

**FIRST QUARTER 2019
SITE MONITORING AND REMEDIATION
SUMMARY REPORT**

KNAUS 28-8

COGCC SPILL TRACKING # 445476
COGCC REMEDIATION # 9767

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1.0 INTRODUCTION

This first 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).

First 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 June 2018.

2.0 FIRST QUARTER 2019 GROUNDWATER MONITORING ACTIVITIES

First Quarter 2019 groundwater monitoring activities were performed at the Site on March 15, 2019. The activities included measurement of groundwater levels from all 18 Site monitoring well locations and the collection of groundwater samples. Groundwater elevation measurements are presented in Table 1 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 first 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 first quarter 2019 groundwater monitoring event, groundwater levels were gauged at all 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 first quarter 2019 groundwater monitoring event, the groundwater elevation at the Site ranged from 4,700.02 ft. amsl in BH12 to 4,700.31 ft. amsl in BH17. The groundwater potentiometric surface at the site slopes to the south/southeast, with a hydraulic gradient of approximately 0.003 feet per foot between wells BH12 and BH17. Groundwater elevation contours and the inferred flow direction are illustrated on Figure 3. Monitoring well BH07 was dry and therefore not sampled.

2.2 Groundwater Purging and Sampling

This section summarizes both general procedures and significant observations from the groundwater purging and sampling activities conducted on March 15, 2019. During the first quarter 2019 groundwater monitoring event, groundwater samples were collected from 17 of the monitoring wells in the Site monitoring well network. One well was dry and was not sampled.

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 FIRST QUARTER 2019 GROUNDWATER SAMPLING RESULTS

This section presents the laboratory analytical results for groundwater samples collected during the first quarter 2019 groundwater monitoring event. Groundwater laboratory analytical data is presented in Table 2 and illustrated on Figure 4. The complete laboratory analytical report is 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 17 Site monitoring wells sampled. The benzene concentrations ranged from 39 $\mu\text{g/L}$ at BH05R to 240 $\mu\text{g/L}$ at BH02R.
- Toluene was not detected above the COGCC Table 910-1 groundwater standard of 560 $\mu\text{g/L}$ in any of the 17 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 17 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 17 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 second 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.

From January 1 to March 7, 2019 the AS wells operated at an average flow rate of 6.42 cfm and at an average pressure of 1.68 pounds per square inch (psi). During this time frame, the System operated with an average uptime of 98%. Pressure surveys were conducted to determine the radius of influence achieved by AS operations. On January 16, 2019 a maximum pressure of 1.7 inches of water column was achieved at 32.4 linear feet at BH08. This was also the greatest distance that influence was observed.

Soil vapor concentrations are measured across the Site using the Site groundwater monitoring wells. A photoionization detector (PID) is used to measure the vapor phase petroleum hydrocarbon concentrations to monitor passive emissions from AS operations. PID readings ranged from 0 to 297.6 milligrams per kilogram (mg/kg) across the site over the first quarter of 2019 with the highest concentrations typically recorded at groundwater monitoring wells BH03, BH05R and BH06R.

Based on the laboratory results from the first quarter 2019 groundwater samples, concentrations have dropped three orders of magnitude at groundwater monitoring well BH04R since system start up in the third quarter 2018. Due to the historic presence of LNAPL at BH03 and BH05R,

remediation efforts during the first quarter 2019 were focused in the area of these two wells. Approximately .02 ounces of LNAPL was removed via hand bailer from BH03 and BH05R during the first quarter of 2019 and for the first time since March 21, 2018 LNAPL was not detected at either BH03 or BH05R during the quarterly sampling event.

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 remain off until these activities are completed.

5.0 UPCOMING SITE ACTIVITIES

Anticipated upcoming Site activities include the following:

- Complete the second quarter 2019 groundwater sampling event in June 2019; and
- Continue monitor 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.

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. BTOC) | Depth to LNAPL (ft. BTOC) | 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | |

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|----------------------|----------|------------------------------------|------------------------|---------------------------|---------------------------|-----------------------|-----------------------------------|--|
| 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 | |
| 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 | |
| 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 | |
| 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 | |
| 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 | 16.32 | ND | ND | 4700.58 | |
| 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 | |

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

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|---------------------------|-------------|---|-------------------------------|----------------------------------|----------------------------------|------------------------------|--|
| 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 |
| BH09 | 06/23/17 | 4660.51 | 21.60 | 14.76 | ND | ND | 4645.75 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |

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. BTOC) | Depth to LNAPL (ft. BTOC) | LNAPL Thickness (ft.) | Groundwater Elevation* (ft. AMSL) |
|--------------------|----------|------------------------------------|------------------------|---------------------------|---------------------------|-----------------------|-----------------------------------|
| 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 |
| 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 |
| 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 |

