING DATA**

KNAUS 28-8

COGCC SPILL TRACKING # 445476
COGCC REMEDIATION # 9767

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1.0 INTRODUCTION

This third quarter 2019 Site Monitoring and Remediation Summary Report (Report) presents the results of groundwater sampling activities and details the installation and operation of an air sparge (AS) remediation system (System) at the Knaus 28-8 site (Site).

Third quarter 2019 field activities detailed in this report were performed by Tasman Geosciences, Inc. (Tasman), on behalf of Noble Energy, Inc. (Noble) in order to further evaluate groundwater conditions and conduct remediation activities at the Site. The data collected was used to develop the analytical summary tables, groundwater elevation map, and analytical results map presented herein.

1.1 Site Background

The Site is located approximately four miles southwest of the town of Lucerne in Weld County, Colorado, as shown on Figure 1. The site is surrounded by crop land, and the legal description is the southeast $\frac{1}{4}$ of the northeast $\frac{1}{4}$ of Section 28, Township 6 North, Range 66 West, of the 6th Principal Meridian. The Site is approximately 465 feet west of the Weld County Road 31, and has coordinates of 40.461743°, -104.775176°.

On April 12, 2016, Noble discovered surfaced fluids in an agricultural field near the Knaus 28-8 wellhead. Subsequently, Noble filed a Form 19 Initial Spill/Release Report (Form 19) with the Colorado Oil and Gas Conservation Commission (COGCC) for the incident (Document # 401026744). The Form 19 was received by the COGCC and the incident was designated Spill/Release ID # 445476.

An excavation to repair the line was conducted at the Site in April 2016, where Tasman collected confirmation samples from the excavation sidewalls and base. Based on Site excavation sampling results, Site assessment activities were conducted at the Site between April and May 2016. A remedial excavation was conducted in February 2017 to remove remaining soil impacts that were detected during the initial excavation to repair the line. Analytical results for soil and groundwater samples collected during site assessment and excavation activities are presented in the *Knaus 28-2 Excavation and Site Assessment Activities Report* (February 1, 2017). A Form 27 pertaining to remediation activities at the Site was received by the COGCC on July 21, 2016, and document number 200439963 and remediation project number 9767 were assigned.

During assessment activities groundwater samples were collected and analytical results exceeded COGCC Table 910-1 standards. During the remedial excavation monitoring wells BH02, BH04, BH05, and BH06 were destroyed. Replacement wells BH02R, BH04R, BH05R, and BH06R and two additional compliance wells, BH09 and BH10 were installed in June 2017. To further delineate the groundwater plume, monitoring wells BH11 through BH18 were installed in June 2018.

2.0 THIRD QUARTER 2019 GROUNDWATER MONITORING ACTIVITIES

Third quarter 2019 groundwater monitoring activities were performed at the Site on September 12, 2019. The activities included measurement of groundwater levels and the collection of groundwater samples from each of the 18 Site monitoring well locations. Groundwater elevation measurements are presented in Table 1, and laboratory analytical data is presented in Table 2.

2.1 Groundwater Level Measurements

Both general procedures and significant observations for the groundwater gauging activities performed during the third quarter 2019 groundwater monitoring event are presented in the following sections.

General Procedures

Groundwater levels are gauged quarterly in order to evaluate hydraulic characteristics and to provide information regarding seasonal and annual fluctuations in groundwater elevations at the Site. During the third quarter 2019 groundwater monitoring event, groundwater levels were gauged at each of the 18 monitoring well locations in the Site monitoring network.

Groundwater is measured on the north side of the well casing to the nearest 0.01-foot using an oil-water interface probe (IP). Groundwater level data were subsequently converted to elevations (ft. amsl) by subtracting the measured depth-to-water (DTW) from the well's top-of-casing (TOC) elevation survey datum. When applicable, DTW data for wells containing Light Non-Aqueous Phase Liquid (LNAPL) were converted to elevation by using the assumed LNAPL density of 0.75 times that of water.

Significant Observations

During the third quarter 2019 groundwater monitoring event, the groundwater elevation at the Site ranged from 4,702.20 ft. amsl in monitoring well BH17 to 4,701.81 ft. amsl in monitoring well BH14. The groundwater potentiometric surface at the Site slopes to the south/southeast, with a hydraulic gradient of approximately 0.004 feet per foot between monitoring wells BH17 and BH14. Groundwater elevation contours and the inferred flow direction are illustrated on Figure 3. Monitoring wells BH03 and BH05R, which previously contained LNAPL, showed no signs of LNAPL during the third quarter 2019 groundwater monitoring event.

2.2 Groundwater Purging and Sampling

This section summarizes both general procedures and significant observations from the groundwater purging and sampling activities conducted on September 12, 2019. During the third

quarter 2019 groundwater monitoring event, groundwater samples were collected from each of the 18 monitoring wells in the Site monitoring well network.

General Procedures

Prior to collecting groundwater samples, groundwater levels were measured at each of the Site monitoring wells, as described above. The presence of LNAPL was also evaluated using an IP. Subsequently, a minimum of three casing volumes of groundwater (calculated from total well depth and groundwater level measurements) were purged from each well prior to collecting a groundwater sample.

Groundwater samples were collected using dedicated, disposable, polyethylene bailers and were placed in clean laboratory-supplied containers for the selected analytical method, packed in an ice-filled cooler, and kept at approximately 4 degrees Celsius for transportation to the laboratory.

Groundwater samples were submitted under standard chain-of-custody procedures to Summit Scientific Laboratory in Golden, Colorado for analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) using United States Environmental Protection Agency (USEPA) Method 8260B.

3.0 THIRD QUARTER 2019 GROUNDWATER SAMPLING RESULTS

This section presents the laboratory analytical results for groundwater samples collected during the third quarter 2019 groundwater monitoring event. Groundwater laboratory analytical data is presented in Table 2 and illustrated on Figure 4. The complete laboratory analytical reports are provided in Attachment A. A summary of the groundwater laboratory analytical data collected by Tasman is presented below:

- Benzene was detected above the COGCC Table 910-1 groundwater standard of 5 micrograms per liter ($\mu\text{g/L}$) in two of the 18 Site monitoring wells sampled. The benzene concentration was 570 $\mu\text{g/L}$ in BH02R and 260 $\mu\text{g/L}$ in BH05R.
- Toluene was not detected above the COGCC Table 910-1 groundwater standard of 560 $\mu\text{g/L}$ in any of the 18 Site monitoring wells sampled.
- Ethylbenzene was not detected above the COGCC Table 910-1 groundwater standard of 700 $\mu\text{g/L}$ in any of the 18 Site monitoring wells sampled.
- Total xylenes were not detected above the COGCC Table 910-1 groundwater standard of 1,400 $\mu\text{g/L}$ in any of the 18 Site monitoring wells sampled.

4.0 REMEDIATION SYSTEM

This section summarizes the installation and operational data for the System that operated at the Site. The remediation system was shut down a minimum of one week prior to quarterly groundwater monitoring events to allow for normalization of Site groundwater levels.

4.1 AS Remediation System Installation

On June 11, 2018 Tasman installed AS-01, which was used in an AS pilot test conducted during the third quarter 2018. Tasman returned between July 2 and 3, 2018 to install seven additional AS wells to be used in operation of the System. The AS remediation well network is illustrated on Figure 2.

Remediation AS wells were completed to a total depth of 20 ft. bgs and constructed of 1-inch schedule 40 PVC casing with 3 ft. of 0.010-inch machine-slotted PVC screen. The System remediation equipment is housed in a trailer that was placed along the eastern end of the Site, as shown on Figure 2.

4.1.1 AS Remediation System Operations

On October 16, 2018, the AS component of the System was initiated. Active AS wells included AS-01 - 08. Monitoring wells BH01 – BH06R, BH08 – BH11, and BH14 – BH18 were outfitted as passive SVE wells. A Red River Compression generator was used to power the System.

The system was shut down on March 7, 2019 for the first quarter groundwater sampling event and remained off for the remainder of the first quarter 2019 due to equipment repairs. Due to farming and irrigation activities the equipment was removed from the site on April 9, 2019. The System will be reinstalled after seasonal farming and irrigation activities conclude.

