WATER QUALITY SAMPLING
2022

AHR-2022

WATER QUALITY SAMPLING PROTOCOL

Procedure

The ground water sampling procedure used at the Keenesburg Mine site during 2022 was originally approved as part of the Coors Energy Company (CEC) Application for Permit Renewal (1997), filed with the then Colorado Division of Minerals and Geology (CDMG). CEC has consistently used this procedure beginning with the fourth quarter, 1997 sample collections. Consent to dispose of Mine Waste Rock at the Keenesburg site (MR #34, 8/98) resulted in minor changes to the approved ground water monitoring plan, pursuant to requests from the Colorado Department of Public Health and Environment (CDPHE). However, field collection procedures, the order of sampling, field measurements and sampling frequency protocols, remain essentially unchanged since 1997. In 2013, CEC applied for and was granted Technical Revision #44 which changed sampling frequency from quarterly to semi-annually. Specifically, sampling was to occur in April and September. This procedure will be under review, with changes contemplated prior to the first sampling event of 2018.

In 2019, AEC took over the water sampling work. They have combined this sampling process with the process approved by CDPHE to more efficiently collect samples that are needed for both DRMS and CDPHE. The full water sampling report, prepared for CDPHE, is included.

Ground Water Monitoring and Quality Analysis

The formal ground water sampling program for the Keenesburg Mine was initiated in 1992. Ground water quality information has consistently been obtained from monitor wells located: 1) upgradient, 2) within the disturbance area, and 3) downgradient from the mine site. The monitoring program provides a basis for comparison of information between a baseline and the existing site conditions relative to ground water flow and water quality at the site.

The water quality test results, obtained from the data collected in the field and from the analytical ground water quality reports, support the contention that the overall groundwater quality in the area has not been adversely affected by; 1) the earlier Keenesburg Coal Strip Mine operations, or 2) the subsequent reclamation activities (which include both the ash and the mine waste rock disposal operations). While questions may have arisen with respect to specific analytes in certain wells

(manganese in the SMW-2 well, for example), overall parameters are within the scope of what should be considered acceptable. Any results that are at issue likely reflect recharge of the groundwater through the disturbed soils/spoils from previous operations, as opposed to one of the aforementioned activities.

While they have been altered within the Keenesburg Mine site itself, general ground water flow patterns in the vicinity of the mine appear not to have been significantly changed (or interrupted) by the past mining activities, or by the ongoing ash disposal and mine reclamation.

The six ground water monitoring wells were sampled by CEC on a semi-annual basis in 2018. These wells are designated: AMW-1, AMW-2, DH-96, DH-122, FPW and SMW-2. Water quality analysis incorporates both the fieldwork and the analytical laboratory testing of water samples collected from these wells.

Field Measurement Protocol:
Static water level is a tape measurement from the top of the well casing (a known ground elevation) to the current water level in the well. This measurement is taken following a visual inspection of the area surrounding the well casing, and precedes any sampling activity. Water sample temperature, specific conductance and pH are determined using a probe placed in each sample as soon as it is collected. Samples are collected and analyzed both before and after the appropriate well purge procedures are conducted.

Laboratory analysis:
The wells are sampled in a sequence that follows the order of least to greatest level of salinity. At the end of 2016 this sequence continued to be: (1) FPW, (2) AMW-1, (3) DH-96, (4) DH-122, (5) SMW-2 and (6) AMW-2. Ash Monitor Well No. 2 (AMW-2) still continues to recharge following the conclusion of the A-Pit reclamation activity. This process has been ongoing since the end of 1999 when A-Pit reclamation was completed, but only since 2004 has it resulted in volumes sufficient to allow sampling. Adequate water volumes were found in this well during each of the samplings for 2017, making it possible to obtain samples following the standard three-well volume purge procedure. While the well bore water level recovery following testing remains slower, higher static water levels provide evidence that the highly disturbed zone in the reclaimed overburden area is recharging. The timeline for this recharge is consistent with previous predictions.