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

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

**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 | <1.0 | <1.0 | <1.0 |
| 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 |
| 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 |
| 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 |
| 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 | | | |

**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 |
| 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 |
| 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 |
| 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 |
| 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 |
| BH07 | 04/15/16 | <1.0 | <1.0 | <1.0 | <1.0 |
| 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 |

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 |
| 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 | | | |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |

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 |
| BH13 | 03/15/19 | <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 |
| 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 |
| 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 |
| 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 |
| 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 |

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

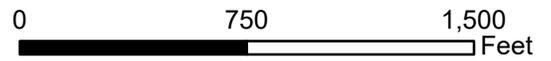
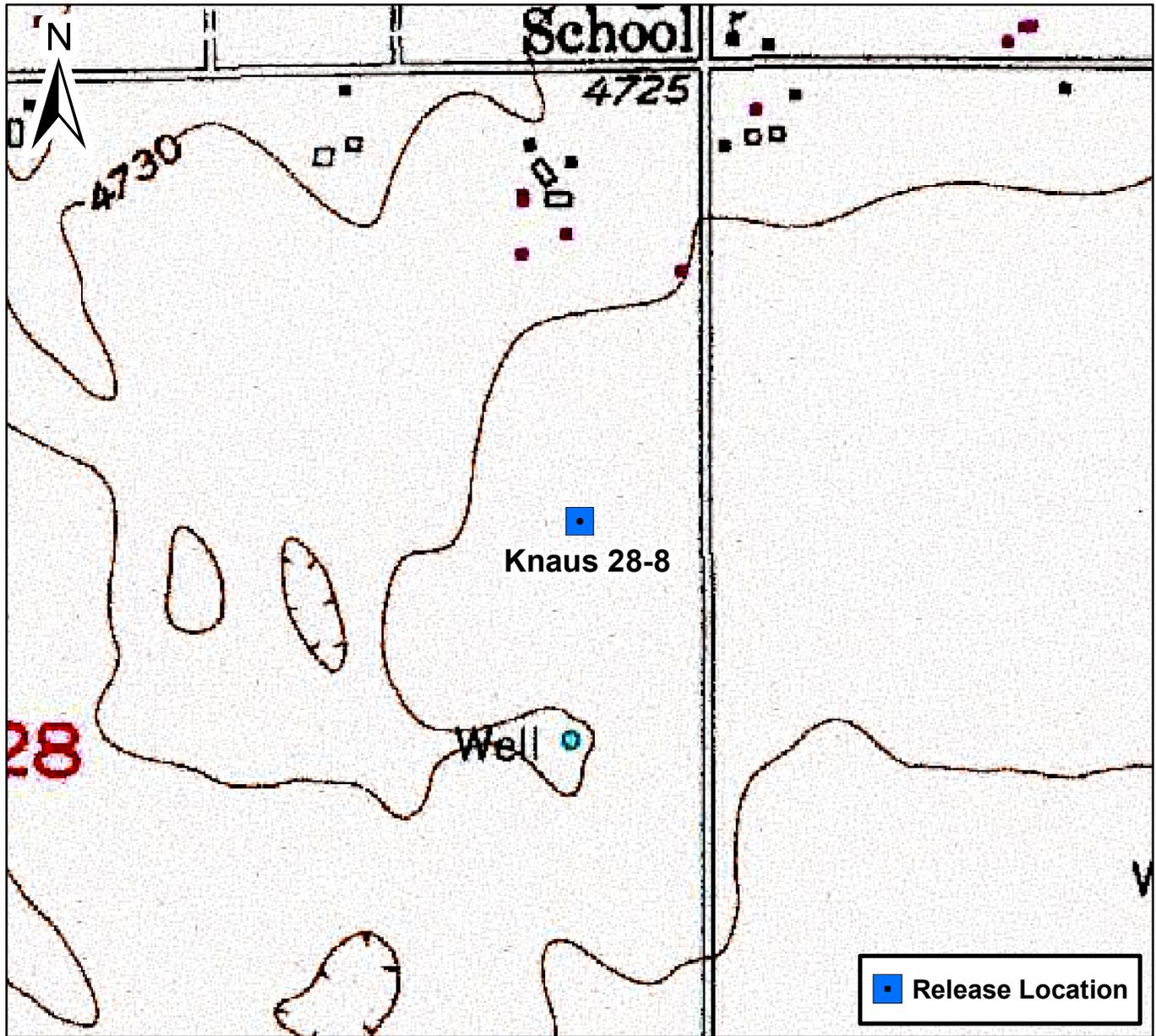
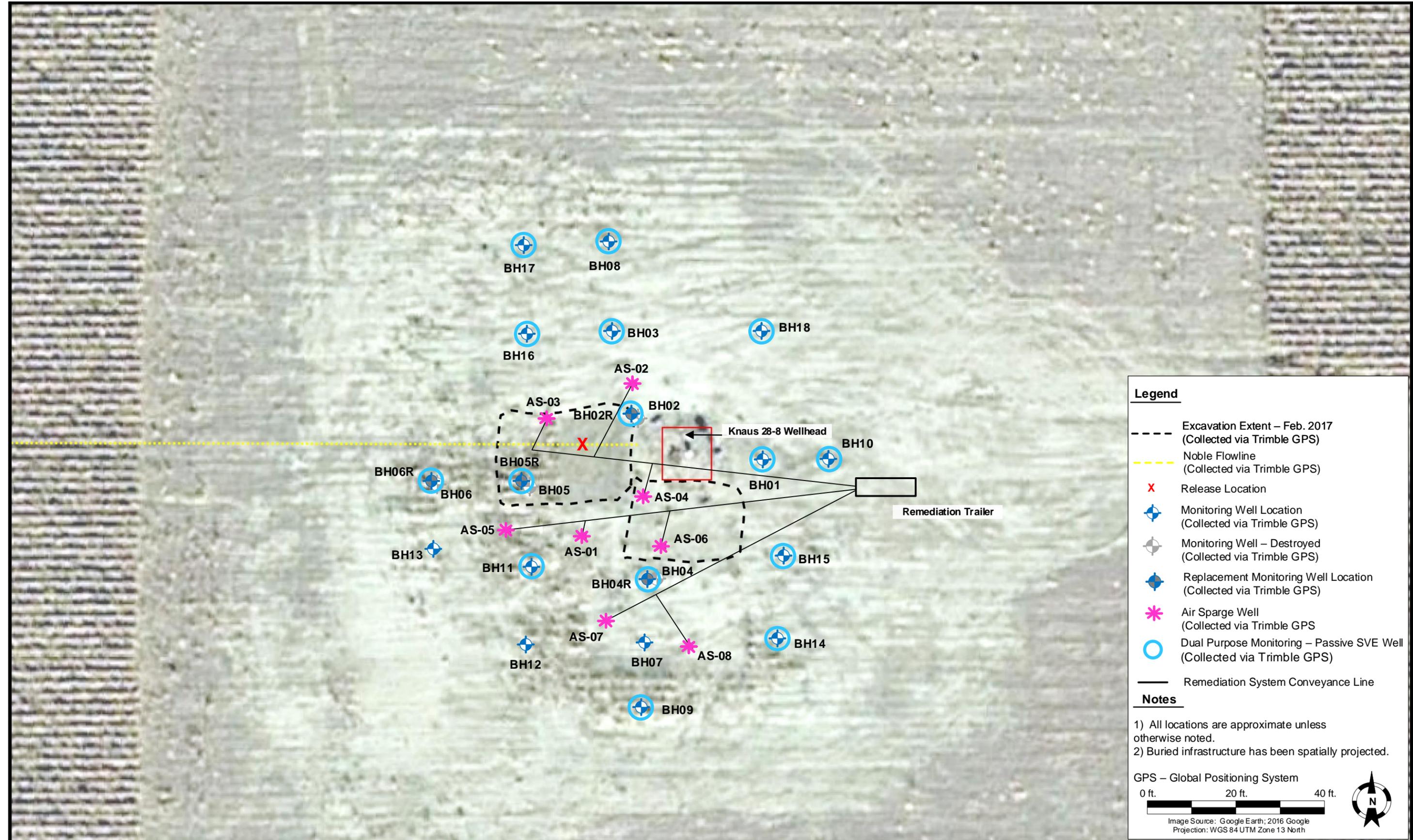