5.0 UPCOMING SITE ACTIVITIES

Anticipated upcoming Site activities include the following:

- Complete the fourth quarter 2019 groundwater sampling event in December 2019; and
- Continue monitoring LNAPL levels at BH03 and BH05R on a biweekly basis or as site access allows; and
- Remove LNAPL from wells with the use of a bailer when LNAPL is detected.
- Determine future remedial approach to employ once farming activities have ceased for the season

TABLES

**TABLE 1
GROUNDWATER ELEVATION DATA
NOBLE ENERGY, INC. - KNAUS 28-8**

Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.) ⁽⁷⁾	Depth to LNAPL (ft.) ⁽⁷⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)	
BH01	04/15/16	4660.12	16.81	14.29	ND	ND	4645.83	
BH01	06/21/16	4660.12	16.24	13.63	ND	ND	4646.49	
BH01	07/08/16	4658.07 ¹	NM	10.71	ND	ND	4647.36	
BH01	09/02/16	4658.07	14.18	9.24	ND	ND	4648.83	
BH01	12/20/16	4660.19 ⁴	16.30	14.03	ND	ND	4646.16	
BH01	06/23/17	4660.13	16.33	14.35	ND	ND	4645.78	
BH01	09/22/17	4660.13	16.31	11.82	ND	ND	4648.31	
BH01	12/07/17	4660.13	16.59	13.60	ND	ND	4646.53	
BH01	03/21/18	4660.13	16.56	14.80	ND	ND	4645.33	
BH01	06/15/18	4716.22	16.89	15.26	ND	ND	4700.96	
BH01	09/26/18	4716.22	16.84	14.29	ND	ND	4701.93	
BH01	12/14/18	4716.22	16.96	15.30	ND	ND	4700.92	
BH01	03/15/19	4716.22	17.06	16.11	ND	ND	4700.11	
BH01	06/21/19	4716.22	17.04	16.77	ND	ND	4699.45	
BH01	07/10/19	4716.22	17.06	13.58	ND	ND	4700.14	
BH01	09/12/19	4716.22	17.02	11.78	ND	ND	4701.94	
BH02	04/15/16	4660.56	17.71	17.13	ND	ND	4643.43	
BH02	06/21/16	4660.56	17.71	13.99	ND	ND	4646.57	
BH02	07/08/16	4660.56	NM	13.04	ND	ND	4647.52	
BH02	09/02/16		Well Casing Damaged - Elevation Control Lost					
BH02 ³	09/12/16	NS	14.69	8.98	ND	ND	NS	
BH02	12/20/16	NS	17.58	14.20	ND	ND	NS	
BH02	02/07/17		Well Destroyed During Excavation					
BH02R	06/23/17	4661.34	22.39	15.45	ND	ND	4645.89	
BH02R	09/22/17	4661.34	22.40	12.96	ND	ND	4648.38	
BH02R	12/07/17	4661.34	22.40	14.74	ND	ND	4646.60	
BH02R	03/21/18	4661.34	22.39	15.95	ND	ND	4645.39	
BH02R	06/15/18	4717.42	22.45	16.40	ND	ND	4701.02	
BH02R	09/26/18	4717.42	22.41	15.43	ND	ND	4701.99	
BH02R	12/14/18	4717.42	22.42	16.42	ND	ND	4701.00	
BH02R	03/15/19	4717.42	22.49	17.22	ND	ND	4700.20	
BH02R	06/21/19	4717.42	22.44	17.16	ND	ND	4699.51	
BH02R	09/12/19	4717.42	22.40	14.51	ND	ND	4702.16	
BH03	04/15/16	4660.75	17.41	14.66	Trace	<0.01	4646.09	
BH03	06/21/16	4660.75	17.41	16.42	13.54	2.88	4646.49	
BH03	07/08/16	4660.75	NM	13.32	13.24	0.08	4647.49	
BH03	09/02/16	4660.75	16.99	11.95	11.76	0.19	4648.94	
BH03	12/20/16	4660.75	16.93	14.77	14.43	0.34	4646.24	
BH03	06/23/17	4660.83	NM	15.07	14.84	0.23	4645.93	
BH03	09/22/17	4660.83	17.12	12.39	12.36	0.03	4648.46	
BH03	12/07/17	4660.83	NM	14.21	14.15	0.06	4646.67	
BH03	03/21/18	4660.83	17.36	15.37	ND	ND	4645.46	
BH03	06/15/18	4716.91	17.50	15.91	15.86	0.05	4701.04	

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NOBLE ENERGY, INC. - KNAUS 28-8**

Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.) ⁽⁷⁾	Depth to LNAPL (ft.) ⁽⁷⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)	
BH03 ⁽¹⁾	09/26/18	4716.91	17.38	14.85	14.84	0.01	4702.07	
BH03	12/14/18	4716.91	NM	15.88	15.84	0.04	4701.06	
BH03	03/15/19	4716.91	17.62	16.67	ND	ND	4700.24	
BH03	06/21/19	4716.91	17.58	17.34	ND	ND	4699.57	
BH03	07/10/19	4716.91	17.58	13.60	ND	ND	4700.27	
BH03	09/12/19	4716.91	17.55	11.76	ND	ND	4702.11	
BH04	04/15/16	4659.97	17.24	14.47	ND	ND	4645.50	
BH04	06/21/16	4659.97	17.24	14.76	13.12	1.64	4646.44	
BH04	07/08/16	4659.97	NM	12.75	12.60	0.15	4647.33	
BH04	09/02/16	4659.97	17.26	11.12	ND	ND	4648.85	
BH04	12/20/16	4659.97	17.24	14.00	13.77	0.23	4646.14	
BH04	02/07/17	Well Destroyed During Excavation						
BH04R	06/23/17	4661.01	21.83	15.21	ND	ND	4645.80	
BH04R	09/22/17	4661.01	21.81	12.78	ND	ND	4648.23	
BH04R	12/07/17	4661.01	21.89	14.49	ND	ND	4646.52	
BH04R	03/21/18	4661.01	21.88	15.71	ND	ND	4645.30	
BH04R	06/15/18	4717.09	21.94	16.17	ND	ND	4700.92	
BH04R	09/26/18	4717.09	21.88	15.20	ND	ND	4701.89	
BH04R	12/14/18	4717.09	21.62	16.19	ND	ND	4700.90	
BH04R	03/15/19	4717.09	21.79	17.01	ND	ND	4700.08	
BH04R	06/21/19	4717.09	21.88	14.23	ND	ND	4699.43	
BH04R	09/12/19	4717.09	21.88	11.75	ND	ND	4701.91	
BH05	04/15/16	4661.14	17.11	15.06	Trace	<0.01	4646.08	
BH05	06/21/16	4661.14	16.81	14.60	14.56	0.04	4646.57	
BH05	07/08/16	4661.14	NM	13.74	13.72	0.02	4647.42	
BH05	09/02/16	4661.14	16.88	12.29	12.28	0.01	4648.86	
BH05	12/20/16	4661.14	17.22	15.29	14.83	0.46	4646.20	
BH05	02/07/17	Well Destroyed During Excavation						
BH05R	06/23/17	4660.88	21.49	15.05	ND	ND	4645.83	
BH05R	09/22/17	4660.88	21.49	12.52	ND	ND	4648.36	
BH05R	12/07/17	4660.88	21.49	14.29	14.28	0.01	4646.60	
BH05R	03/21/18	4660.88	21.50	15.46	ND	ND	4645.42	
BH05R	06/15/18	4716.96	21.51	15.94	NM	NM	NM ⁶	
BH05R ⁽¹⁾	09/26/18	4716.96	21.48	14.96	14.95	0.01	4702.01	
BH05R	12/14/18	4716.96	NM	15.95	15.94	0.01	4701.02	
BH05R	03/15/19	4716.96	21.54	16.77	ND	ND	4700.19	
BH05R	06/21/19	4716.96	21.44	14.09	ND	ND	4699.51	
BH05R	09/12/19	4716.96	21.47	11.51	ND	ND	4702.09	
BH06	04/15/16	4660.85	16.65	14.77	ND	ND	4646.08	
BH06	06/21/16	4660.85	16.62	14.24	ND	ND	4646.61	
BH06	07/08/16	4660.85	NM	13.39	ND	ND	4647.46	
BH06	09/02/16	4660.85	16.78	11.92	ND	ND	4648.93	
BH06	12/20/16	4660.85	16.81	14.61	ND	ND	4646.24	