Copies of the analytical laboratory test results are found in the pages following this text. Each ground water monitoring well was sampled in accordance with the "permit procedure". The "B" designation following the well identification confirms that the laboratory sample was obtained after initial field sampling, well purging and a subsequent (second) field sampling. The 2019 ground water monitoring test results remain consistent with results from previous year's analyses in that there have been no confirmed statistical exceedences, with but one exception, the samples obtained from the SMW-2 well during 2004. The SMW-2 well is completed in the disturbed spoil material which is being subjected to slow re-saturation by ground water, and appears to be leaching dissolved minerals as the water table rises. This has caused manganese concentrations to somewhat exceed the calculated tolerance limit. CEC addressed this tolerance limit exceedence with CDPHE during 2005, and was granted permission to continue the current detection monitoring program *[Doty & Associates letter dated 04/08/05, "Alternate Source Demonstration, Statistically Significant Increase Over Background Manganese in SMW-2, Fourth Quarter 2004, Keenesburg Disposal Facility"]*.

The direction of ground water flow, to the extent that it has been documented in the area of the Keenesburg Mine property, trends downgradient to the northeast. Recharge of the aquifer in the "spoil area" continues to be limited to a single source, the localized infiltration of precipitation to the subsurface. There is no evidence of any significant ground water recharge to the site from the Ennis Draw fluvial ground water system. Ground water elevations in the sampled Ennis Draw wells close to the Keenesburg Mine site are significantly higher than in either the spoil monitoring well (SMW-2) or in the ash monitoring wells (AMW-1 or AMW-2).

It is CEC's position that no adverse affect on the overall hydrologic balance of the Keenesburg Mine site will result from, a continuation of the ash disposal operation, from the limited addition of mine waste rock to the B-Pit ash disposal, or from the continuing reclamation operations. Ground water levels in the former coal extraction areas should be expected to recover to their approximate pre-mining levels following the conclusion of all CEC operations (see McWhorter report, Appendix I-1 to Permit C-81-028). Treatment of either the ground water or the surface waters at the Keenesburg Mine site is not anticipated to be necessary.

Notice: In the course of applying for, and obtaining approval to dispose of mine waste rock in the ash disposal pit (B-Pit) at the Keenesburg Mine site, CEC submitted, and received CDPHE approval for, a Ground-Water Monitoring Plan. As a requirement of the approval, CEC is providing notice that the data developed under the Monitoring Plan for 2011 has been placed in the operating records at the site office. This is the fifteenth such notice relative to the Ground-Water Monitoring Plan.

LIST OF MONITOR WELLS

This table summarizes monitor well information, to include: well designation, top of casing elevation, location, and aquifer monitored. The wells monitored during 2019 were:

Well	Elevation	Aquifer	Location
AMW-1	4804'	Alluvial, in Undisturbed Overburden	Mine Site, Down gradient from B-Pit
AMW-2	4811'	Alluvial, in Reclaimed Spoil	Mine Site, Down gradient
DH-96	4764'	Alluvial, in Ennis Draw	Down gradient from Mine Site
DH-122	4814'	Alluvial, in Ennis Draw	Up gradient from Mine Site, from A-Pit

FPW	4780'	Alluvial, in Ennis Draw	Mine Site
SMW-2	4803'	Alluvial, in Reclaimed Spoil	Mine Site

Well locations can be found on the Existing Surface Features and Utilities Map.

WATER QUALITY PARAMETERS ANALYZED

Report Key	Parameter
a	Calcium - dissolved
b	Iron - dissolved
b	Magnesium - dissolved
b	Manganese - dissolved
b	Molybdenum - dissolved
a	Sodium - dissolved
a	Alkalinity - total (as CaCO3)
a	Carbonate - (as CO3)
a	Hardness - (as CaCO3)
a	Bicarbonate - (as HCO3)
a	pH - (pH units)
a	Specific conductance - (µmhos/cm)
b	Lead - dissolved
b	Selenium - dissolved
a	Total dissolved solids - at 180°C (TDS)
a	Chloride
a	Sulfate (as SO4)
a	Sodium absorption ratio (SAR)
a	Hydroxide (as OH)
b	Barium – [added in1998 for mine waste rock]
b	Arsenic – [added in 2000]
b	Cadmium – [added in 2000]

a = General Chemistry Lab Report
b = Metals Lab Report

AEC *AMERICAN ENVIRONMENTAL CONSULTING, LLC*

February 28, 2023

Jerry Henderson
Colorado Department of Public Health and Environment
HMWMD
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Re: 2022 Annual Groundwater Monitoring Report
Keenesburg Ash Disposal Site
Weld County, Colorado