Figure 1

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





Legend

- Excavation Extent – Feb. 2017 (Collected via Trimble GPS)
- - - Noble Flowline (Collected via Trimble GPS)
- X Release Location
- Monitoring Well Location (Collected via Trimble GPS)
- Monitoring Well – Destroyed (Collected via Trimble GPS)
- Replacement Monitoring Well Location (Collected via Trimble GPS)
- * Air Sparge Well (Collected via Trimble GPS)
- Dual Purpose Monitoring – Passive SVE Well (Collected via Trimble GPS)
- Remediation System Conveyance Line

Notes

- 1) All locations are approximate unless otherwise noted.
- 2) Buried infrastructure has been spatially projected.

GPS – Global Positioning System

0 ft. 20 ft. 40 ft.

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

| | |
|--------------|-----------|
| DATE: | 1/28/2019 |
| DESIGNED BY: | DA |
| DRAWN BY: | GB |

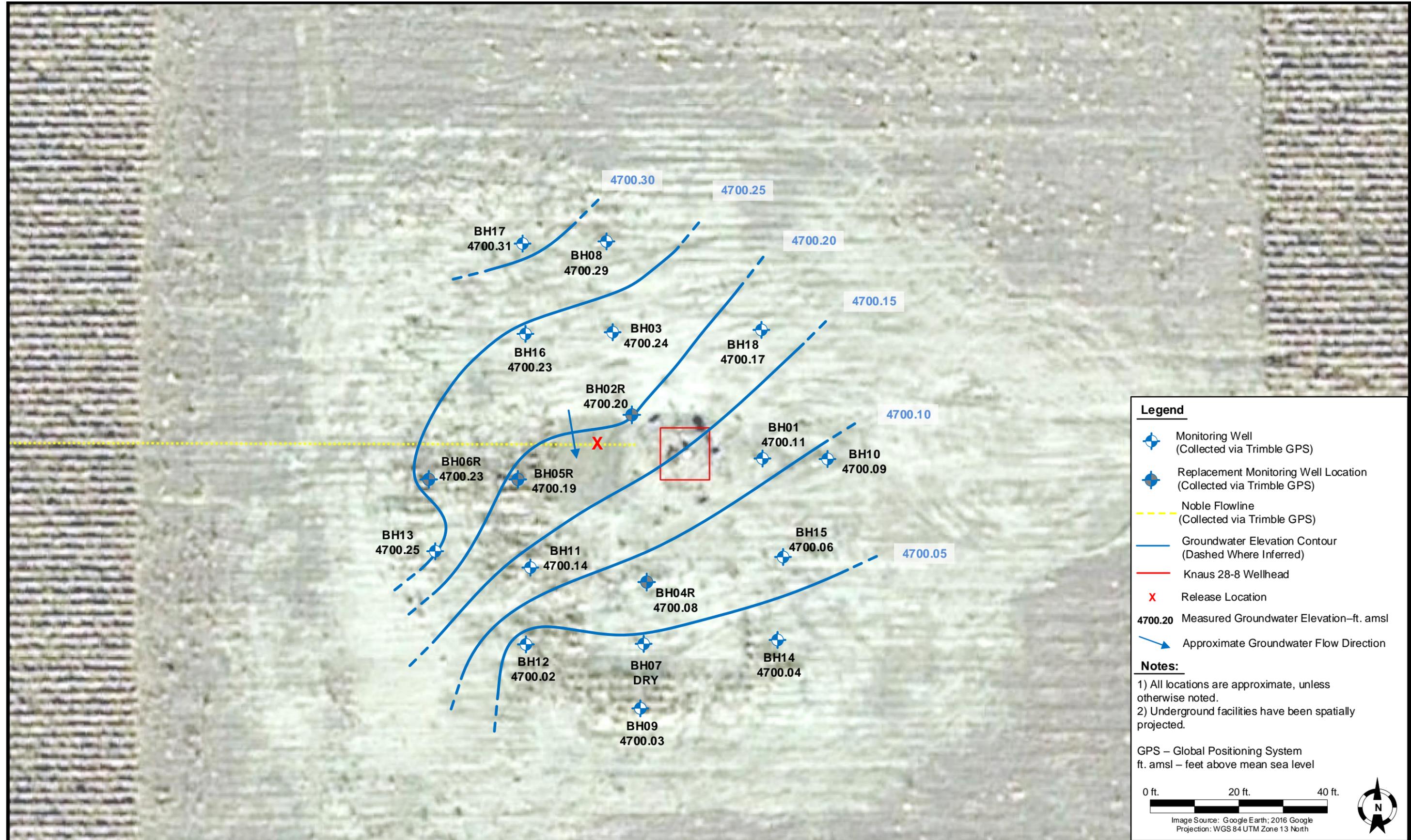
TASMAN
GEOSCIENCES

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

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



| | |
|--------------|------------|
| DATE: | 04/25/2019 |
| DESIGNED BY: | DA |
| DRAWN BY: | CO |



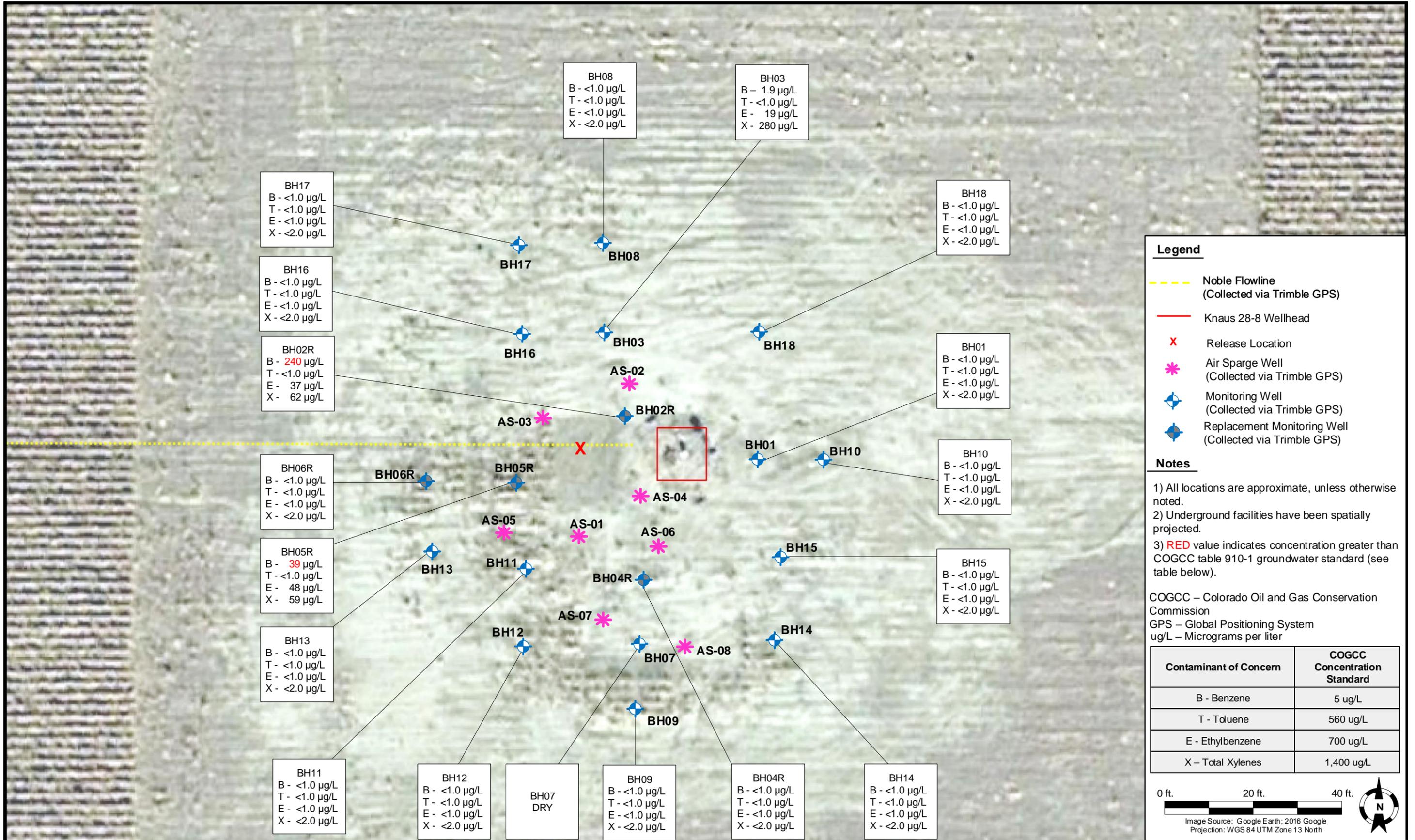
TASMAN
GEOSCIENCES

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

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
(March 15, 2019)

FIGURE
3



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: 4/24/19

DESIGNED BY: DA

DRAWN BY: JW

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

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

Groundwater Analytical
 Results Map
 (March 15, 2019)

FIGURE
 4

ATTACHMENT A