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Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.) ⁽⁷⁾	Depth to LNAPL (ft.) ⁽⁷⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)
BH06	02/07/17	Well Destroyed During Excavation					
BH06R	06/23/17	4660.56	19.43	14.62	ND	ND	4645.94
BH06R	09/22/17	4660.56	19.40	12.16	ND	ND	4648.40
BH06R	12/07/17	4660.56	19.58	13.91	ND	ND	4646.65
BH06R	03/21/18	4660.56	19.60	15.12	ND	ND	4645.44
BH06R	06/15/18	4716.64	19.68	15.59	ND	ND	4701.05
BH06R	09/26/18	4716.64	19.63	14.61	ND	ND	4702.03
BH06R	12/14/18	4716.64	19.80	15.62	ND	ND	4701.02
BH06R	03/15/19	4716.64	19.83	16.41	ND	ND	4700.23
BH06R	06/21/19	4716.64	19.07	14.39	ND	ND	4699.55
BH06R	09/12/19	4716.64	19.92	11.87	ND	ND	4702.07
BH07	04/15/16	4660.84	17.20	14.90	ND	ND	4645.94
BH07	06/21/16	4660.84	16.91	14.38	ND	ND	4646.46
BH07	07/08/16	4660.84	NM	13.56	ND	ND	4647.28
BH07	09/02/16	4660.84	16.90	12.13	ND	ND	4648.71
BH07	12/20/16	4660.84	16.88	14.77	ND	ND	4646.07
BH07	06/23/17	4660.82	16.95	15.05	ND	ND	4645.77
BH07	09/22/17	4660.82	16.93	12.61	ND	ND	4648.21
BH07	12/07/17	4660.82	16.59	14.33	ND	ND	4646.49
BH07	03/21/18	4660.82	16.88	15.56	ND	ND	4645.26
BH07	06/15/18	4716.90	16.40	16.02	ND	ND	4700.88
BH07	09/26/18	4716.90	16.42	15.03	ND	ND	4701.87
BH07	12/14/18	4716.90	16.28	16.01	ND	ND	4700.89
BH07	03/15/19	4716.90	16.32		Monitoring Well Dry		
BH07	06/21/19	4716.90	16.28	16.26	ND	ND	4700.64
BH07	07/10/19	4716.90	16.29		Monitoring Well Dry		
BH07	09/12/19	4716.90	16.26	11.78	ND	ND	4701.90
BH08	06/21/16	4661.26	22.25	14.62	ND	ND	4646.64
BH08	07/08/16	4661.26	NM	13.71	ND	ND	4647.55
BH08	09/02/16	4658.51 ²	19.50	9.28	ND	ND	4649.23
BH08	12/20/16	4661.45 ⁵	22.44	14.98	ND	ND	4646.47
BH08	06/23/17	4661.26	22.43	15.32	ND	ND	4645.94
BH08	09/22/17	4661.26	22.42	12.76	ND	ND	4648.50
BH08	12/07/17	4661.26	22.54	14.54	ND	ND	4646.72
BH08	03/21/18	4661.26	22.48	15.75	ND	ND	4645.51
BH08	06/15/18	4717.34	22.56	16.22	ND	ND	4701.12
BH08	09/26/18	4717.34	22.52	15.23	ND	ND	4702.11
BH08	12/14/18	4717.34	22.52	16.23	ND	ND	4701.11
BH08	03/15/19	4717.34	22.58	17.05	ND	ND	4700.29
BH08	06/21/19	4717.34	22.22	14.02	ND	ND	4700.04
BH08	09/12/19	4717.34	22.68	11.89	ND	ND	4702.17
BH09	06/23/17	4660.51	21.60	14.76	ND	ND	4645.75

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NOBLE ENERGY, INC. - KNAUS 28-8**

Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.)⁽⁷⁾	Depth to LNAPL (ft.)⁽⁷⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)
BH09	09/22/17	4660.51	21.61	12.32	ND	ND	4648.19
BH09	12/07/17	4660.51	21.59	14.05	ND	ND	4646.46
BH09	03/21/18	4660.51	21.60	15.26	ND	ND	4645.25
BH09	06/15/18	4716.59	21.70	15.72	ND	ND	4700.87
BH09	09/26/18	4716.59	21.67	14.76	ND	ND	4701.83
BH09	12/14/18	4716.59	21.64	15.76	ND	ND	4700.83
BH09	03/15/19	4716.59	21.71	16.56	ND	ND	4700.03
BH09	06/21/19	4716.59	21.72	14.23	ND	ND	4699.38
BH09	09/12/19	4716.59	21.67	11.78	ND	ND	4701.83
BH10	06/23/17	4660.28	19.65	14.43	ND	ND	4645.85
BH10	09/22/17	4660.28	19.62	11.99	ND	ND	4648.29
BH10	12/07/17	4660.28	19.75	13.75	ND	ND	4646.53
BH10	03/21/18	4660.28	19.71	14.96	ND	ND	4645.32
BH10	06/15/18	4716.35	19.91	15.43	ND	ND	4700.92
BH10	09/26/18	4716.35	19.88	14.47	ND	ND	4701.88
BH10	12/14/18	4716.35	19.91	15.47	ND	ND	4700.88
BH10	03/15/19	4716.35	19.94	16.26	ND	ND	4700.09
BH10	06/21/19	4716.35	19.95	14.28	ND	ND	4699.32
BH10	09/12/19	4716.35	19.94	11.70	ND	ND	4701.90
BH11	06/11/18	4716.91	20.82	15.87	ND	ND	4701.04
BH11	06/15/18	4716.91	21.30	15.93	ND	ND	4700.98
BH11	09/26/18	4716.91	21.21	14.97	ND	ND	4701.94
BH11	12/14/18	4716.91	21.57	15.98	ND	ND	4700.93
BH11	03/15/19	4716.91	22.01	16.77	ND	ND	4700.14
BH11	06/21/19	4716.91	22.08	14.26	ND	ND	4699.47
BH11	09/12/19	4716.91	22.12	11.74	ND	ND	4701.99
BH12	06/11/18	4716.66	18.95	15.66	ND	ND	4701.00
BH12	06/15/18	4716.66	19.01	15.73	ND	ND	4700.93
BH12	09/26/18	4716.66	19.20	14.76	ND	ND	4701.90
BH12	12/14/18	4716.66	18.94	15.73	ND	ND	4700.93
BH12	03/15/19	4716.66	19.20	16.64	ND	ND	4700.02
BH12	06/21/19	4716.66	19.22	14.16	ND	ND	4699.44
BH12	09/12/19	4716.66	18.93	11.73	ND	ND	4701.87
BH13	06/11/18	4716.99	18.71	15.90	ND	ND	4701.09
BH13	06/15/18	4716.99	18.92	15.97	ND	ND	4701.02
BH13	09/26/18	4716.99	18.71	14.99	ND	ND	4702.00
BH13	12/14/18	4716.99	18.71	15.99	ND	ND	4701.00
BH13	03/15/19	4716.99	18.51	16.74	ND	ND	4700.25
BH13	06/21/19	4716.99	18.74	14.29	ND	ND	4699.50
BH13	09/12/19	4716.99	18.70	11.77	ND	ND	4702.02
BH14	06/11/18	4716.41	18.66	15.49	ND	ND	4700.92
BH14	06/15/18	4716.41	18.68	15.55	ND	ND	4700.86

TABLE 1
GROUNDWATER ELEVATION DATA
NOBLE ENERGY, INC. - KNAUS 28-8

Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.) ⁽⁷⁾	Depth to LNAPL (ft.) ⁽⁷⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)
BH14	09/26/18	4716.41	18.66	14.59	ND	ND	4701.82
BH14	12/14/18	4716.41	18.66	15.57	ND	ND	4700.84
BH14	03/15/19	4716.41	18.95	16.37	ND	ND	4700.04
BH14	06/21/19	4716.41	18.95	13.86	ND	ND	4699.34
BH14	09/12/19	4716.41	18.65	11.39	ND	ND	4701.81
BH15	06/11/18	4716.33	18.46	15.38	ND	ND	4700.95
BH15	06/15/18	4716.33	18.50	15.44	ND	ND	4700.89
BH15	09/26/18	4716.33	18.68	14.47	ND	ND	4701.86
BH15	12/14/18	4716.33	18.45	15.45	ND	ND	4700.88
BH15	03/15/19	4716.33	18.75	16.27	ND	ND	4700.06
BH15	06/21/19	4716.33	18.74	14.10	ND	ND	4699.40
BH15	09/12/19	4716.33	18.44	11.60	ND	ND	4701.90
BH16	06/11/18	4717.24	18.93	16.12	ND	ND	4701.12
BH16	06/15/18	4717.24	19.00	16.15	ND	ND	4701.09
BH16	09/26/18	4717.24	18.93	15.16	ND	ND	4702.08
BH16	12/14/18	4717.24	18.93	16.16	ND	ND	4701.08
BH16	03/15/19	4717.24	19.24	17.01	ND	ND	4700.23
BH16	06/21/19	4717.24	18.96	14.32	ND	ND	4699.59
BH16	09/12/19	4717.24	18.92	11.77	ND	ND	4702.14
BH17	06/11/18	4716.75	21.84	15.45	ND	ND	4701.30
BH17	06/15/18	4716.75	21.75	15.62	ND	ND	4701.13
BH17	09/26/18	4716.75	21.65	14.62	ND	ND	4702.13
BH17	12/14/18	4716.75	21.99	15.62	ND	ND	4701.13
BH17	03/15/19	4716.75	22.01	16.44	ND	ND	4700.31
BH17	06/21/19	4716.75	22.09	14.38	ND	ND	4699.56
BH17	09/12/19	4716.75	22.02	11.74	ND	ND	4702.20
BH18	06/11/18	4716.80	21.85	15.76	ND	ND	4701.04
BH18	06/15/18	4716.80	22.23	15.80	ND	ND	4701.00
BH18	09/26/18	4716.80	22.13	14.81	ND	ND	4701.99
BH18	12/14/18	4716.80	22.12	15.81	ND	ND	4700.99
BH18	03/15/19	4716.80	22.23	16.63	ND	ND	4700.17
BH18	06/21/19	4716.80	22.68	14.74	ND	ND	4699.06
BH18	09/12/19	4716.80	22.26	11.73	ND	ND	4702.07

Notes:

ft. = Feet

AMSL = Above mean sea level

BTOC = Below top of casing

LNAPL = Light non-aqueous phase liquid

ND = No LNAPL detected

NM = Not Measured

TABLE 1
GROUNDWATER ELEVATION DATA
NOBLE ENERGY, INC. - KNAUS 28-8

Monitoring Well ID	Date	Top of Casing Elevation (ft. AMSL)	Total Depth (ft. BTOC)	Depth to Water (ft.) ⁽⁷⁾	Depth to LNAPL (ft.) ⁽⁷⁾	LNAPL Thickness (ft.)	Groundwater Elevation* (ft. AMSL)
--------------------	------	------------------------------------	------------------------	-------------------------------------	-------------------------------------	-----------------------	-----------------------------------

NS = Not Surveyed

(1) = LNAPL present and removed with bailer. Interface Probe did not detect it. LNAPL thickness estimated at 0.01ft

* 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

¹ Approximately 2.05 ft of casing broken off of BH01 prior to gauging on 7/8/16. Top of casing elevation is estimated, not surveyed.