Dear Mr. Henderson

This groundwater monitoring report describes the groundwater monitoring activities performed at the Keenesburg Ash Disposal Site (the facility) in 2022. Sampling was conducted by American Environmental Consulting, LLC (AEC) in accordance with the August 5, 2018 Post-Closure Care Plan (PCCP) and the August 5, 2018 Post-Closure Groundwater Monitoring Plan (GMP).

Please feel free to call of email me with any questions.

Respectfully,
AMERICAN ENVIRONMENTAL CONSULTING, LLC

Skyler Elder
Staff Professional

Reviewed by:

Curtis Ahrendsen
Project Manager

cc: Ben Moline, Molson Coors Beverage Co.

1.0 INTRODUCTION

The site is located approximately 4.5 miles north of Keenesburg (Figure 1) in portions of Sections 25 and 36, Township 3 North, Range 64 West, Sixth Principal Meridian, Weld County, Colorado (Figure 2). The area included in the permit allowing both mining and disposal operations is approximately 788.5 acres. Only 413 acres were actually disturbed by mining activities. Ash disposal occurred in two pits (the A-Pit and B-Pit) totaling about 65.6 acres.

The property was a surface coal mine (with associated support operations) from 1981 through 1987. Disposal of ash began in 1987 as part of the mine reclamation process. The site is permitted to dispose of fly and bottom ash from the coal-fired power plant located at the Molson Coors Brewing complex in Golden, Colorado. The facility also accepted waste rock from other mines on a case-by-case basis. The approved operations plan also allows demolition and disposal of on-site facilities such as the shop/office building. The disposal pit closure was completed in 2019.