LABORATORY ANALYTICAL DATA REPORT

Summit Scientific

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

March 25, 2019

Brandon Bruns

Tasman Geosciences

6899 Pecos St, Unit C

Denver, CO 80221

RE: Noble - Knaus 28-8

Enclosed are the results of analyses for samples received by Summit Scientific on 03/15/19 18:30. 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

ANALYTICAL REPORT FOR SAMPLES

| Sample ID | Laboratory ID | Matrix | Date Sampled | Date Received |
|-----------|---------------|--------|----------------|----------------|
| BH01 | 1903130-01 | Water | 03/15/19 11:21 | 03/15/19 18:30 |
| BH02R | 1903130-02 | Water | 03/15/19 11:38 | 03/15/19 18:30 |
| BH03 | 1903130-03 | Water | 03/15/19 12:34 | 03/15/19 18:30 |
| BH04R | 1903130-04 | Water | 03/15/19 11:58 | 03/15/19 18:30 |
| BH05R | 1903130-05 | Water | 03/15/19 12:27 | 03/15/19 18:30 |
| BH06R | 1903130-06 | Water | 03/15/19 12:20 | 03/15/19 18:30 |
| BH08 | 1903130-07 | Water | 03/15/19 11:25 | 03/15/19 18:30 |
| BH09 | 1903130-08 | Water | 03/15/19 10:40 | 03/15/19 18:30 |
| BH10 | 1903130-09 | Water | 03/15/19 11:30 | 03/15/19 18:30 |
| BH11 | 1903130-10 | Water | 03/15/19 10:58 | 03/15/19 18:30 |
| BH12 | 1903130-11 | Water | 03/15/19 12:06 | 03/15/19 18:30 |
| BH13 | 1903130-12 | Water | 03/15/19 12:40 | 03/15/19 18:30 |
| BH14 | 1903130-13 | Water | 03/15/19 12:18 | 03/15/19 18:30 |
| BH15 | 1903130-14 | Water | 03/15/19 12:25 | 03/15/19 18:30 |
| BH16 | 1903130-15 | Water | 03/15/19 11:11 | 03/15/19 18:30 |
| BH17 | 1903130-16 | Water | 03/15/19 10:40 | 03/15/19 18:30 |
| BH18 | 1903130-17 | Water | 03/15/19 11:36 | 03/15/19 18:30 |