² Approximately 2.75 ft of casing broken off of BH08 prior to gauging on 9/2/16. Top of casing elevation is estimated, not surveyed.

³ Damaged casing cut off just below ground surface, repaired with new stick up casing after sampling.

⁴ BH01 damaged, well repaired with approximately 2.12 ft of casing. Top of casing elevation is estimated, not surveyed.

⁵ BH08 damaged, well repaired with approximately 2.94 ft of casing. Top of casing elevation is estimated, not surveyed.

⁶ IP malfunction while gauging LNAPL, groundwater elevation lost

⁷ Depth to water measurements collected prior to second quarter 2019 were measured from top of well casing. Subsequent measurements were collected from top of casing and adjusted using survey data to reflect depth of water from ground surface.

**TABLE 2
GROUNDWATER ANALYTICAL DATA
NOBLE ENERGY, INC. - KNAUS 28-8**

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
COGCC Standard		5	560	700	1,400
BH01	04/15/16	<1.0	<1.1	<1.2	<1.3
BH01	06/21/16	<1.0	<1.0	<1.0	<1.0
BH01	09/02/16	380	1.4	<1.0	340
BH01	12/20/16	32	<1.0	<1.0	1.3
BH01	06/23/17	<1.0	<1.0	<1.0	<2.0
BH01	09/22/17	<1.0	<1.0	<1.0	<2.0
BH01	12/07/17	<1.0	<1.0	<1.0	<2.0
BH01	03/21/18	<1.0	<1.0	<1.0	<2.0
BH01	06/15/18	<1.0	<1.0	<1.0	<2.0
BH01	09/26/18	<1.0	<1.0	<1.0	<2.0
BH01	12/14/18	<1.0	<1.0	<1.0	<2.0
BH01	03/15/19	<1.0	<1.0	<1.0	<2.0
BH01	06/21/19	Not Sampled - Insufficient Water Volume			
BH01	07/10/19	<1.0	<1.0	<1.0	<2.0
BH01	09/12/19	<1.0	<1.0	<1.0	<2.0
BH02	04/15/16	5,300	3,900	130	1,200
BH02	06/21/16	7,300	1,500	97	2,300
BH02 ¹	09/12/16	9,700	3,800	<1.0	3,400
BH02	12/20/16	7,700	14	<1.0	1,000
BH02	02/07/17	Monitoring Well Destroyed During Excavation			
BH02R	06/23/17	<1.0	<1.0	<1.0	<2.0
BH02R	09/22/17	<1.0	<1.0	<1.0	<2.0
BH02R	12/07/17	<1.0	<1.0	<1.0	<2.0
BH02R	03/21/18	130	<1.0	<1.0	9.6
BH02R	06/15/18	130	<1.0	6.1	6.1
BH02R	09/26/18	380	1.2	10	9.4
BH02R	12/14/18	110	1.0	33	29
BH02R	03/15/19	240	<1.0	37	62
BH02R	06/21/19	88	<1.0	<1.0	<2.0
BH02R	09/12/19	570	1.8	7.3	360
BH03	04/15/16	Not Sampled - LNAPL Present			
BH03	06/21/16	Not Sampled - LNAPL Present			
BH03	09/02/16	Not Sampled - LNAPL Present			
BH03	12/20/16	Not Sampled - LNAPL Present			
BH03	06/23/17	Not Sampled - LNAPL Present			
BH03 ¹	09/22/17	500	46	33	2,300
BH03	12/07/17	Not Sampled - LNAPL Present			
BH03	03/21/18	45	<1.0	1.9	810
BH03	06/15/18	Not Sampled - LNAPL Present			
BH03	09/26/18	Not Sampled - LNAPL Present			
BH03	12/14/18	Not Sampled - LNAPL Present			
BH03	03/15/19	1.9	<1.0	19	280

TABLE 2
GROUNDWATER ANALYTICAL DATA
NOBLE ENERGY, INC. - KNAUS 28-8

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
COGCC Standard		5	560	700	1,400
BH03	06/21/19	Not Sampled - Insufficient Water Volume			
BH03	07/10/19	<1.0	<1.0	<1.0	11
BH03	09/12/19	1.1	<1.0	1.2	<2.0
BH04	04/15/16	1,700	2,600	130	1,200
BH04	06/21/16	Not Sampled - LNAPL Present			
BH04 ¹	09/02/16	14,000	12,000	240	5,600
BH04	12/20/16	Not Sampled - LNAPL Present			
BH04	02/07/17	Monitoring Well Destroyed During Excavation			
BH04R	06/23/17	<1.0	<1.0	<1.0	12
BH04R	09/22/17	1400	<1.0	<1.0	13
BH04R	12/07/17	190	<1.0	9.2	4.0
BH04R	03/21/18	2,000	<1.0	8.7	3.1
BH04R	06/15/18	970	<1.0	39	4.0
BH04R	09/26/18	1,200	<1.0	44	13
BH04R	12/14/18	2.2	<1.0	<1.0	<2.0
BH04R	03/15/19	<1.0	<1.0	<1.0	<2.0
BH04R	06/21/19	<1.0	<1.0	<1.0	<2.0
BH04R	09/12/19	<1.0	<1.0	<1.0	<2.0
BH05	04/15/16	Not Sampled - LNAPL Present			
BH05	06/21/16	Not Sampled - LNAPL Present			
BH05	09/02/16	Not Sampled - LNAPL Present			
BH05	12/20/16	Not Sampled - LNAPL Present			
BH05	02/07/17	Monitoring Well Destroyed During Excavation			
BH05R	06/23/17	2,800	860	<1.0	1,000
BH05R ¹	09/22/17	9,800	3,300	140	12,000
BH05R	12/07/17	Not Sampled - LNAPL Present			
BH05R	03/21/18	1,700	1.4	45	900
BH05R	06/15/18	Not Sampled - LNAPL Present			
BH05R	09/26/18	Not Sampled - LNAPL Present			
BH05R	12/14/18	Not Sampled - LNAPL Present			
BH05R	03/15/19	39	<1.0	48	59
BH05R	06/21/19	<1.0	<1.0	<1.0	<2.0
BH05R	09/12/19	260	<1.0	3.9	15
BH06	04/15/16	<1.0	8.0	<1.0	<1.0
BH06	06/21/16	<1.0	<1.0	<1.0	<1.0
BH06	09/02/16	<1.0	1.4	<1.0	<1.0
BH06	12/20/16	3.1	<1.0	<1.0	6.7
BH06	02/07/17	Monitoring Well Destroyed During Excavation			
BH06R	06/23/17	1.9	<1.0	<1.0	<2.0
BH06R	09/22/17	<1.0	<1.0	<1.0	6.5
BH06R	12/07/17	<1.0	<1.0	<1.0	<2.0
BH06R	03/21/18	<1.0	<1.0	<1.0	<2.0