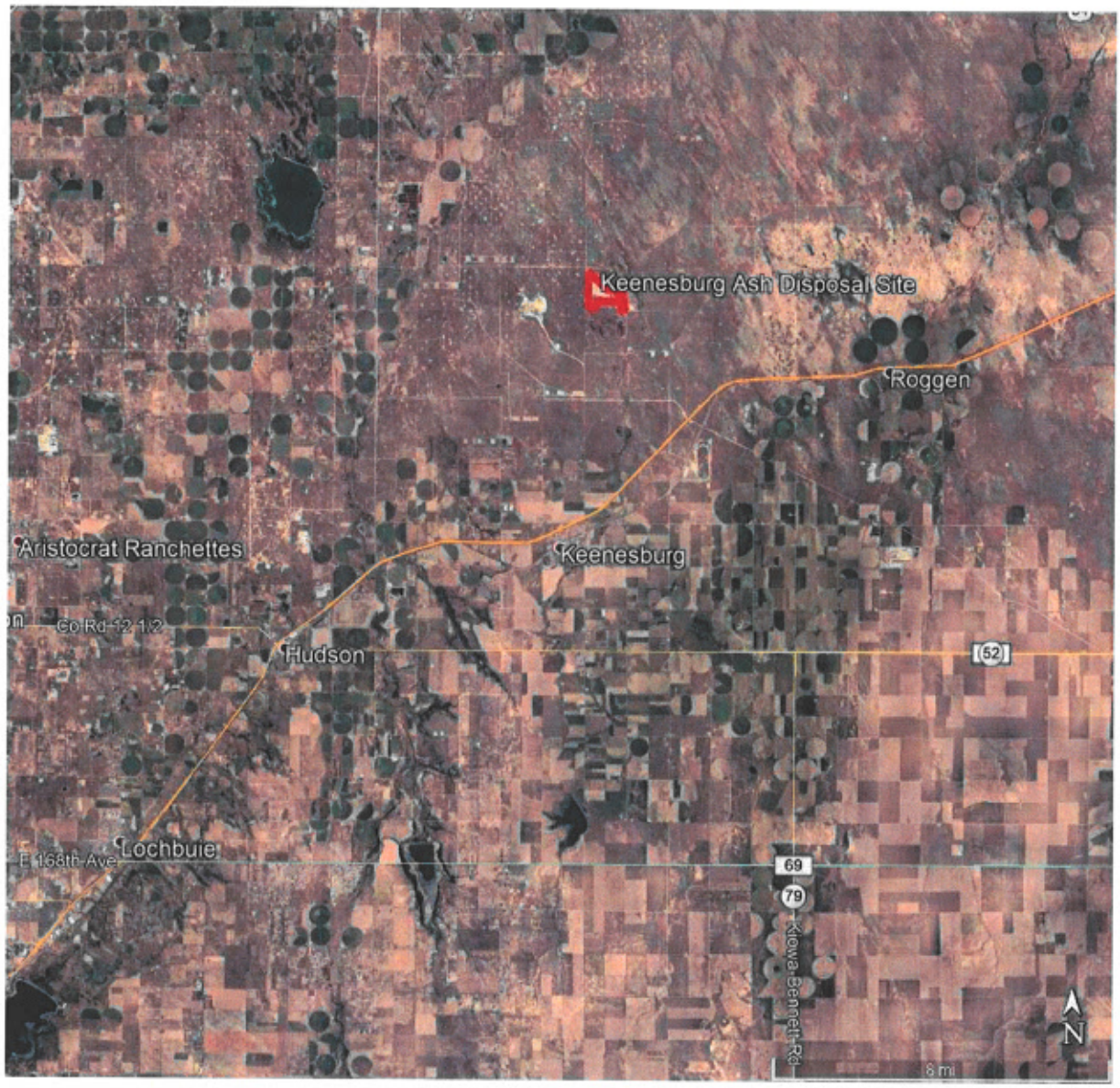
The facility began post-closure groundwater monitoring in the 4th Quarter of 2019 in accordance with the PCCP and GMP. According to the GMP, water levels will be measured quarterly and sampling is conducted semiannually. In accordance with the PCCP, four new groundwater monitoring wells were installed at the facility in July 2019 (PC-1, PC-2, PC-5 and PC-6). These new wells were sampled for the first time during the 4th Quarter 2019 groundwater monitoring event. Statistical analysis of the facility's groundwater will begin after the new wells have been sampled eight times. Statistical analyses is anticipated to begin upon receiving the sampling results of the April event in 2023.

The monitoring well network consists of seven wells including:

PC-1 PC-2 PC5 PC-6 AMW-1 AMW-2 SMW-2

The original closure plan included two additional wells, PC-3 and PC-4. PC-3 was not installed due to encountering ash and darker materials during drilling. AMW-2 is in the same area and became part of the CDPHE's post-closure monitoring program taking the place of PC-3. PC-4 also encountered similar materials during drilling and therefore was not completed to groundwater. CDPHE and CEC agreed that if a need for a well replacing the planned PC-4 well is discovered in the future we would address the location of a replacement well. Approval of these changes was noted in an email from Eric Jacobs of the CDPHE on August 29, 2019.

FIGURE 1
SITE LOCATION MAP



2.0 SAMPLING

All seven monitoring wells in the post-closure monitoring network were sampled by AEC twice in 2022. The first 2022 semiannual sampling event was conducted on April 30 and May 1, 2022, and the second sampling event was conducted on September 27 and 28, 2022. All sampling activities were performed by AEC in accordance with the GMP procedures with the exception that water levels were collected immediately before each well was sampled rather than from all wells prior to commencing sampling.

Upon arriving at each monitoring well, the sampling technician first measured the static water levels and recorded the measurements on the field forms. The technician then purged the wells using the dedicated 12V pumps. At wells with adequate recharge, three wellbore storage volumes were purged prior to sampling. Wells with poor recharge were purged until dry and then sampled the following day. After each wellbore storage volume was purged, the technician measured the purged water's pH, temperature and conductivity using a portable meter that was calibrated that day. The technician recorded the water level, total volume of water purged, and field parameter measurements onto field sampling forms which are included in Attachment 1.