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.

1903/30.1

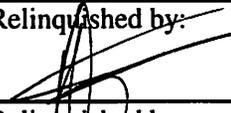
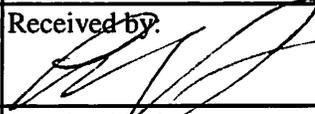
Summit Scientific

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: 970.210.6571 | Project Name: <u>KNAUS 28-B</u> |
| Sampler Name: T. Lichtenberg | 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 | \$260 BTEX | \$260B GBTEXN | \$015 DRO | | pH, EC, SAR |
| 1 | BH01 | 3/15/19 | 1121 | 1 | X | | | | X | | | | X | | | | |
| 2 | BH02R | | 1138 | 3 | | | | | | | | | | | | | |
| 3 | BH03 | | 1234 | | | | | | | | | | | | | | |
| 4 | BH04R | | 1158 | | | | | | | | | | | | | | |
| 5 | BH05R | | 1227 | | | | | | | | | | | | | | |
| 6 | BH06R | | 1220 | | | | | | | | | | | | | | |
| 7 | BH08 | | 1125 | | | | | | | | | | | | | | |
| 8 | BH09 | | 1040 | | | | | | | | | | | | | | |
| 9 | BH10 | | 1130 | | | | | | | | | | | | | | |
| 10 | BH11 | | 1058 | | | | | | | | | | | | | | |

| | | | |
|--|---|--|-----------------------------|
| Relinquished by:  Date/Time: 3/15/19 @ 1600 | Received by: Tasman's Lock Box Date/Time: 3/15/19 @ 1600 | Turn Around Time (Check) Same Day _____ 72 hours _____ 24 hours _____ Standard <u>✓</u> 48 hours _____ Sample Integrity: Temperature Upon Receipt: <u>2.5</u> Samples Intact: <u>(es)</u> No | Notes: on vcp |
| Relinquished by: Tasman's Lock Box Date/Time: 3.15.19 1630 | Received by:  Date/Time: 3.15.19 1630 | | |
| Relinquished by: _____ Date/Time: _____ | Received by: _____ Date/Time: _____ | | |

1903130.2

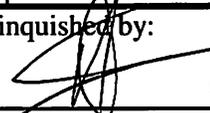
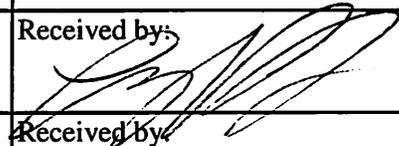
Summit Scientific

S₂

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

Client: Noble / Tasman Project Manager: Brandon Brunns, Invoice: Jacob Evans
 Address: 6899 Pecos Street E-Mail: Bbruns@tasman-geo.com
 City/State/Zip: Denver / CO/ 80221
 Phone: 970.210.6571 Project Name: KNAS 28.8
 Sampler Name: T. Lichtenberg 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 | \$260 BTEX | \$260B GBTEXN | 8015 DRO | pH, EC, SAR | |
| 1 | BH12 | 3/15/19 | 1200 | 3 | X | | | | X | | | | X | | | | |
| 2 | BH13 | | 1240 | 1 | | | | | | | | | | | | | |
| 3 | BH14 | | 1218 | 3 | | | | | | | | | | | | | |
| 4 | BH15 | | 1225 | 1 | | | | | | | | | | | | | |
| 5 | BH16 | | 1111 | 1 | | | | | | | | | | | | | |
| 6 | BH17 | | 1040 | 1 | | | | | | | | | | | | | |
| 7 | BH18 | | 1130 | 1 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | |

| | | | | | |
|--|--------------------------|--|--------------------------|--|----------------------------|
| Relinquished by:  | Date/Time: 3/15/19 01600 | Received by: Tasman's Lock Box | Date/Time: 3/15/19 01600 | 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"/> Sample Integrity: Temperature Upon Receipt: <u>2.5</u> Samples Intact: <input checked="" type="radio"/> Yes <input type="radio"/> No | Notes: 07102 |
| Relinquished by: Tasman's Lock Box | Date/Time: 3.15.19 1830 | Received by:  | Date/Time: 3.15.19 1830 | | |
| Relinquished by: | Date/Time: | Received by: | Date/Time: | | |

