

**FOURTH QUARTER 2018  
SITE MONITORING AND REMEDIATION  
SUMMARY REPORT**

**KNAUS 28-8**

COGCC SPILL TRACKING # 445476  
COGCC REMEDIATION # 9767

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## 1.0 INTRODUCTION

This Fourth Quarter 2018 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), soil vapor extraction (SVE) remediation system (System) at the Knaus 28-8 site (Site).

Fourth Quarter 2018 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 benzene concentration 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 FOURTH QUARTER 2018 GROUNDWATER MONITORING ACTIVITIES

Fourth Quarter 2018 groundwater monitoring activities were performed at the Site on December 14, 2018. The activities included measurement of groundwater levels from all 18 Site monitoring well locations and the collection of groundwater samples. Groundwater laboratory analytical data is presented in Table 2 and groundwater elevation measurements are presented in Table 1.

### 2.1 Groundwater Level Measurements

Both general procedures and significant observations for the groundwater gauging activities performed during the Fourth Quarter 2018 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 Fourth Quarter 2018 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 Fourth Quarter 2018 groundwater monitoring event, the groundwater elevation at the Site ranged from 4,700.83 ft. amsl in BH09 to 4,701.13 ft. amsl in BH17. The groundwater potentiometric surface at the site slopes to the east/southeast, with a hydraulic gradient of approximately 0.003 feet per foot between wells BH17 and BH09. Groundwater elevation contours and the inferred flow direction are illustrated on Figure 3. During the Fourth Quarter 2018 monitoring event, approximately 0.04 and 0.01 feet of LNAPL was measured in BH03 and BH05R respectively. Monitoring wells BH03 and BH05R were not sampled due to the presence of LNAPL. In addition, BH07 was not sampled due to insufficient amounts of groundwater.

### 2.2 Groundwater Purging and Sampling

This section summarizes both general procedures and significant observations from the groundwater purging and sampling activities conducted on December 14, 2018. During the

Fourth Quarter 2018 groundwater monitoring event, groundwater samples were collected from 15 of the monitoring wells in the Site monitoring well network. Two wells containing LNAPL and one well with insufficient water volume to collect a sample were 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 FOURTH QUARTER 2018 GROUNDWATER SAMPLING RESULTS**

This section presents the laboratory analytical results for groundwater samples collected during the Fourth Quarter 2018 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 one of the 15 Site monitoring wells sampled. The Benzene concentration associated with BH02R was 110  $\mu\text{g/L}$ .
- Toluene was not detected above the COGCC Table 910-1 groundwater standard of 560  $\mu\text{g/L}$  in any of the 15 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 15 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 15 Site monitoring wells sampled.

## **4.0 REMEDIATION SYSTEM**

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

### **4.1 AS/SVE 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.

### **4.2 AS/SVE Remediation System Operations**

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

From October 16 to December 31, 2018 the AS wells operated at an average flow rate of 7.38 cfm and at an average pressure of 2.35 pounds per square inch (psi). During this time frame, the System operated with an average uptime of 89%. Pressure surveys were conducted to determine the radius of influence achieved by AS activities. On October 16, 2018 a maximum pressure of 39.1 inches of water column was achieved at 6.89 linear feet at BH04R. The greatest distance that influence was observed was at 11.81 linear feet with a pressure of 0.5 inches of water column at BH05R.

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. Elevated PID readings have been measured across the Site with the highest concentrations typically detected in well BH02R. PID readings as high as 5,000 milligrams per kilogram (mg/kg) have been detected at this well.

Based on the laboratory results from the Fourth Quarter 2018 sampling event, it appears the System has been relatively successful since startup at addressing dissolved phase petroleum hydrocarbon concentrations as indicated in the concentration reductions experienced in groundwater monitoring wells BH02R and BH04R. LNAPL was still detected in wells BH03 and BH05R during the fourth quarter sampling event. Remediation efforts during the first quarter 2019 will be focused in the area of these two wells to help remove LNAPL and address the dissolved phase petroleum hydrocarbon concentrations.

## **5.0 UPCOMING SITE ACTIVITIES**

Anticipated upcoming Site activities include the following:

- Complete the First Quarter 2019 groundwater sampling event in March 2019; and
- Perform routine maintenance and operation of the remediation system.

## **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 <sup>1</sup>	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 <sup>4</sup>	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
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 <sup>3</sup>	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
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 <sup>(1)</sup>	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
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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**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)
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
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 <sup>6</sup>
BH05R <sup>(1)</sup>	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
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
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
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 <sup>2</sup>	19.50	9.28	ND	ND	4649.23
BH08	12/20/16	4661.45 <sup>5</sup>	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

**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)
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
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
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
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
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
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
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
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
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
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

**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)
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

**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

<sup>1</sup> 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.

<sup>2</sup> 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.

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

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

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

<sup>6</sup> 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)
<b>COGCC Standard</b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>
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
BH02	04/15/16	5,300	3,900	130	1,200
BH02	06/21/16	7,300	1,500	97	2,300
BH02 <sup>1</sup>	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
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 <sup>1</sup>	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			
BH04	04/15/16	1,700	2,600	130	1,200
BH04	06/21/16	Not Sampled - LNAPL Present			
BH04 <sup>1</sup>	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)
<b>COGCC Standard</b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>
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
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 <sup>1</sup>	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			
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
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
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			

**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)
<b>COGCC Standard</b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>
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
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
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
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
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
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
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
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
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

**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)
<b>COGCC Standard</b>		<b>5</b>	<b>560</b>	<b>700</b>	<b>1,400</b>
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
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

Notes:

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

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

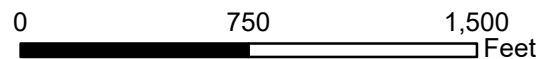
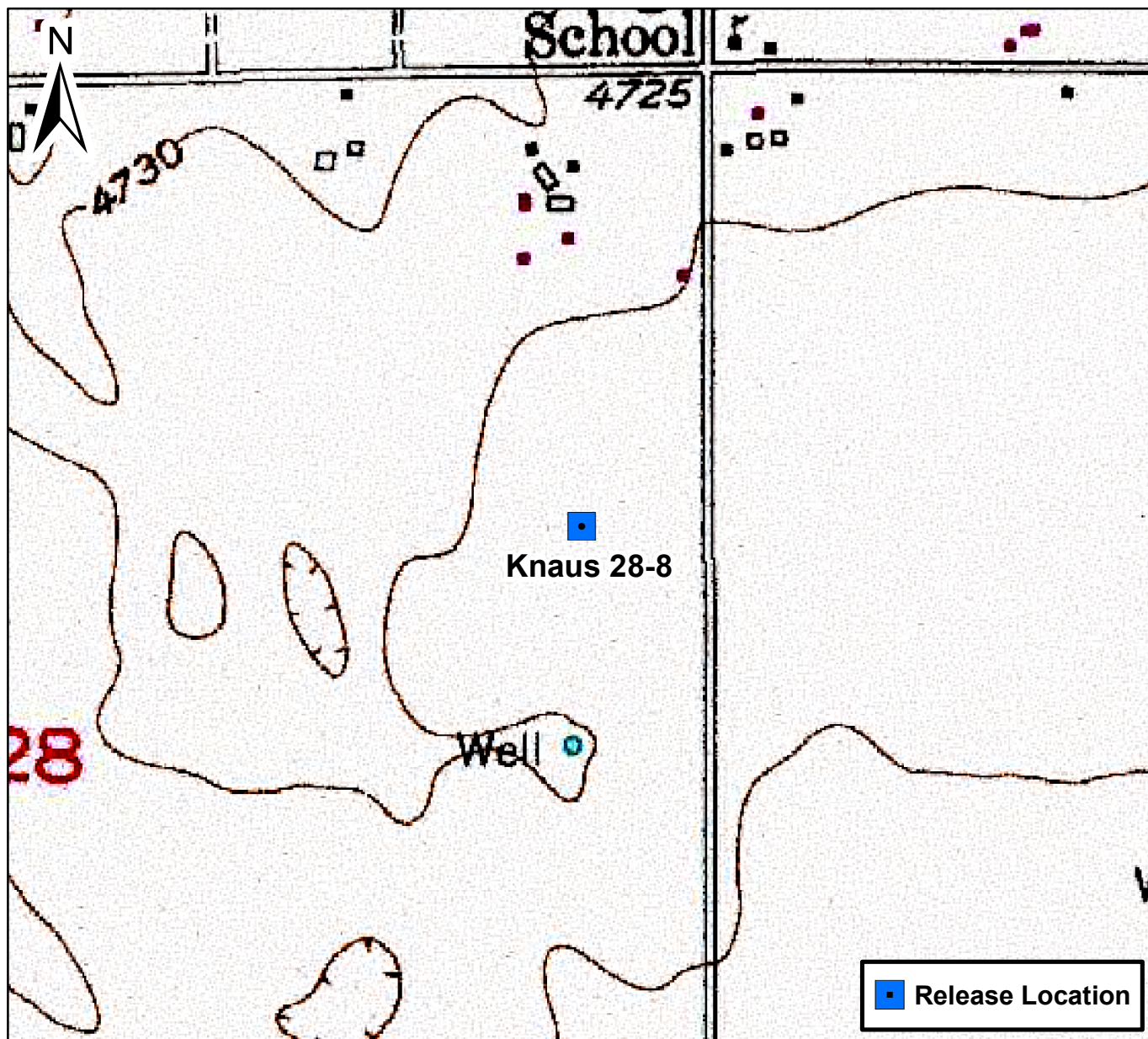
Groundwater standards referenced from COGCC Table 910-1

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

<sup>1</sup> Sheen present on groundwater sample.