After each well was purged, the technician collected groundwater samples into new sample containers, containing appropriate preservatives as required, provided by Pace Analytical. A duplicate sample was collected from AMW-1 during the April/May and September monitoring events. All sample containers were labeled with the well name, the date and time collected, the analyses to be performed, the preservative used (if any), and the sampler's initials. The sample containers were immediately sealed and placed on ice in a cooler after collection. A chain of custody form (COC) was provided by the laboratory. The technician added each sample to the COC, along with the date and time it was collected, and the analyses to be performed.

Samples were preserved during collection activities by placing them in ice-packed coolers. After the last samples were collected on the second day of sampling during each monitoring event, the coolers were filled with fresh ice and sealed with the COCs inside. The coolers were shipped via FedEx™ overnight to the Pace Analytical laboratory in Mount Juliet, TN.

3.0 GROUNDWATER HYDROLOGY

The groundwater monitoring network at the facility is made up of seven wells: PC-1, PC-2, PC-5, PC-6, AMW-1, AMW-2, and SMW-2, and water levels in in these wells are measured quarterly. The field technician measured the depths to water in each well using an electronic water level indicator, and the indicator was decontaminated after measuring water levels in each well. Table 1 shows the depth to groundwater measurements and static water elevations during each quarterly water level monitoring event.

TABLE 1
2022 QUARTERLY WATER LEVELS

Well	ToC Elevation	1/12/2022		4/29/2022		9/27/2022		12/02/2022	
		Depth	Elev	Depth	Elev	Depth	Elev	Depth	Elev
AMW-1	4,804.55	27.35	4,777.20	28.33	4,776.22	28.20	4,776.35	28.26	4,776.29
AMW-2	4,808.88	24.38	4,784.50	23.80	4,785.08	24.79	4,784.09	23.48	4,785.40
PC-1	4,830.46	21.28	4,809.18	21.42	4,809.04	20.97	4,809.49	20.29	4,810.17
PC-2	4,819.29	37.11	4,782.18	36.69	4,782.60	36.53	4,782.76	36.40	4,782.89
PC-5	4,803.16	33.00	4,770.16	33.37	4,769.79	32.81	4,770.35	32.66	4,770.50
PC-6	4,798.63	27.09	4,771.54	28.10	4,770.53	27.82	4,770.81	27.93	4,770.70
SMW-2	4,803.80	33.74	4,770.06	33.23	4,770.57	33.45	4,770.35	33.05	4,770.75

Notes: Elevation is feet above mean sea level.
Depth measured in feet from top of casing.

AEC constructed groundwater potentiometric surface maps for each monitoring quarter in 2022 using the groundwater elevations from Table 1. Additionally, water levels were voluntarily measured in well SMW-1 during the quarterly events, and those measurements were included in the potentiometric surface maps. The potentiometric surface maps are included in Attachment 2 and are labeled Figure 2-1 through 2-4.

All four of the 2022 maps are substantially similar, and they show groundwater generally flowing east to north-northeast beneath the facility. Near the A-Pit, groundwater flows north-northeast at a gradient of approximately 2.22% to 2.26%. Near the B-Pit, groundwater flows east at a gradient of approximately 0.75% to 0.82%. The observed quarterly groundwater gradients beneath each pit are shown in Table 2 on the following page.

Groundwater flow velocities beneath both the A-Pit and B-Pit were calculated using the formula from the GMP. The GMP lists the average hydraulic conductivity beneath the site as $3x10^{-5}$ cm/s and the porosity as 0.1; however, the actual hydraulic gradient varies across the site. The formula provided in the GMP for calculating groundwater flow velocity is:

$$V_S = 2830\frac{Ki}{n_e}$$

Where:

V_s	=	groundwater seepage velocity (ft/day)
K	=	hydraulic conductivity (cm/s)
i	=	hydraulic gradient (dimensionless)
n_e	=	effective porosity (dimensionless)
2830	=	unit conversion factor ((s*ft)/(cm*day))

Using that formula, AEC calculated the groundwater flow velocity beneath both the A-Pit and B-Pit for each of the 2022 quarterly water level monitoring events, and the results are shown in Table 2 below.