Sample Receipt Checklist

S2 Work Order 1903/30

Client: Noble/Tosman Client Project ID: Kraus 23-8

Shipped 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>2.5</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. | / | | | <u>on ice</u> |
| 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 | / | | | <u>HCl</u> |
| 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? | | | / | |
| <u>Additional Comments (if any):</u> | | | | |
| ⁽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 Custodian

3.15.19 1905
Date/Time



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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH01
1903130-01 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:21**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:21**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 75.3 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 99.2 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 96.9 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Brun

Reported:
03/25/19 09:46

BH02R
1903130-02 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:38**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|------------------------|------------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | 240 | 10 | | ug/l | 10 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | 1 | " | " | " | " | |
| Ethylbenzene | 37 | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | 62 | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:38**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 107 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 104 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 97.9 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Brun

Reported:
03/25/19 09:46

BH03
1903130-03 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:34**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|------------------------|------------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | 1.9 | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | 19 | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | 280 | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:34**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 118 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 102 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 119 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH04R
1903130-04 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:58**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:58**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 103 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 101 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 98.2 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH05R
1903130-05 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:27**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|------------------------|-----------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | 39 | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | 48 | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | 59 | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:27**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 106 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 103 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 105 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH06R
1903130-06 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:20**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:20**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 97.7 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 102 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 94.8 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH08
1903130-07 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:25**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:25**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 100 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 102 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 92.7 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH09
1903130-08 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 10:40**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 10:40**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 103 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 101 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 95.5 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH10
1903130-09 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:30**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:30**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 104 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 102 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 94.8 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH11
1903130-10 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 10:58**

| Analyte | Result | Reporting | | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | Units | | | | | | |
| Benzene | ND | 1.0 | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | " | " | " | " | " | " | |

Date Sampled: **03/15/19 10:58**

| Analyte | Result | Reporting | | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | Units | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 109 % | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 102 % | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 94.4 % | 21-167 | | " | " | " | " | |

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH12
1903130-11 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:06**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:06**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 88.5 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 92.6 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 95.3 % | | 21-167 | | " | " | " | " | |

Summit Scientific



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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Brun

Reported:
03/25/19 09:46

BH13
1903130-12 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:40**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:40**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 92.9 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 93.7 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 95.3 % | | 21-167 | | " | " | " | " | |

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH14
1903130-13 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:18**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:18**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 91.4 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 94.3 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 93.4 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Brun

Reported:
03/25/19 09:46

BH15
1903130-14 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 12:25**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 12:25**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 91.5 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 92.9 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 96.2 % | | 21-167 | | " | " | " | " | |

Summit Scientific



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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH16
1903130-15 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:11**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:11**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 91.9 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 93.4 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 93.2 % | | 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
6899 Pecos St, Unit C
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH17
1903130-16 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 10:40**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 10:40**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 89.6 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 93.4 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 94.4 % | | 21-167 | | " | " | " | " | |

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

BH18
1903130-17 (Water)

Summit Scientific

Volatile Organic Compounds by EPA Method 8260B

Date Sampled: **03/15/19 11:36**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|-----------------|--------|-----------|--|-------|----------|---------|----------|----------|-----------|-------|
| | | Limit | | | | | | | | |
| Benzene | ND | 1.0 | | ug/l | 1 | 1903172 | 03/18/19 | 03/19/19 | EPA 8260B | |
| Toluene | ND | 1.0 | | " | " | " | " | " | " | |
| Ethylbenzene | ND | 1.0 | | " | " | " | " | " | " | |
| Xylenes (total) | ND | 2.0 | | " | " | " | " | " | " | |

Date Sampled: **03/15/19 11:36**

| Analyte | Result | Reporting | | Units | Dilution | Batch | Prepared | Analyzed | Method | Notes |
|----------------------------------|--------|-----------|--|--------|----------|-------|----------|----------|--------|-------|
| | | Limit | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | | 94.1 % | | 23-173 | | " | " | " | " | |
| Surrogate: Toluene-d8 | | 95.4 % | | 20-170 | | " | " | " | " | |
| Surrogate: 4-Bromofluorobenzene | | 93.5 % | | 21-167 | | " | " | " | " | |

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

Volatile Organic Compounds by EPA Method 8260B - Quality Control

Summit Scientific

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

Batch 1903172 - EPA 5030 Water MS

Blank (1903172-BLK1)