## FIGURES

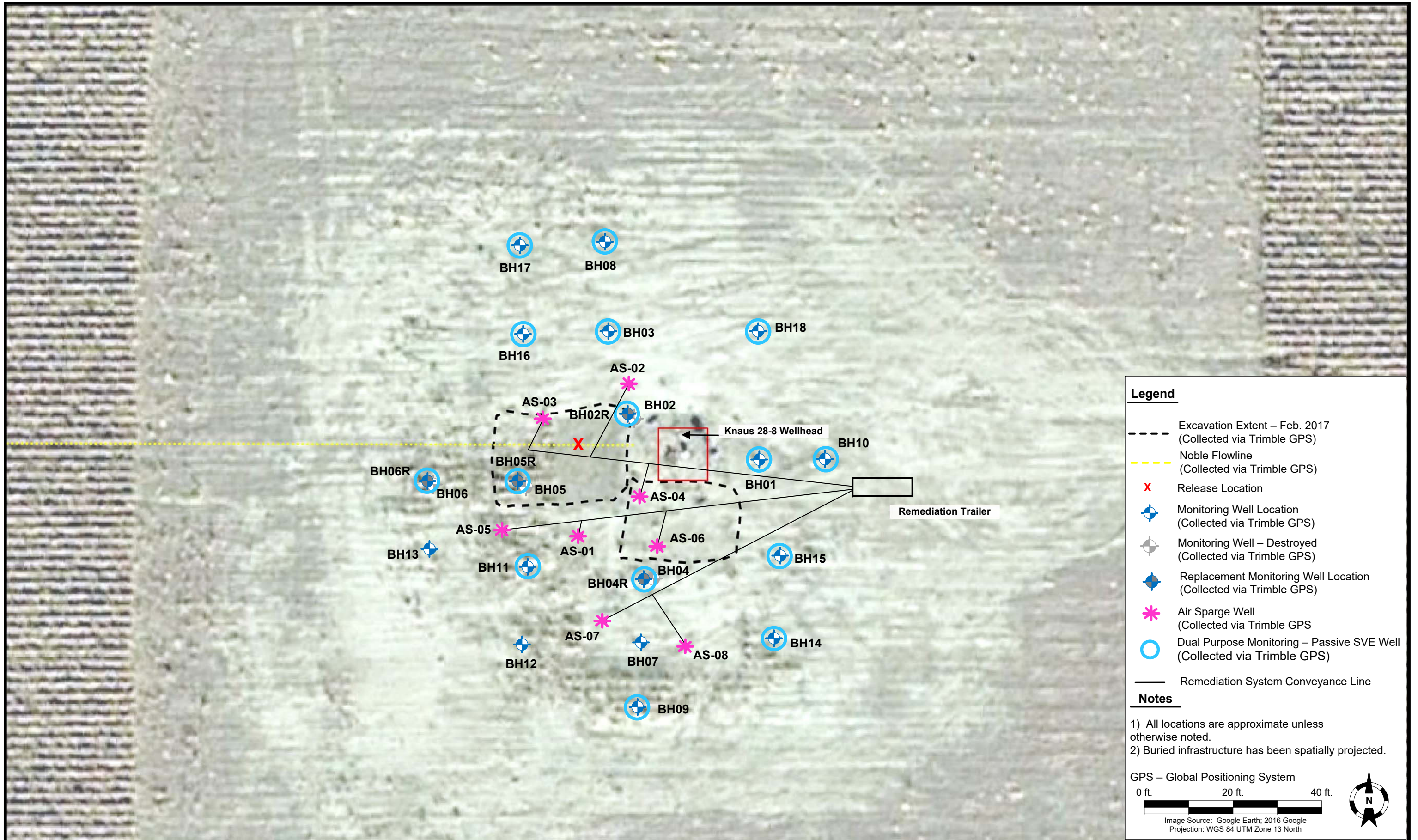


## Figure 1

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

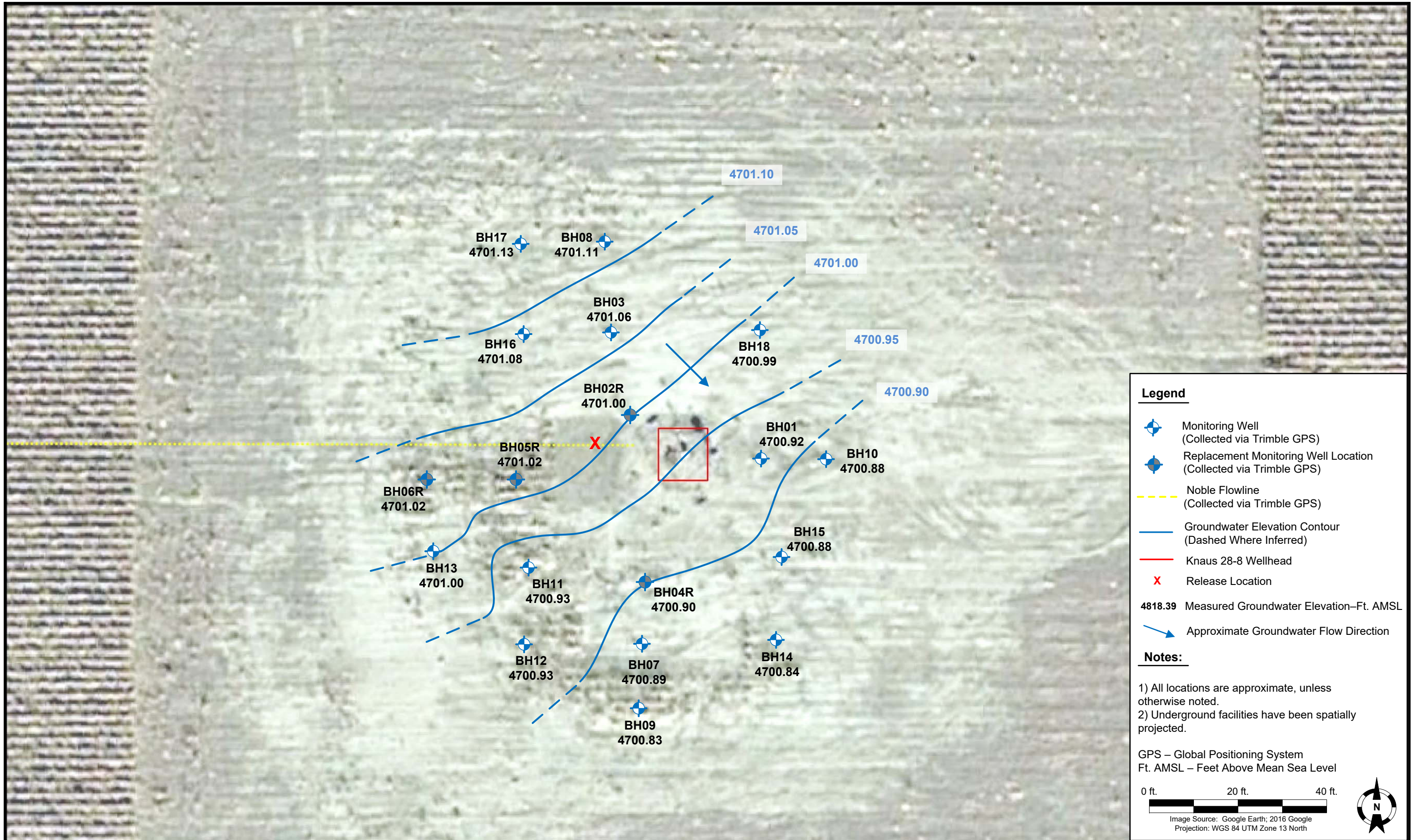
**Notes**

- 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







**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
- 4818.39 Measured Groundwater Elevation–Ft. AMSL
- Approximate Groundwater Flow Direction