**TABLE 2
GROUNDWATER ANALYTICAL DATA
NOBLE ENERGY, INC. - KNAUS 28-8**

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
COGCC Standard		5	560	700	1,400
BH06R	06/15/18	<1.0	<1.0	<1.0	<2.0
BH06R	09/26/18	<1.0	<1.0	<1.0	<2.0
BH06R	12/14/18	<1.0	<1.0	<1.0	<2.0
BH06R	03/15/19	<1.0	<1.0	<1.0	<2.0
BH06R	06/21/19	<1.0	<1.0	<1.0	<2.0
BH06R	09/12/19	<1.0	<1.0	<1.0	<2.0
BH07	04/15/16	<1.0	<1.1	<1.2	<1.3
BH07	06/21/16	<1.0	<1.0	<1.0	<1.0
BH07	09/02/16	1,600	6.6	<1.0	200
BH07	12/20/16	9,000	24	<1.0	630
BH07	06/23/17	9,100	1.5	<1.0	260
BH07	09/22/17	240	<1.0	<1.0	<2.0
BH07	12/07/17	3,900	<1.0	11	<2.0
BH07	03/21/18	690	<1.0	19	3.9
BH07	06/15/18		Not Sampled - Insufficient Water Volume		
BH07	09/26/18	<1.0	<1.0	<1.0	<2.0
BH07	12/14/18		Not Sampled - Insufficient Water Volume		
BH07	03/15/19		Not Sampled - Insufficient Water Volume		
BH07	06/21/19		Not Sampled - Insufficient Water Volume		
BH07	07/10/19		Not Sampled - Insufficient Water Volume		
BH07	09/12/19	<1.0	<1.0	<1.0	<2.0
BH08	06/21/16	<1.0	<1.0	<1.0	<1.0
BH08	09/02/16	<1.0	1.4	<1.0	<1.0
BH08	12/20/16	<1.0	<1.0	<1.0	<1.0
BH08	06/23/17	<1.0	<1.0	<1.0	<2.0
BH08	09/22/17	<1.0	<1.0	<1.0	<2.0
BH08	12/07/17	<1.0	<1.0	<1.0	<2.0
BH08	03/21/18	<1.0	<1.0	<1.0	<2.0
BH08	06/15/18	<1.0	<1.0	<1.0	<2.0
BH08	09/26/18	<1.0	<1.0	<1.0	<2.0
BH08	12/14/18	<1.0	<1.0	<1.0	<2.0
BH08	03/15/19	<1.0	<1.0	<1.0	<2.0
BH08	06/21/19	<1.0	<1.0	<1.0	<2.0
BH08	09/12/19	<1.0	<1.0	<1.0	<2.0
BH09	06/23/17	<1.0	<1.0	<1.0	<2.0
BH09	09/22/17	<1.0	<1.0	<1.0	<2.0
BH09	12/07/17	<1.0	<1.0	<1.0	<2.0
BH09	03/21/18	<1.0	<1.0	<1.0	<2.0
BH09	06/15/18	1.8	<1.0	<1.0	<2.0
BH09	09/26/18	2.6	<1.0	<1.0	<2.0
BH09	12/14/18	<1.0	<1.0	<1.0	<2.0
BH09	03/15/19	<1.0	<1.0	<1.0	<2.0

TABLE 2
GROUNDWATER ANALYTICAL DATA
NOBLE ENERGY, INC. - KNAUS 28-8

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
COGCC Standard		5	560	700	1,400
BH09	06/21/19	<1.0	<1.0	<1.0	<2.0
BH09	09/12/19	<1.0	<1.0	<1.0	<2.0
BH10	06/23/17	<1.0	<1.0	<1.0	<2.0
BH10	09/22/17	<1.0	<1.0	<1.0	<2.0
BH10	12/07/17	<1.0	<1.0	<1.0	<2.0
BH10	03/21/18	<1.0	<1.0	<1.0	<2.0
BH10	06/15/18	<1.0	<1.0	<1.0	<2.0
BH10	09/26/18	<1.0	<1.0	<1.0	<2.0
BH10	12/14/18	<1.0	<1.0	<1.0	<2.0
BH10	03/15/19	<1.0	<1.0	<1.0	<2.0
BH10	06/21/19	<1.0	<1.0	<1.0	<2.0
BH10	09/12/19	<1.0	<1.0	<1.0	<2.0
BH11	06/11/18	340	<1.0	5.8	<2.0
BH11	09/26/18	<1.0	<1.0	<1.0	<2.0
BH11	12/14/18	<1.0	<1.0	<1.0	<2.0
BH11	03/15/19	<1.0	<1.0	<1.0	<2.0
BH11	06/21/19	<1.0	<1.0	<1.0	<2.0
BH11	09/12/19	<1.0	<1.0	<1.0	<2.0
BH12	06/11/18	<1.0	<1.0	<1.0	<2.0
BH12	09/26/18	<1.0	<1.0	<1.0	<2.0
BH12	12/14/18	<1.0	<1.0	<1.0	<2.0
BH12	03/15/19	<1.0	<1.0	<1.0	<2.0
BH12	06/21/19	<1.0	<1.0	<1.0	<2.0
BH12	09/12/19	<1.0	<1.0	<1.0	<2.0
BH13	06/11/18	<1.0	<1.0	<1.0	<2.0
BH13	09/26/18	<1.0	<1.0	<1.0	<2.0
BH13	12/14/18	<1.0	<1.0	<1.0	<2.0
BH13	03/15/19	<1.0	<1.0	<1.0	<2.0
BH13	06/21/19	<1.0	<1.0	<1.0	<2.0
BH13	09/12/19	<1.0	<1.0	<1.0	<2.0
BH14	06/11/18	<1.0	<1.0	<1.0	<2.0
BH14	09/26/18	<1.0	<1.0	<1.0	<2.0
BH14	12/14/18	1.2	<1.0	<1.0	<2.0
BH14	03/15/19	<1.0	<1.0	<1.0	<2.0
BH14	06/21/19	<1.0	<1.0	<1.0	<2.0
BH14	09/12/19	<1.0	<1.0	<1.0	<2.0
BH15	06/11/18	1.2	<1.0	3.9	<2.0
BH15	09/26/18	<1.0	<1.0	<1.0	<2.0
BH15	12/14/18	1.6	<1.0	<1.0	<2.0
BH15	03/15/19	<1.0	<1.0	<1.0	<2.0
BH15	06/21/19	<1.0	<1.0	<1.0	<2.0
BH15	09/12/19	<1.0	<1.0	<1.0	<2.0

TABLE 2
GROUNDWATER ANALYTICAL DATA
NOBLE ENERGY, INC. - KNAUS 28-8

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)
COGCC Standard		5	560	700	1,400
BH16	06/11/18	1.0	<1.0	9.2	27
BH16	09/26/18	<1.0	<1.0	5.6	15
BH16	12/14/18	<1.0	<1.0	<1.0	<2.0
BH16	03/15/19	<1.0	<1.0	<1.0	<2.0
BH16	06/21/19	<1.0	<1.0	<1.0	<2.0
BH16	09/12/19	<1.0	<1.0	<1.0	<2.0
BH17	06/11/18	<1.0	<1.0	<1.0	<2.0
BH17	09/26/18	<1.0	<1.0	<1.0	<2.0
BH17	12/14/18	<1.0	<1.0	<1.0	<2.0
BH17	03/15/19	<1.0	<1.0	<1.0	<2.0
BH17	06/21/19	<1.0	<1.0	<1.0	<2.0
BH17	09/12/19	<1.0	<1.0	<1.0	<2.0
BH18	06/11/18	<1.0	<1.0	<1.0	<2.0
BH18	09/26/18	<1.0	<1.0	<1.0	<2.0
BH18	12/14/18	<1.0	<1.0	<1.0	<2.0
BH18	03/15/19	<1.0	<1.0	<1.0	<2.0
BH18	06/21/19	<1.0	<1.0	<1.0	<2.0
BH18	09/12/19	<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

¹ Sheen present on groundwater sample.