Prepared: 03/18/19 Analyzed: 03/19/19

| | | | | | | | | | | | |
|----------------------------------|------|-----|------|------|--|------|--|--------|--|--|--|
| Benzene | ND | 1.0 | ug/l | | | | | | | | |
| Toluene | ND | 1.0 | " | | | | | | | | |
| Ethylbenzene | ND | 1.0 | " | | | | | | | | |
| Xylenes (total) | ND | 2.0 | " | | | | | | | | |
| Surrogate: 1,2-Dichloroethane-d4 | 12.2 | | " | 13.3 | | 91.1 | | 23-173 | | | |
| Surrogate: Toluene-d8 | 13.7 | | " | 13.3 | | 102 | | 20-170 | | | |
| Surrogate: 4-Bromofluorobenzene | 12.6 | | " | 13.3 | | 94.4 | | 21-167 | | | |

LCS (1903172-BS1)

Prepared: 03/18/19 Analyzed: 03/19/19

| | | | | | | | | | | | |
|----------------------------------|------|-----|------|------|--|------|--|--------|--|--|--|
| Benzene | 35.0 | 1.0 | ug/l | 33.3 | | 105 | | 70-130 | | | |
| Toluene | 35.7 | 1.0 | " | 33.3 | | 107 | | 70-130 | | | |
| Ethylbenzene | 40.4 | 1.0 | " | 33.3 | | 121 | | 70-130 | | | |
| m,p-Xylene | 73.7 | 2.0 | " | 66.7 | | 111 | | 70-130 | | | |
| o-Xylene | 36.6 | 1.0 | " | 33.3 | | 110 | | 70-130 | | | |
| Surrogate: 1,2-Dichloroethane-d4 | 13.1 | | " | 13.3 | | 98.3 | | 23-173 | | | |
| Surrogate: Toluene-d8 | 13.9 | | " | 13.3 | | 104 | | 20-170 | | | |
| Surrogate: 4-Bromofluorobenzene | 12.9 | | " | 13.3 | | 96.8 | | 21-167 | | | |

Matrix Spike (1903172-MS1)

Source: 1903120-01

Prepared: 03/18/19 Analyzed: 03/19/19

| | | | | | | | | | | | |
|----------------------------------|------|-----|------|------|----|------|--|--------|--|--|--|
| Benzene | 35.7 | 1.0 | ug/l | 33.3 | ND | 107 | | 70-130 | | | |
| Toluene | 36.4 | 1.0 | " | 33.3 | ND | 109 | | 70-130 | | | |
| Ethylbenzene | 41.9 | 1.0 | " | 33.3 | ND | 126 | | 70-130 | | | |
| m,p-Xylene | 76.1 | 2.0 | " | 66.7 | ND | 114 | | 70-130 | | | |
| o-Xylene | 38.3 | 1.0 | " | 33.3 | ND | 115 | | 70-130 | | | |
| Surrogate: 1,2-Dichloroethane-d4 | 13.6 | | " | 13.3 | | 102 | | 23-173 | | | |
| Surrogate: Toluene-d8 | 14.0 | | " | 13.3 | | 105 | | 20-170 | | | |
| Surrogate: 4-Bromofluorobenzene | 13.0 | | " | 13.3 | | 97.7 | | 21-167 | | | |

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

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 1903172 - EPA 5030 Water MS

| Matrix Spike Dup (1903172-MSD1) | Source: 1903120-01 | | | Prepared: 03/18/19 Analyzed: 03/19/19 | | | | | | |
|---|---------------------------|-----|----------|--|----|-------------|---------------|------|----|--|
| Benzene | 31.1 | 1.0 | ug/l | 33.3 | ND | 93.4 | 70-130 | 13.7 | 30 | |
| Toluene | 31.8 | 1.0 | " | 33.3 | ND | 95.5 | 70-130 | 13.5 | 30 | |
| Ethylbenzene | 37.3 | 1.0 | " | 33.3 | ND | 112 | 70-130 | 11.7 | 30 | |
| m,p-Xylene | 66.7 | 2.0 | " | 66.7 | ND | 100 | 70-130 | 13.1 | 30 | |
| o-Xylene | 33.5 | 1.0 | " | 33.3 | ND | 101 | 70-130 | 13.4 | 30 | |
| <i>Surrogate: 1,2-Dichloroethane-d4</i> | <i>14.0</i> | | <i>"</i> | <i>13.3</i> | | <i>105</i> | <i>23-173</i> | | | |
| <i>Surrogate: Toluene-d8</i> | <i>13.7</i> | | <i>"</i> | <i>13.3</i> | | <i>103</i> | <i>20-170</i> | | | |
| <i>Surrogate: 4-Bromofluorobenzene</i> | <i>13.3</i> | | <i>"</i> | <i>13.3</i> | | <i>99.5</i> | <i>21-167</i> | | | |

Summit Scientific

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

Project: Noble - Knaus 28-8

Project Number: [none]
Project Manager: Brandon Bruns

Reported:
03/25/19 09:46

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