**Notes:**

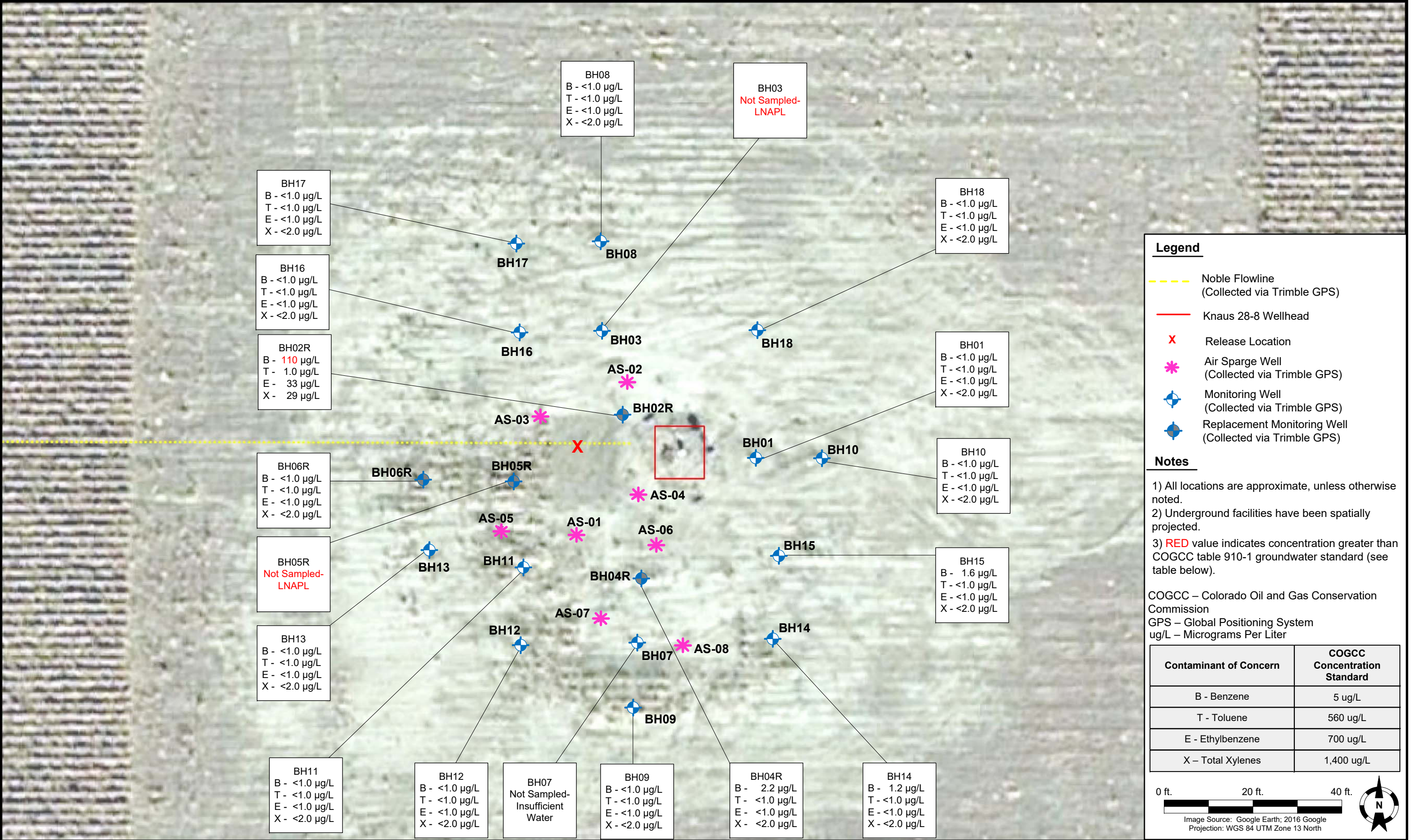
1) All locations are approximate, unless otherwise noted.  
2) Underground facilities have been spatially projected.

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





# **ATTACHMENT A**

## **BORING LOGS**





6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Graham Basecke

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 6/11/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~13

Knaus 28-8

BORING / WELL ID: AS-01

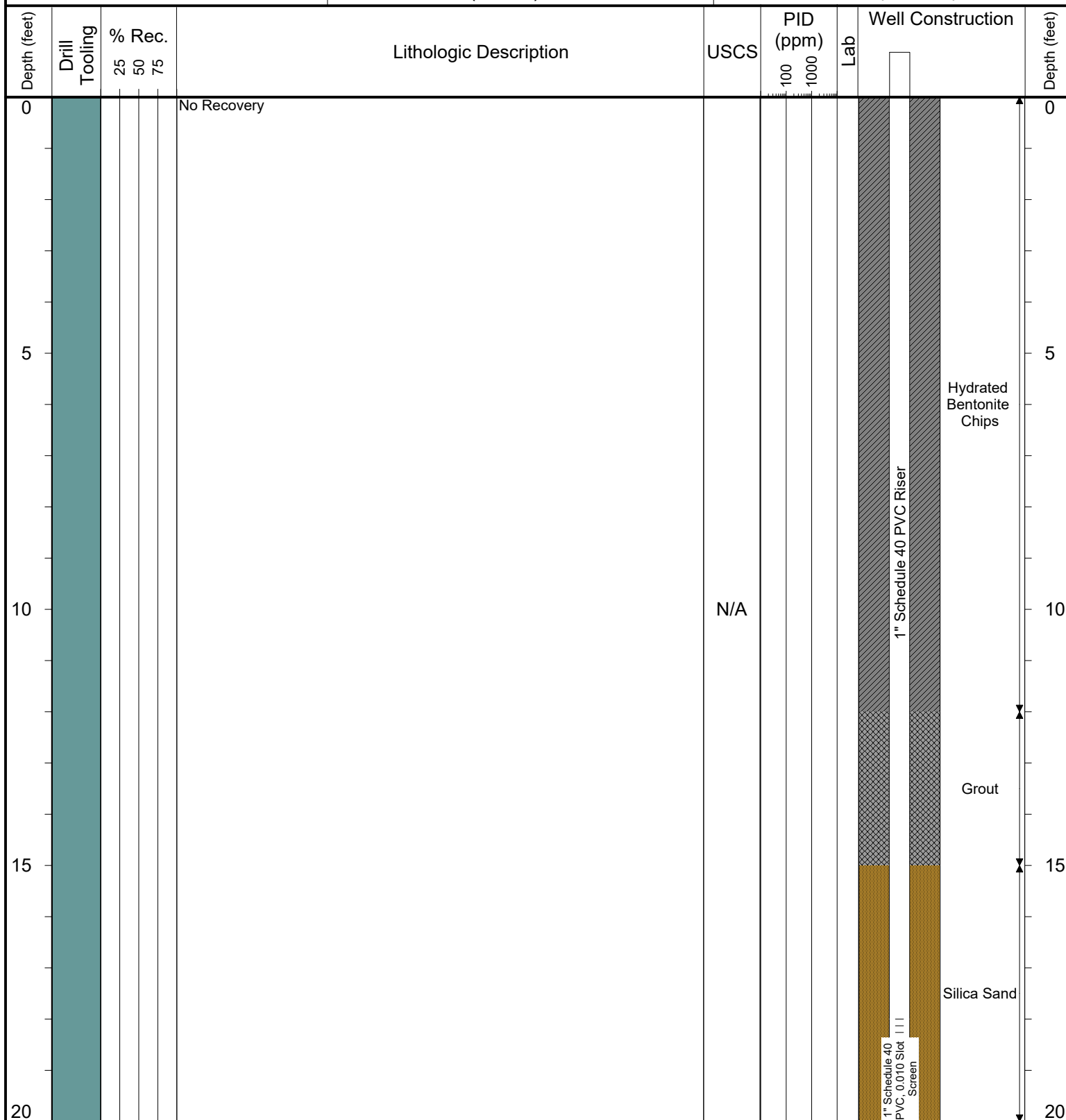
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Graham Basecke