FIGURES

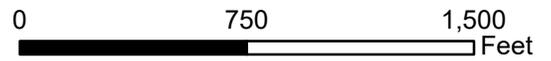
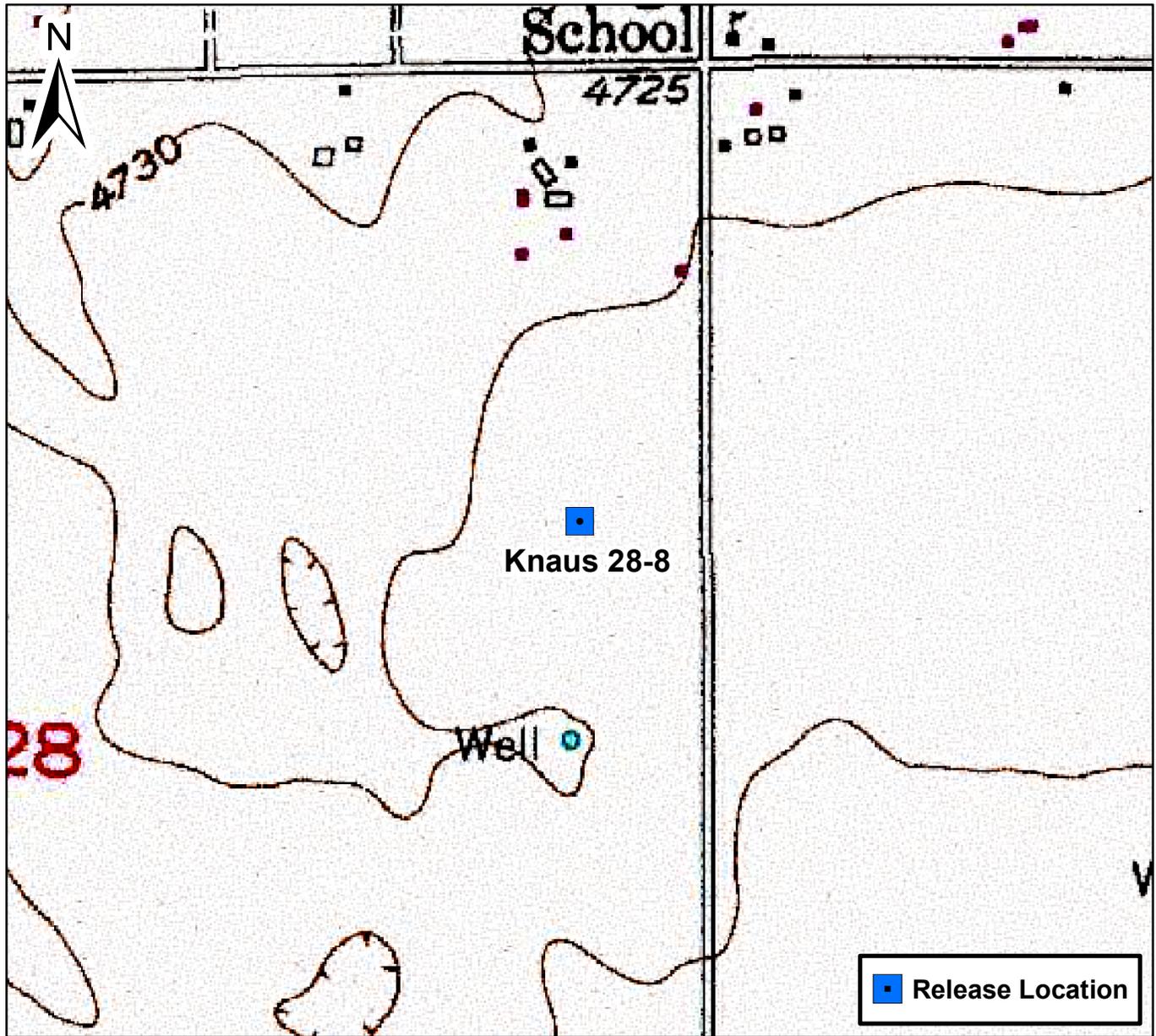
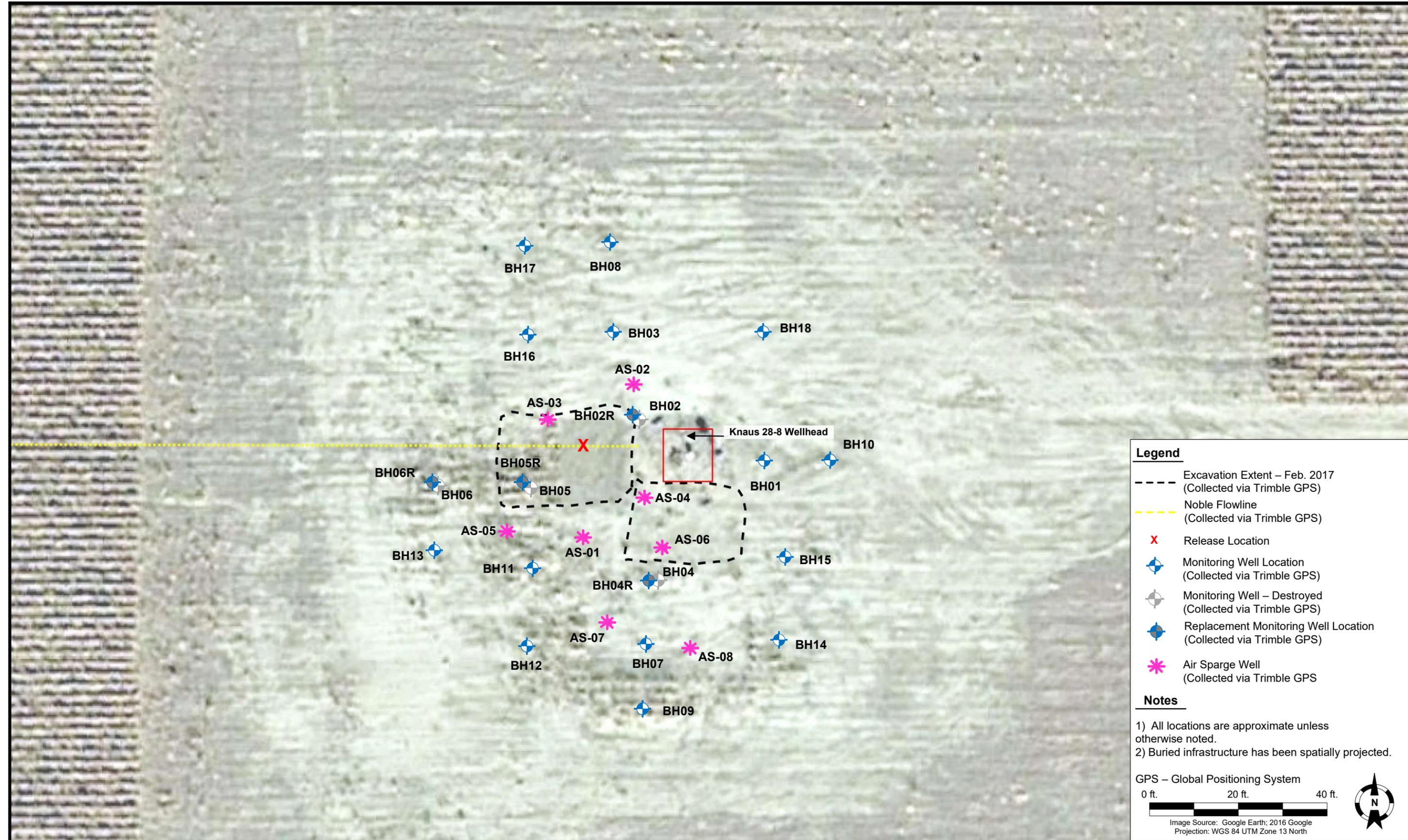


Figure 1

Site Location Map
 Knaus 28-8
 SENE S28 T6N R66W Weld
 County, Colorado





DATE:	7/1/2019
DESIGNED BY:	JW
DRAWN BY:	KC



TASMAN
GEOSCIENCES

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

Noble Energy, Inc. – DJ Basin
Knaus 28-8
 SENE, Section 28, Township 6 North, Range 66 West
 Weld County, Colorado

Site Overview Map

FIGURE
2



Legend

- Monitoring Well (Collected via Trimble GPS)
- Replacement Monitoring Well Location (Collected via Trimble GPS)
- Noble Flowline (Collected via Trimble GPS)
- Groundwater Elevation Contour (Dashed Where Inferred)
- Knaus 28-8 Wellhead
- Release Location

Notes:

- 1) All locations are approximate, unless otherwise noted.
- 2) Underground facilities have been spatially projected.

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

0 ft. 20 ft. 40 ft.

Image Source: Google Earth; 2016 Google
 Projection: WGS 84 UTM Zone 13 North

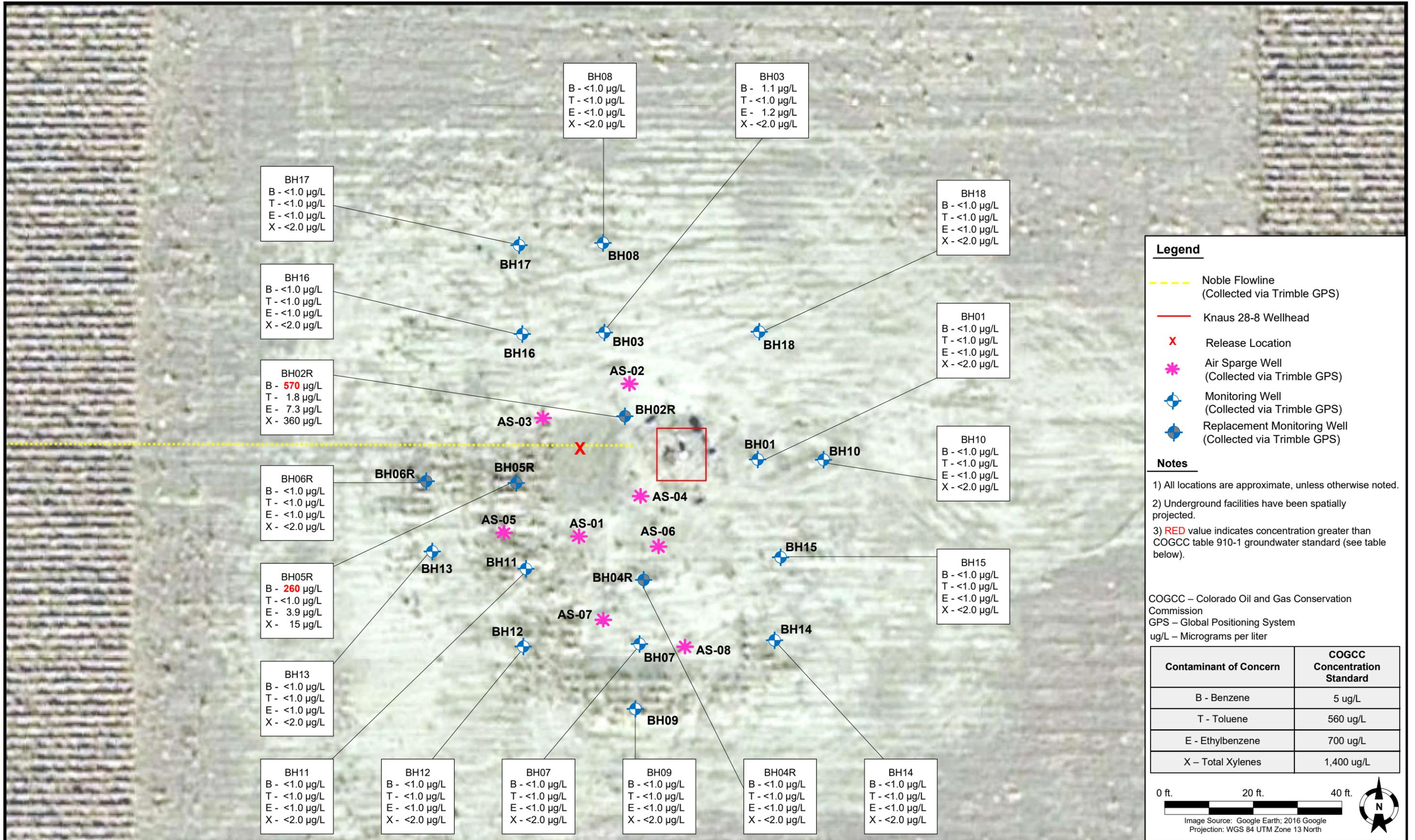
DATE:	09/16/2019
DESIGNED BY:	DA
DRAWN BY:	TC