TABLE 2
2022 QUARTERLY GROUNDWATER FLOW VELOCITIES

Monitoring Quarter	Pit	Gradient	Velocity	
			(ft/day)	(ft/year)
1st Quarter	A-Pit	2.26%	0.01922	7.0
	B-Pit	0.75%	0.00638	2.3
2nd Quarter	A-Pit	2.22%	0.01887	6.9
	B-Pit	0.82%	0.00696	2.5
3rd Quarter	A-Pit	2.24%	0.01904	7.0
	B-Pit	0.79%	0.00674	2.5
4th Quarter	A-Pit	2.26%	0.01917	7.0
	B-Pit	0.78%	0.00663	2.4

4.0 LABORATORY RESULTS

The samples collected by AEC for the 2nd Quarter monitoring event were received by Pace Analytical on May 3, 2022, and the 3rd Quarter monitoring event samples were received by Pace Analytical on September 30, 2022. The laboratory noted that all samples were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times for both 2022 monitoring events. Duplicate samples were collected from AMW-1 during both events. Table 3 shows the analytical results from the primary and duplicate samples and the relative percent difference (RPD) between them for both 2021 monitoring events. The primary and duplicate samples showed good agreement for both monitoring events, with nearly all parameters differing by less than 10%.

TABLE 3
PRIMARY AND DUPLICATE SAMPLE RESULTS AND COMPARISON

	Apr-22			Sep-22		
	AMW-1	DUP	RPD	AMW-1	DUP	RPD
Sodium Adsorption Ratio	1.81	1.65	9%	1.85	1.89	2%
Hardness (calculated) as CaCO3	1080	1130	5%	950	950	0%
Dissolved Solids	1730	1660	4%	1630	1540	6%
Alkalinity,Bicarbonate	215	214	0%	204	201	1%
Alkalinity,Carbonate	ND	ND	0%	ND	ND	0%
Chloride	30.8	33.1	7%	30.5	31.9	4%
Fluoride	0.871	0.792	10%	1.06	ND	#N/A
Sulfate	826	940	13%	855	866	1%
Antimony,Dissolved	ND	ND	0%	ND	ND	0%
Arsenic,Dissolved	ND	ND	0%	ND	ND	0%
Barium,Dissolved	0.0293	0.0303	3%	0.0303	0.0292	4%
Boron,Dissolved	ND	ND	0%	ND	ND	0%
Cadmium,Dissolved	ND	ND	0%	ND	ND	0%
Calcium	298	315	6%	258	256	1%
Calcium,Dissolved	254	264	4%	265	255	4%
Iron,Dissolved	ND	ND	0%	ND	ND	0%
Lead,Dissolved	ND	ND	0%	ND	ND	0%
Magnesium	82	83.1	1%	74.1	75.6	2%
Magnesium,Dissolved	69.1	70.6	2%	79.6	77.7	2%
Manganese,Dissolved	0.0128	0.0123	4%	ND	ND	0%
Molybdenum,Dissolved	ND	ND	0%	ND	ND	0%
Potassium,Dissolved	4.05	3.93	3%	3.45	3.42	1%
Selenium,Dissolved	0.0242	0.0276	13%	0.0187	0.0196	5%
Sodium	137	128	7%	131	134	2%
Sodium,Dissolved	127	122	4%	147	143	3%

The complete laboratory analytical reports for both 2022 semiannual water quality sampling events are included in Attachment 3.

5.0 STATISTICAL ANALYSIS

The GMP specifies that the analytical data will be statistically analyzed using interwell prediction limits, which requires a minimum of eight observations in the up-gradient wells (PC-1 and PC-2). As of the end of 2022, seven observations have been collected. Based on the semiannual water quality monitoring schedule, the first statistical analysis will be conducted on the April 2023 observations.