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/2/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~13

Knaus 28-8

BORING / WELL ID: AS-02

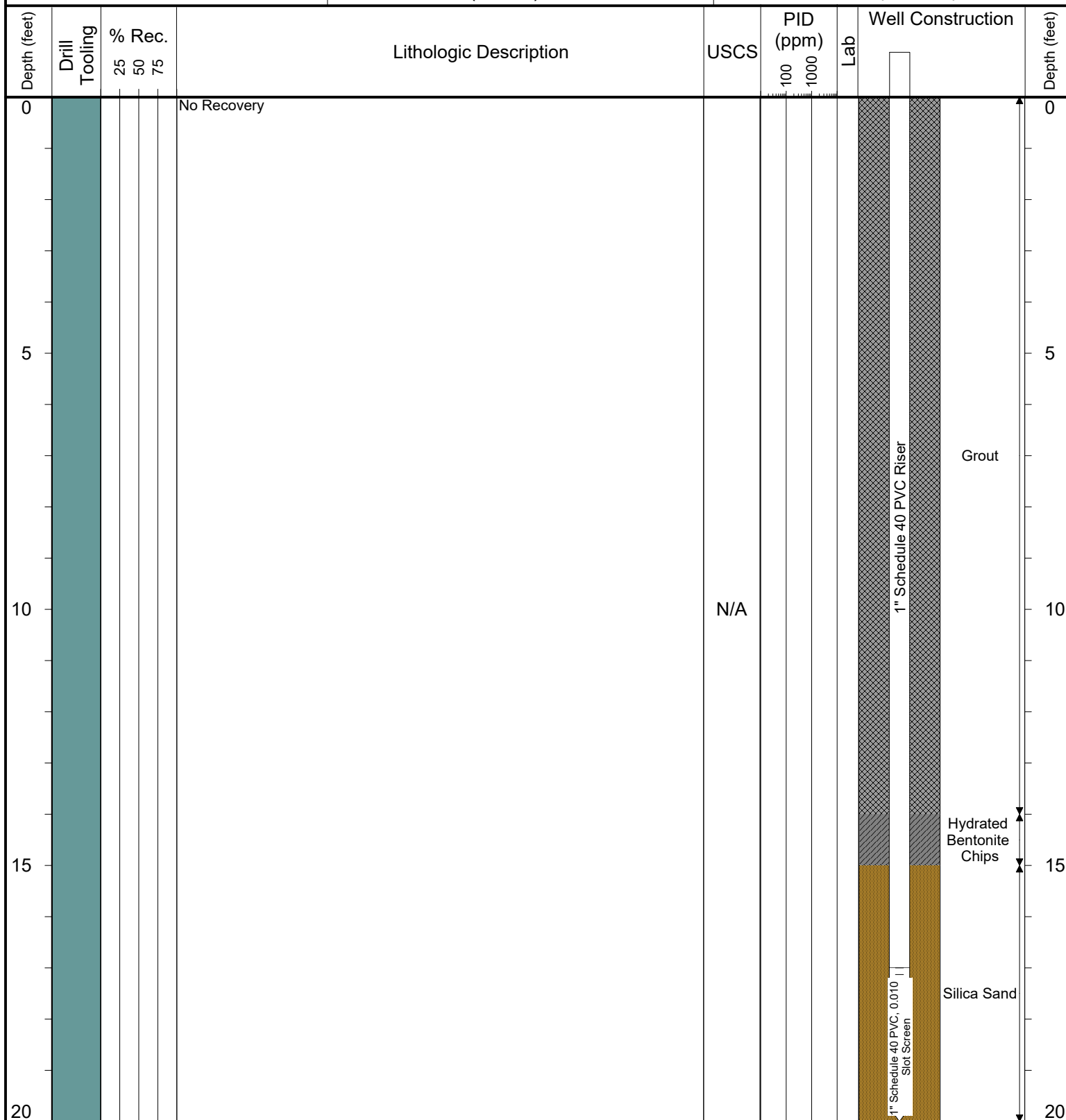
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab





6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Graham Basecke

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/2/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~13

Knaus 28-8

BORING / WELL ID: AS-03

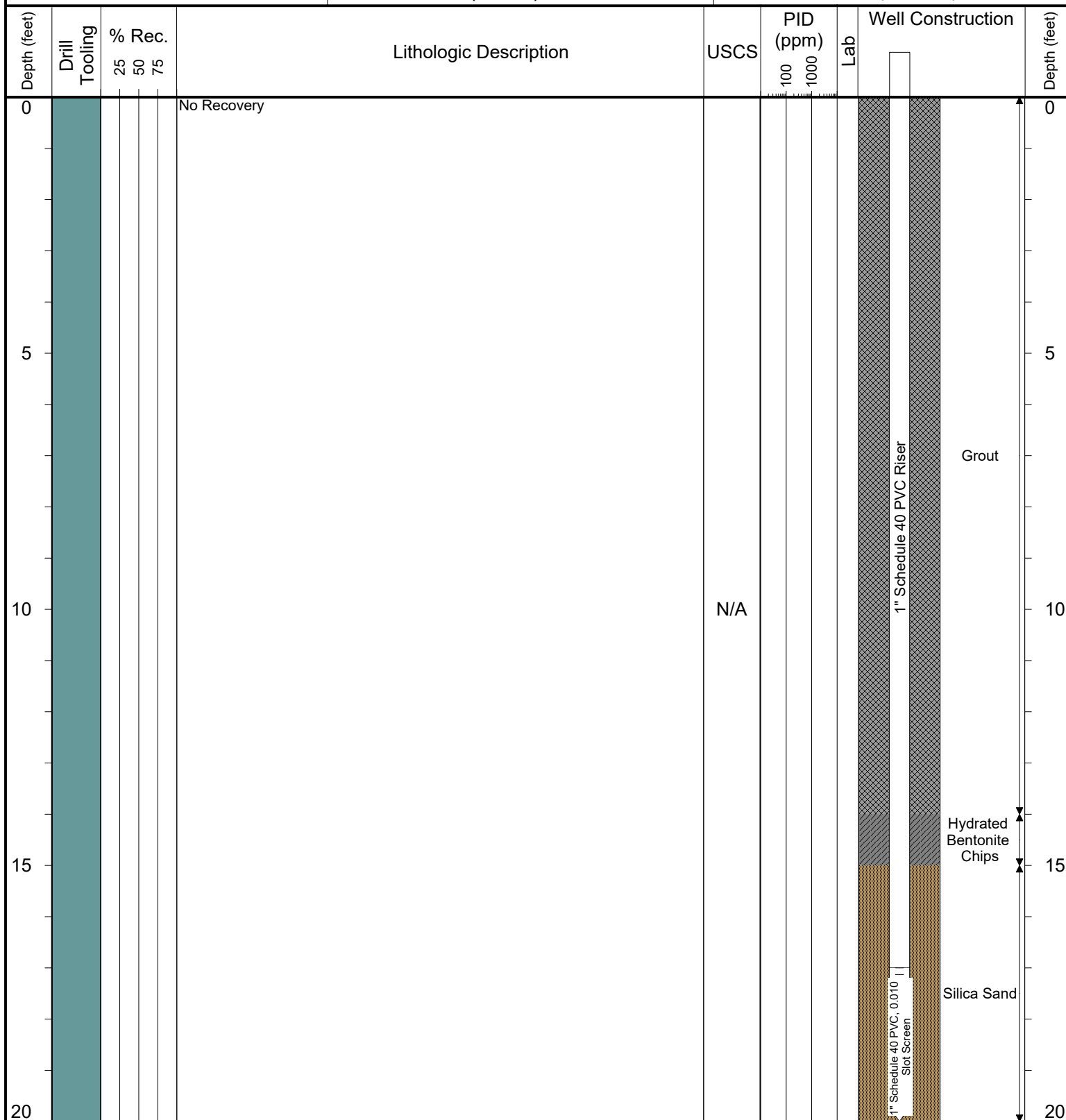
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Graham Basecke

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/2/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~13