TASMAN
 GEOSCIENCES

Tasman Geosciences, Inc.
 6855 119th St.
 Broomfield, CO 80020

Noble Energy, Inc. – DJ Basin
Knaus 28-8
 SENE, Section 28, Township 6 North, Range 66 West
 Weld County, Colorado

Groundwater Potentiometric
 Surface Contour Map
 (September 12, 2019)



Legend

- Noble Flowline (Collected via Trimble GPS)
- Knaus 28-8 Wellhead
- X Release Location
- * Air Sparge Well (Collected via Trimble GPS)
- + Monitoring Well (Collected via Trimble GPS)
- + Replacement Monitoring Well (Collected via Trimble GPS)

Notes

- 1) All locations are approximate, unless otherwise noted.
- 2) Underground facilities have been spatially projected.
- 3) RED value indicates concentration greater than COGCC table 910-1 groundwater standard (see table below).

COGCC – Colorado Oil and Gas Conservation Commission
 GPS – Global Positioning System
 ug/L – Micrograms per liter

Contaminant of Concern	COGCC Concentration Standard
B - Benzene	5 ug/L
T - Toluene	560 ug/L
E - Ethylbenzene	700 ug/L
X – Total Xylenes	1,400 ug/L

0 ft. 20 ft. 40 ft.

Image Source: Google Earth; 2016 Google
 Projection: WGS 84 UTM Zone 13 North

DATE: 9/23/19

DESIGNED BY: JW

DRAWN BY: KC

TASMAN
 GEOSCIENCES

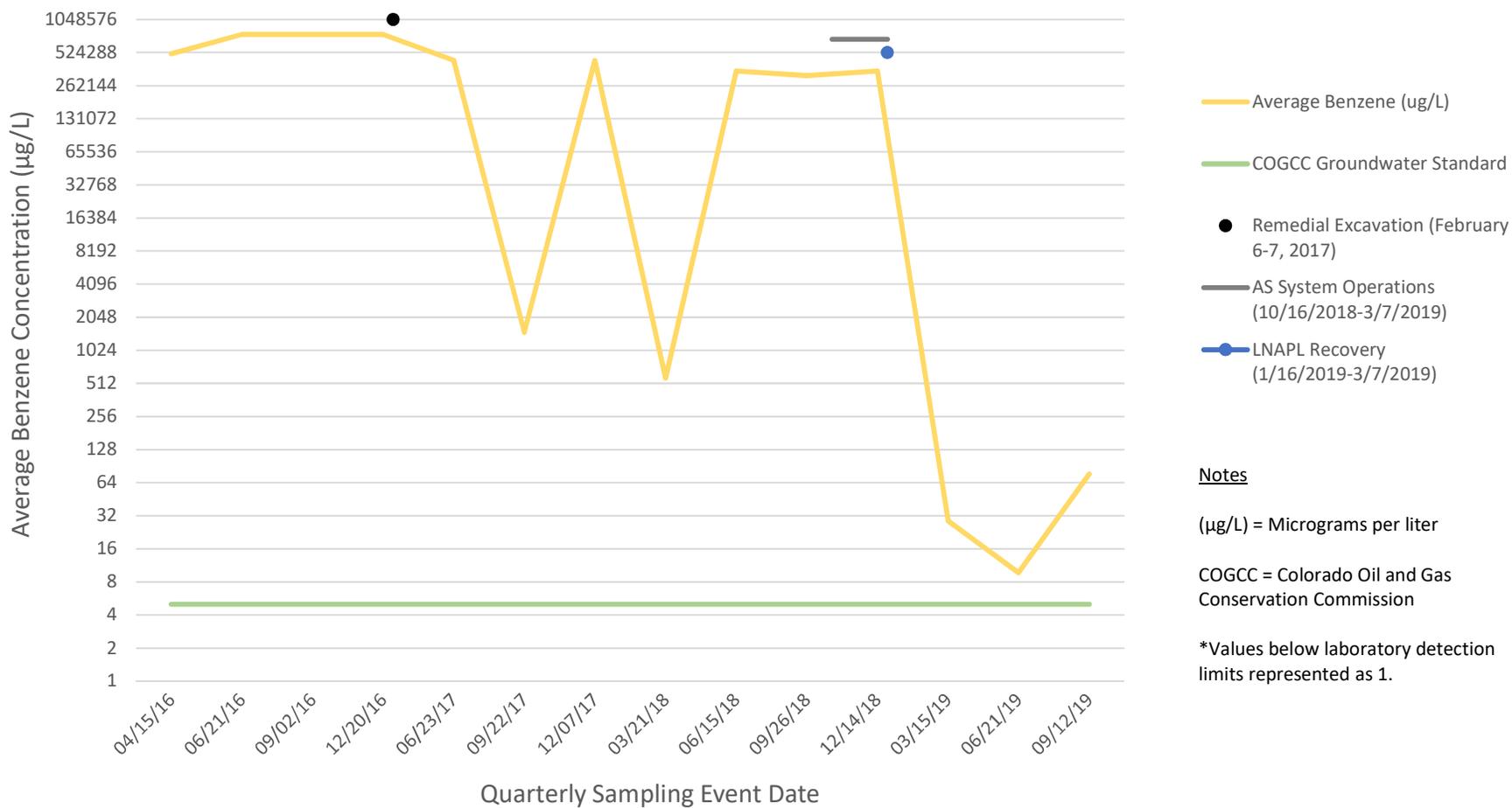
Tasman Geosciences, Inc.
 6855 W 119th Avenue
 Broomfield, CO, 80020

Noble Energy, Inc. – DJ Basin
Knaus 28-8
 SENE, Section 28, Township 6 North, Range 66 West
 Weld County, Colorado

Groundwater Analytical
 Results Map
 (September 12, 2019)

FIGURE
 4

Figure 5
Knaus 28-8
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.

ATTACHMENT A

LABORATORY ANALYTICAL DATA REPORT

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

September 20, 2019

Brandon Bruns
Tasman Geosciences
6855 W. 119th Ave.
Broomfield, CO 80020
RE: Noble - Knaus 28-8
Work Order # 1909165

Enclosed are the results of analyses for samples received by Summit Scientific on 09/12/19 17:30. 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 Ben Shrewsbury
Laboratory Manager



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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1909165-01	Water	09/12/19 13:35	09/12/19 17:30
BH02R	1909165-02	Water	09/12/19 13:15	09/12/19 17:30
BH03	1909165-03	Water	09/12/19 12:55	09/12/19 17:30
BH04R	1909165-04	Water	09/12/19 13:45	09/12/19 17:30
BH05R	1909165-05	Water	09/12/19 13:20	09/12/19 17:30
BH06R	1909165-06	Water	09/12/19 13:15	09/12/19 17:30
BH07	1909165-07	Water	09/12/19 12:20	09/12/19 17:30
BH08	1909165-08	Water	09/12/19 12:15	09/12/19 17:30
BH09	1909165-09	Water	09/12/19 12:15	09/12/19 17:30
BH10	1909165-10	Water	09/12/19 13:25	09/12/19 17:30
BH11	1909165-11	Water	09/12/19 12:55	09/12/19 17:30
BH12	1909165-12	Water	09/12/19 12:40	09/12/19 17:30
BH13	1909165-13	Water	09/12/19 13:04	09/12/19 17:30
BH14	1909165-14	Water	09/12/19 12:35	09/12/19 17:30
BH15	1909165-15	Water	09/12/19 12:44	09/12/19 17:30
BH16	1909165-16	Water	09/12/19 12:45	09/12/19 17:30
BH17	1909165-17	Water	09/12/19 12:30	09/12/19 17:30
BH18	1909165-18	Water	09/12/19 13:05	09/12/19 17:30

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.