Knaus 28-8

BORING / WELL ID: AS-04

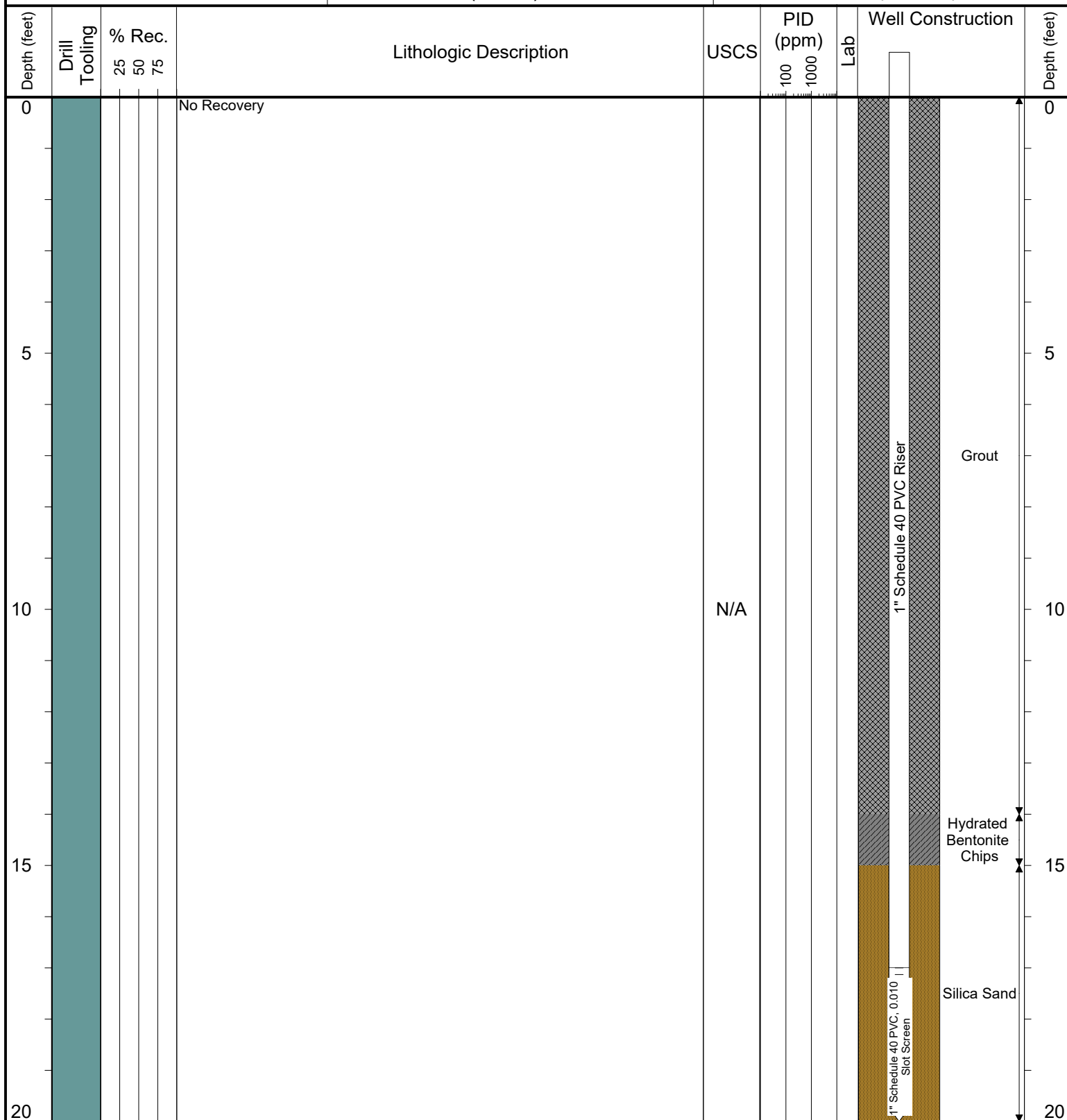
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Graham Basecke

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/2/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~13

Knaus 28-8

BORING / WELL ID: AS-05

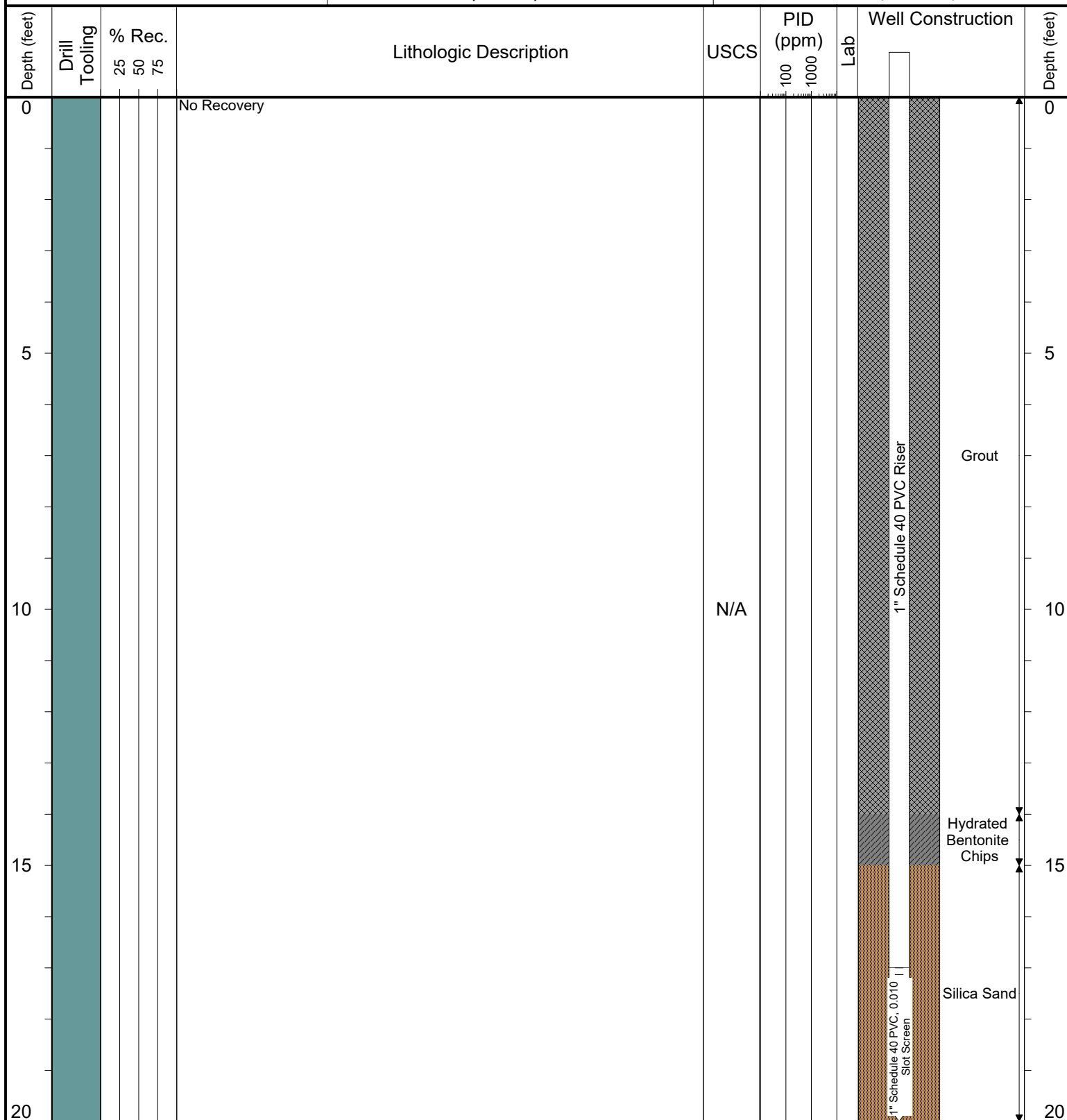
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Max Garza

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/3/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~14