1909165.1

Summit Scientific

S₂

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

Page 1 of 2

Client: Noble / Tasman Geosciences Project Manager: Brandon Bruns, Invoice: Jacob Evans
Address: 6855 119th St. E-Mail: Bbruns@tasman-geo.com
City/State/Zip: Broomfield / CO/ 80020
Phone: 303-487-1228 Project Name: Knows 2B-B
Sampler Name: Tanner Cook Project Number: _____

ID	Sample Description	Date Sampled	Time Sampled	# of containers	Preservative				Matrix				Analysis Requested				Special Instructions	
					HCl	HNO ₃	None	Other	Water	Soil	Air-Canister #	Other	8260 BTEX	8260B GBTEXN	8015 DRO	pH, EC, SAR		
1	BH01	9/12/19	1335	3			X		X				X					
2	BH02R		1315	↓														
3	BH03		1255	↓														
4	BH04R		1345	↓														
5	BH05R		1320	↓														
6	BH06R		1315	↓														
7	BH07		1220	1														
8	BH08		1215	3														
9	BH09		1215	↓														
10	BH10		1325	↓														

Relinquished by: <u>Tanner Cook</u> Date/Time: 9/12/19 1520	Received by: Tasman's Lock Box Date/Time: 9/12/19 1520	Turn Around Time (Check) Same Day _____ 72 hours 24 hours _____ Standard <u>X</u> 48 hours _____ Sample Integrity: Temperature Upon Receipt: <u>4.5</u> Samples Intact: <u>Yes</u> No	Notes:
Relinquished by: Tasman's Lock Box Date/Time: 9/12/19 1730	Received by: <u>[Signature]</u> Date/Time: 9/12/19 1730		
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: _____		

1909165.2

Summit Scientific

S₂

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

Client: Noble / Tasman Geosciences Project Manager: Brandon Bruns, Invoice: Jacob Evans
 Address: 6855 119th St. E-Mail: Bbruns@tasman-geo.com
 City/State/Zip: Broomfield / CO/ 80020
 Phone: 303-487-1228 Project Name: Knews 78-B
 Sampler Name: Tanner Cook 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	BH11	9/12/19	1255	3			X		X				X				
2	BH12		1240	↓			↓		↓				↓				
3	BH13		1304	↓			↓		↓				↓				
4	BH14		1235	↓			↓		↓				↓				
5	BH15		1244	↓			↓		↓				↓				
6	BH16		1245	↓			↓		↓				↓				
7	BH17		1230	↓			↓		↓				↓				
8	BH18		1305	↓			↓		↓				↓				
9																	
10																	

Relinquished by: <u>Tanner Cook</u> Date/Time: <u>9/12/19 1520</u>	Received by: <u>Tasman's Lock Box</u> Date/Time: <u>9/12/19 1520</u>	Turn Around Time (Check) Same Day _____ 72 hours 24 hours _____ Standard <u>X</u> 48 hours _____ Sample Integrity: Temperature Upon Receipt: <u>4.5</u> Samples Intact: <u>Yes</u> No	Notes:
Relinquished by: <u>Tasman's Lock Box</u> Date/Time: <u>9/12/19 1730</u>	Received by: <u>[Signature]</u> Date/Time: <u>9/12/19 1730</u>		
Relinquished by: _____ Date/Time: _____	Received by: _____ Date/Time: _____		

Sample Receipt Checklist

S2 Work Order: 1909165

Client: NOBLE/TASMAN GEO Client Project ID: KNAVS 28-8

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

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

Temp (°C)	4.5
-----------	-----

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.	✓			
Were all samples received intact ⁽¹⁾ ?	✓			
Was adequate sample volume provided ⁽¹⁾ ?	✓			
If custody seals are present, are they intact ⁽¹⁾ ?			✓	
Are samples with holding times due within 48 hours sample due within 48 hours present?		✓		
Is a chain-of-custody (COC) form present and filled out completely ⁽¹⁾ ?	✓			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	✓			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	✓			
Is the COC properly relinquished by the client w/ date and time recorded ⁽¹⁾ ?	✓			
For volatiles in water – is there headspace present? If yes, contact client and note in narrative.		✓		
Are samples preserved that require preservation (excluding cooling) ⁽¹⁾ ? 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⁾ ? Record the pH in Comments.			✓	
If dissolved metals are requested, were samples field filtered?			✓	

Additional Comments (if any):

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

RZ _____ 9/12/19
 Custodian Printed Name or Initials Signature of Custodian Date/Time



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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH01
1909165-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		119 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.5 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH02R
1909165-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	570	100		ug/l	100	1909198	09/16/19	09/18/19	EPA 8260B	
Toluene	1.8	1.0		"	1	"	"	09/18/19	"	
Ethylbenzene	7.3	1.0		"	"	"	"	"	"	
Xylenes (total)	360	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<i>Surrogate: 1,2-Dichloroethane-d4</i>		131 %		23-173		"	"	"	"	
<i>Surrogate: Toluene-d8</i>		116 %		20-170		"	"	"	"	
<i>Surrogate: 4-Bromofluorobenzene</i>		104 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH03
1909165-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	1.1	1.0		ug/l	1	1909198	09/16/19	09/18/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	1.2	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		104 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		94.3 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.6 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH04R
1909165-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		120 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.1 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH05R
1909165-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:20**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	260	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	3.9	1.0		"	"	"	"	"	"	
Xylenes (total)	15	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:20**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		84.6 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		103 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.6 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH06R
1909165-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		116 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.4 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.8 %		21-167		"	"	"	"	

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH07
1909165-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:20**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:20**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		120 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.1 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH08
1909165-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		118 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.8 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH09
1909165-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:15**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		113 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.0 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.0 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH10
1909165-10 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:25**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		119 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.7 %		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 - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH11
1909165-11 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:55**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		120 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.1 %		21-167		"	"	"	"	

Summit Scientific

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH12
1909165-12 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:40**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		118 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.5 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.0 %		21-167		"	"	"	"	

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH13
1909165-13 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:04**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:04**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		117 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.3 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.9 %		21-167		"	"	"	"	

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH14
1909165-14 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		120 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.6 %		21-167		"	"	"	"	

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH15
1909165-15 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:44**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:44**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		119 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.8 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.2 %		21-167		"	"	"	"	

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH16
1909165-16 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:45**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		122 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		96.4 %		21-167		"	"	"	"	

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH17
1909165-17 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 12:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 12:30**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		115 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.7 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.1 %		21-167		"	"	"	"	

Summit Scientific

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

BH18
1909165-18 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **09/12/19 13:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1909198	09/16/19	09/17/19	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **09/12/19 13:05**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		115 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.4 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.1 %		21-167		"	"	"	"	

Summit Scientific

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 11:39

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1909198 - EPA 5030 Water MS

Blank (1909198-BLK1)

Prepared: 09/16/19 Analyzed: 09/17/19

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	15.0		"	13.3		112		23-173		
Surrogate: Toluene-d8	13.4		"	13.3		100		20-170		
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.2		21-167		

LCS (1909198-BS1)

Prepared: 09/16/19 Analyzed: 09/17/19

Benzene	34.2	1.0	ug/l	33.3		102		51-132		
Toluene	34.4	1.0	"	33.3		103		51-138		
Ethylbenzene	32.3	1.0	"	33.3		96.8		58-146		
m,p-Xylene	60.2	2.0	"	66.7		90.3		57-144		
o-Xylene	31.2	1.0	"	33.3		93.7		53-146		
Surrogate: 1,2-Dichloroethane-d4	13.1		"	13.3		98.0		23-173		
Surrogate: Toluene-d8	14.4		"	13.3		108		20-170		
Surrogate: 4-Bromofluorobenzene	12.7		"	13.3		95.4		21-167		

Matrix Spike (1909198-MS1)

Source: 1909165-01

Prepared: 09/16/19 Analyzed: 09/17/19

Benzene	37.0	1.0	ug/l	33.3	ND	111		34-141		
Toluene	37.2	1.0	"	33.3	ND	112		27-151		
Ethylbenzene	36.7	1.0	"	33.3	ND	110		29-160		
m,p-Xylene	67.9	2.0	"	66.7	ND	102		20-166		
o-Xylene	35.7	1.0	"	33.3	ND	107		33-159		
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.3		101		23-173		
Surrogate: Toluene-d8	13.8		"	13.3		104		20-170		
Surrogate: 4-Bromofluorobenzene	12.9		"	13.3		97.0		21-167		

Summit Scientific

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Broomfield CO, 80020

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Brun

Reported:
09/20/19 11:39

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1909198 - EPA 5030 Water MS

Matrix Spike Dup (1909198-MSD1)	Source: 1909165-01			Prepared: 09/16/19 Analyzed: 09/17/19					
Benzene	36.6	1.0	ug/l	33.3	ND	110	34-141	0.842	30
Toluene	37.0	1.0	"	33.3	ND	111	27-151	0.620	30
Ethylbenzene	37.2	1.0	"	33.3	ND	112	29-160	1.57	30
m,p-Xylene	69.4	2.0	"	66.7	ND	104	20-166	2.20	30
o-Xylene	36.2	1.0	"	33.3	ND	109	33-159	1.39	30
Surrogate: 1,2-Dichloroethane-d4	13.8		"	13.3		104	23-173		
Surrogate: Toluene-d8	13.5		"	13.3		102	20-170		
Surrogate: 4-Bromofluorobenzene	12.6		"	13.3		94.7	21-167		

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Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
09/20/19 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