Knaus 28-8

BORING / WELL ID: AS-06

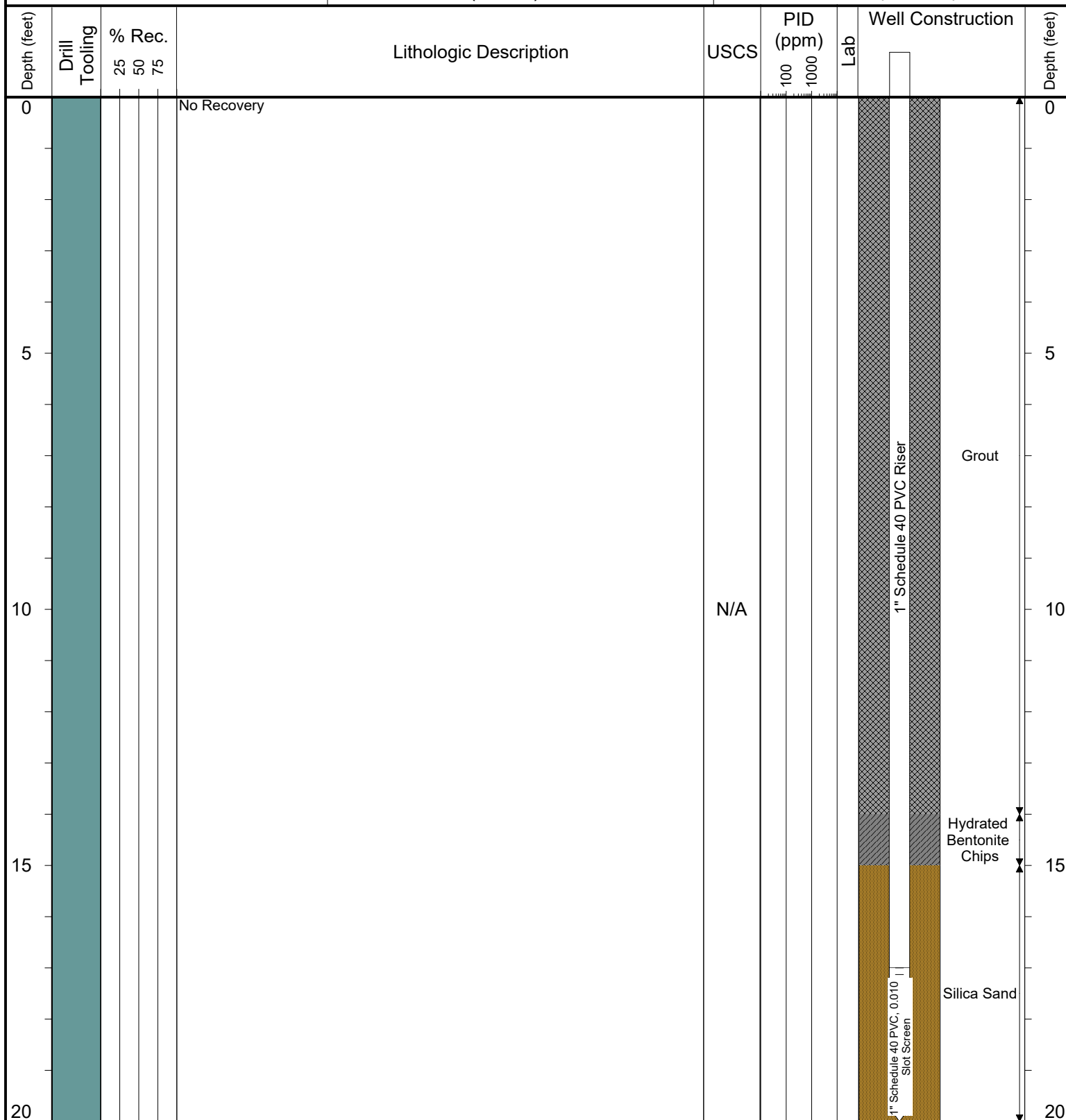
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Max Garza

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/3/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~14

Knaus 28-8

BORING / WELL ID: AS-07

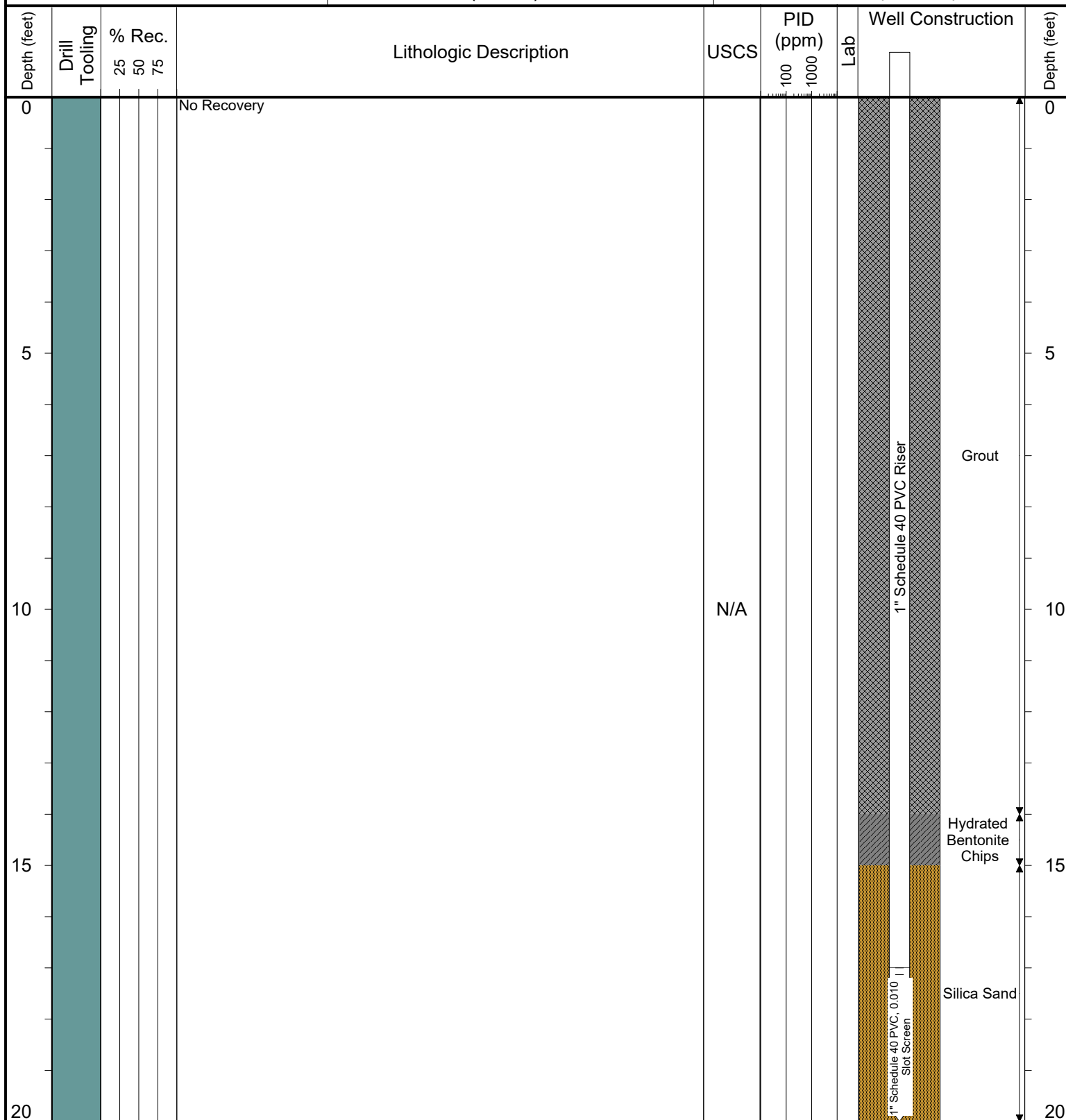
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab



6899 Pecos Street, Unit C  
Denver, Colorado 80221

CLIENT: Noble Energy, Inc.

LOGGED BY: Max Garza

PROJECT MANAGER: Brandon Bruns

DRILLING CONTRACTOR: Tasman Geosciences

DRILLING EQUIPMENT: Power Probe

DRILL BIT SIZE (INCHES): 8

DATE STARTED - COMPLETED: 7/3/2018

TOTAL WELL DEPTH (FT. BGS): 20

DEPTH TO WATER (FT. BGS): ~14

Knaus 28-8

BORING / WELL ID: AS-08

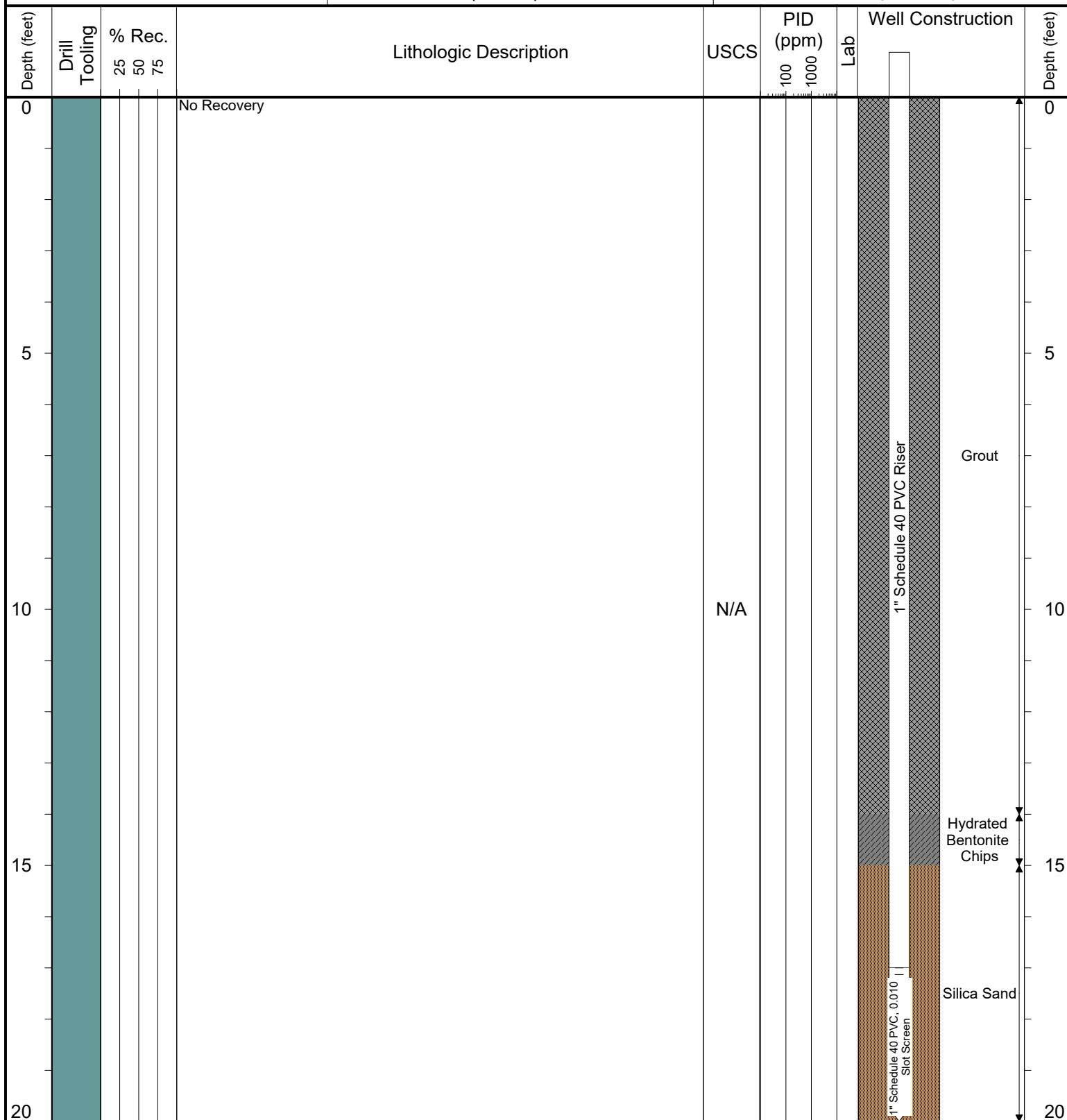
LOCATION: Weld, County

LATITUDE (WGS 84): N/A

LONGITUDE (WGS 84): N/A

CASING ELEVATION (FT. AMSL): N/A

GROUND ELEVATION (FT. AMSL): N/A



Drilling / Sample Method:

- Macro-Core
- Expendable Well Tip
- Solid Stem Auger
- HydroPunch Groundwater Sampler

Laboratory Sample Types:

- Geotechnical Lab
- Analytical Chemistry Lab
- Geotechnical & Analytical Chemistry Lab

# **ATTACHMENT B**

## **LABORATORY ANALYTICAL DATA REPORT**

# Summit Scientific

---

4653 Table Mountain Drive, Golden, Colorado 80403

303.277.9310

December 20, 2018

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 12/14/18 18:45. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

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

Paul Shrewsbury For Ben Shrewsbury

Laboratory Manager





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

Project: Noble - Knaus 28-8

Project Number: [none]  
Project Manager: Brandon Bruns

**Reported:**  
12/20/18 07:31

### ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
BH01	1812197-01	Water	12/14/18 12:17	12/14/18 18:45
BH02R	1812197-02	Water	12/14/18 12:33	12/14/18 18:45
BH04R	1812197-03	Water	12/14/18 12:37	12/14/18 18:45
BH06R	1812197-04	Water	12/14/18 12:16	12/14/18 18:45
BH08	1812197-05	Water	12/14/18 11:28	12/14/18 18:45
BH09	1812197-06	Water	12/14/18 11:45	12/14/18 18:45
BH10	1812197-07	Water	12/14/18 11:52	12/14/18 18:45
BH11	1812197-08	Water	12/14/18 12:07	12/14/18 18:45
BH12	1812197-09	Water	12/14/18 12:23	12/14/18 18:45
BH13	1812197-10	Water	12/14/18 12:25	12/14/18 18:45
BH14	1812197-11	Water	12/14/18 11:35	12/14/18 18:45
BH15	1812197-12	Water	12/14/18 11:55	12/14/18 18:45
BH16	1812197-13	Water	12/14/18 11:48	12/14/18 18:45
BH17	1812197-14	Water	12/14/18 11:40	12/14/18 18:45
BH18	1812197-15	Water	12/14/18 12:10	12/14/18 18:45

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.*

# Summit Scientific

18121971

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

Page 1 of 2

Client: Noble/Tasman  
Address: 6899 Pecos St  
City/State/Zip: Denver / CO / 80221  
Phone: 303-487-1228 Fax: -  
Sampler Name: Alison Dahl, Brian Gabel

Project Manager: Brandon Bruns, Invoice: Jacob Evans  
E-Mail: Bbruns@tasman-geo.com  
Project Name: Knaus 2B-8  
Project Number:

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:								Special Instructions		
				HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	8260 BTEX	8260B GBTEXN	8015 DRO	pH, EC, SAR						
BH01	12/14/2018	1217	3	X				X				X									
BH02R		1233																			
BH04R		1237																			
BH06R		1216																			
BH08		1128																			
BH09		1145																			
BH10		1152																			
BH11		1207																			
BH12		1223																			
BH13		1225																			
Relinquished by: <u>Alison Dahl</u>		Date/Time: <u>12/14/2018/1425</u>		Received by: <u>Tasman's Lock Box</u>		Date/Time: <u>12/14/2018/1425</u>		Turn Around Time (Check)				Notes:									
								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"/>													
Relinquished by: <u>Tasman's Lock Box</u>		Date/Time: <u>12/14/2018</u>		Received by: <u>[Signature]</u>		Date/Time: <u>12-14-18</u>		Sample Integrity:													
								Temperature Upon Receipt: <u>7-1</u>													
								Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>													

# Summit Scientific

1812197.2

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

Page 2 of 2

Client: Noble/Tasman  
Address: 6899 Pecos St  
City/State/Zip: Denver / CO / 80221  
Phone: 303-487-1228 Fax: -  
Sampler Name: Alison Dahl, Brian Gabel

Project Manager: Brandon Bruns, Invoice: Jacob Evans  
E-Mail: Bbruns@tasman-geo.com  
Project Name: Klaus 28-8  
Project Number:

Sample Description	Date Sampled	Time Sampled	Number of Containers	Preservative				Matrix			Analyze For:						Special Instructions
				HCl	HNO <sub>3</sub>	None	Other (Specify)	Groundwater	Soil	Air - Canister Serial #	Other (Specify)	8260 BTEX	8260B GBTEXN	8015 DRO	pH, EC, SAR		
BH14	12/14/2018	1135	3	X				X				X					
BH15	I	1155	I	I				I				I					
BH16	I	1148	I	I				I				I					
BH17	I	1140	I	I				I				I					
BH18	I	1210	I	I				I				I					
<div> <div>Relinquished by: <u>Alison Dahl</u> Date/Time: <u>12/14/2018</u></div> <div>Received by: <u>Tasman's Lock Box</u> Date/Time: <u>12/14/2018 1425</u></div> <div>Turn Around Time (Check)</div> <div> <div>Same Day</div> <div>24 Hours</div> <div>48 Hours</div> <div>72 Hours</div> <div>Standard</div> </div> <div> <div>Sample Integrity:</div> <div>Temperature Upon Receipt: <u>7.1</u></div> <div>Intact: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></div> </div> </div>																	
<div> <div>Relinquished by: <u>Tasman's Lock Box</u> Date/Time: <u>12/14/2018 1845</u></div> <div>Received by: <u>[Signature]</u> Date/Time: <u>12-14-18 1845</u></div> </div>																	
<div> <div>Relinquished by:</div> <div>Date/Time:</div> <div>Received in Lab by:</div> <div>Date/Time:</div> </div>																	



# Sample Receipt Checklist

S2 Work Order: 1812197

Client: Noble/Tasman Client Project ID: Kravis 28-8

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

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

Temp (°C)	<u>7.1</u>
-----------	------------

Thermometer ID: 61857155-K

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

LP  
Custodian Printed Name or Initials

[Signature]  
Signature or Initials of Custodian

12.14.18 1855  
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:**  
12/20/18 07:31

**BH01**  
**1812197-01 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 12:17**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Benzene	ND	1.0		ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **12/14/18 12:17**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		117 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.2 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.3 %		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:**

12/20/18 07:31

**BH02R**

**1812197-02 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 12:33**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Benzene</b>	<b>110</b>	1.0		ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
<b>Toluene</b>	<b>1.0</b>	1.0		"	"	"	"	"	"	
<b>Ethylbenzene</b>	<b>33</b>	1.0		"	"	"	"	"	"	
<b>Xylenes (total)</b>	<b>29</b>	2.0		"	"	"	"	"	"	

Date Sampled: **12/14/18 12:33**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		105 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		98.9 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		98.6 %		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  
6899 Pecos St, Unit C  
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]

Project Manager: Brandon Bruns

**Reported:**  
12/20/18 07:31

**BH04R**  
**1812197-03 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 12:37**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Benzene</b>	<b>2.2</b>	1.0		ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **12/14/18 12:37**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		106 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		99.1 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		82.9 %		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 Bruns

**Reported:**  
12/20/18 07:31

**BH06R**  
**1812197-04 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 12:16**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 12:16**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		110 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		104 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		82.2 %	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:**  
12/20/18 07:31

**BH08**  
**1812197-05 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 11:28**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 11:28**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		102 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		99.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		97.9 %	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:**

12/20/18 07:31

### BH09

### 1812197-06 (Water)

### Summit Scientific

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

Date Sampled: 12/14/18 11:45

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: 12/14/18 11:45

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		105 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		100 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		95.9 %	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 Bruns

**Reported:**

12/20/18 07:31

**BH10**

**1812197-07 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 11:52**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 11:52**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		104 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.4 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		83.9 %	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 Bruns

**Reported:**  
12/20/18 07:31

**BH11**  
**1812197-08 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 12:07**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 12:07**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		116 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		73.4 %	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 Bruns

**Reported:**

12/20/18 07:31

## BH12

### 1812197-09 (Water)

#### Summit Scientific

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

Date Sampled: 12/14/18 12:23

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: 12/14/18 12:23

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		110 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.6 %	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  
6899 Pecos St, Unit C  
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]

Project Manager: Brandon Bruns

**Reported:**

12/20/18 07:31

### BH13

### 1812197-10 (Water)

### Summit Scientific

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

Date Sampled: 12/14/18 12:25

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: 12/14/18 12:25

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		113 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		101 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		89.6 %	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  
6899 Pecos St, Unit C  
Denver CO, 80221

Project: Noble - Knaus 28-8

Project Number: [none]

Project Manager: Brandon Bruns

**Reported:**

12/20/18 07:31

**BH14**

**1812197-11 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 11:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
<b>Benzene</b>	<b>1.2</b>	1.0		ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0		"	"	"	"	"	"	
Ethylbenzene	ND	1.0		"	"	"	"	"	"	
Xylenes (total)	ND	2.0		"	"	"	"	"	"	

Date Sampled: **12/14/18 11:35**

Analyte	Result	Reporting		Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit								
Surrogate: 1,2-Dichloroethane-d4		108 %		23-173		"	"	"	"	
Surrogate: Toluene-d8		102 %		20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		75.5 %		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:**  
12/20/18 07:31

**BH15**  
**1812197-12 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 11:55**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
<b>Benzene</b>	<b>1.6</b>	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 11:55**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		111 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.3 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		99.7 %	21-167		"	"	"	"	

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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:**

12/20/18 07:31

## BH16

### 1812197-13 (Water)

#### Summit Scientific

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

Date Sampled: 12/14/18 11:48

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: 12/14/18 11:48

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		102 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.7 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		92.5 %	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:**

12/20/18 07:31

**BH17**

**1812197-14 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 11:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 11:40**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		109 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.0 %	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:**  
12/20/18 07:31

**BH18**  
**1812197-15 (Water)**

**Summit Scientific**

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

Date Sampled: **12/14/18 12:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Benzene	ND	1.0	ug/l	1	1812232	12/17/18	12/18/18	EPA 8260B	
Toluene	ND	1.0	"	"	"	"	"	"	
Ethylbenzene	ND	1.0	"	"	"	"	"	"	
Xylenes (total)	ND	2.0	"	"	"	"	"	"	

Date Sampled: **12/14/18 12:10**

Analyte	Result	Reporting	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
		Limit							
Surrogate: 1,2-Dichloroethane-d4		109 %	23-173		"	"	"	"	
Surrogate: Toluene-d8		98.9 %	20-170		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		94.3 %	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:**  
12/20/18 07:31

## Volatile Organic Compounds by EPA Method 8260B - Quality Control

### Summit Scientific

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

#### Batch 1812232 - EPA 5030 Water MS

##### Blank (1812232-BLK1)

Prepared & Analyzed: 12/17/18

Benzene	ND	1.0	ug/l							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes (total)	ND	2.0	"							
Surrogate: 1,2-Dichloroethane-d4	13.1		"	13.2		99.5	23-173			
Surrogate: Toluene-d8	13.8		"	13.3		104	20-170			
Surrogate: 4-Bromofluorobenzene	12.1		"	13.3		91.1	21-167			

##### LCS (1812232-BS1)

Prepared & Analyzed: 12/17/18

Benzene	28.6	1.0	ug/l	33.3		86.0	70-130			
Toluene	28.2	1.0	"	33.3		84.7	70-130			
Ethylbenzene	25.9	1.0	"	33.3		77.7	70-130			
m,p-Xylene	50.1	2.0	"	66.7		75.1	70-130			
o-Xylene	25.0	1.0	"	33.3		75.1	70-130			
Surrogate: 1,2-Dichloroethane-d4	12.7		"	13.2		96.1	23-173			
Surrogate: Toluene-d8	15.1		"	13.3		113	20-170			
Surrogate: 4-Bromofluorobenzene	13.1		"	13.3		98.2	21-167			

##### Matrix Spike (1812232-MS1)

Source: 1812208-02

Prepared & Analyzed: 12/17/18

Benzene	30.8	1.0	ug/l	33.3	ND	92.3	70-130			
Toluene	30.0	1.0	"	33.3	1.31	86.1	70-130			
Ethylbenzene	28.4	1.0	"	33.3	ND	85.3	70-130			
m,p-Xylene	55.9	2.0	"	66.7	1.06	82.3	70-130			
o-Xylene	27.8	1.0	"	33.3	ND	83.4	70-130			
Surrogate: 1,2-Dichloroethane-d4	13.0		"	13.2		98.1	23-173			
Surrogate: Toluene-d8	14.4		"	13.3		108	20-170			
Surrogate: 4-Bromofluorobenzene	13.2		"	13.3		99.2	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:**

12/20/18 07:31

## Volatile Organic Compounds by EPA Method 8260B - Quality Control

### Summit Scientific

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

#### Batch 1812232 - EPA 5030 Water MS

Matrix Spike Dup (1812232-MSD1)	Source: 1812208-02			Prepared & Analyzed: 12/17/18						
Benzene	32.9	1.0	ug/l	33.3	ND	98.8	70-130	6.85	30	
Toluene	31.8	1.0	"	33.3	1.31	91.5	70-130	5.82	30	
Ethylbenzene	30.6	1.0	"	33.3	ND	91.8	70-130	7.38	30	
m,p-Xylene	58.7	2.0	"	66.7	1.06	86.5	70-130	4.90	30	
o-Xylene	30.4	1.0	"	33.3	ND	91.3	70-130	9.00	30	
Surrogate: 1,2-Dichloroethane-d4	13.5		"	13.2		102	23-173			
Surrogate: Toluene-d8	14.0		"	13.3		105	20-170			
Surrogate: 4-Bromofluorobenzene	12.8		"	13.3		95.9	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:**  
12/20/18 07:31

### 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