ATTACHMENT 1

FIELD FORMS

ATTACHMENT 1.1

APRIL 2022 FORMS

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-1						
Sampled by: SJE				**Date:** 4/30/2022		
Weather during sampling: Windy, Cloudy, Slight Sprinkle, 60F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 19:00		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 50.15'						
Depth to Groundwater from Measuring Point: 20.89'						
Height of Water Column: 29.26'						
Single Casing/Tubing Volume of Water: 4.9 gallons						
Volume of Water to Purge Prior to Sampling: 15 gallons						
Volume of Water Actually Purged Prior to Sampling: 8 gallons				**Flow Rate:** 1.33 gal/min		
Method of Purging/Equipment: 12V Pump			**Voltage:** 15V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 11V Controller			
FIELD PARAMETERS						
	Units	**1**	**2**	**3**	**4**	**5**
pH	**pH units**	7.32	7.22			
Temperature	**°F**	57.5	57.3			
Conductance	**mS/cm**	2.88	2.87			
Turbidity	**NTU/FTU**	--	--			
Color of Groundwater	Clear					
Odor	None					
Appearance	Clean					

NOTES:
2-inch well → Water Column * 0.167 = Casing Volume
45' Cord → 15V Controller for purge

Purging slowed to a trickle after ~8 gallons. Allowed well to recharge overnight.

Dark Tan and Turbid during purge.
Dark Reddish Brown and Turbid after recharge (first set of field parameters).

The water collected for samples was clear and clean, took a second set of field parameters with the clean water.

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-2						
Sampled by: SJE				**Date:** 4/30/2022		
Weather during sampling: Sunny, Gusty, 65F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 19:15		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 74.78'						
Depth to Groundwater from Measuring Point: 36.71'						
Height of Water Column: 38.07'						
Single Casing/Tubing Volume of Water: 6.3g						
Volume of Water to Purge Prior to Sampling: 19g						
Volume of Water Actually Purged Prior to Sampling: ~6g				**Flow Rate:** 0.75 gpm		
Method of Purging/Equipment: 12V Pump			**Voltage:** 14 V			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 14 V			
FIELD PARAMETERS						
	Units	**1**	**2**	**3**	**4**	**5**
pH	**pH units**	6.85				
Temperature	**°F**	58.1				
Conductance	**mS/cm**	7.72				
Turbidity	**NTU/FTU**					
Color of Groundwater	Clear					
Odor	None					
Appearance	Clear					

NOTES:
2-inch well

70' Cord

Flow rate slowed down after ~5 gallons purged
Purged dry after ~ 6 gallons
Recovered for sampling

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-5						
Sampled by: SJE				**Date:** 5/1/2022		
Weather during sampling: Windy, Partly Cloudy, 65F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 3:15		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 50.40'						
Depth to Groundwater from Measuring Point: 32.73'						
Height of Water Column: 17.67'						
Single Casing/Tubing Volume of Water: 2.9g						
Volume of Water to Purge Prior to Sampling: 8.8g						
Volume of Water Actually Purged Prior to Sampling: 9g				**Flow Rate:** 1.25 gpm		
Method of Purging/Equipment: 12V Pump			**Voltage:** 14V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 10V Controller			
FIELD PARAMETERS						
	Units	**1 (3g)**	**2 (6g)**	**3 (9g)**	**4**	**5**
pH	**pH units**	6.61	6.53	6.55		
Temperature	**°F**	58.8	57.6	57.8		
Conductance	**mS/cm**	3.07	3.07	3.04		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Slightly brown					
Odor	None					
Appearance	Slightly turbid					

NOTES:
Single Casing Volume = Height of Water Column x 0.167

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GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-6						
Sampled by: SJE				**Date:** 5/1/2022		
Weather during sampling: Partly Cloudy, Windy, 65F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 2:45		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well from Measuring Point: 49.00'						
Depth to Groundwater from Measuring Point: 27.46'						
Height of Water Column: 21.54'						
Single Casing/Tubing Volume of Water: 3.6g						
Volume of Water to Purge Prior to Sampling: 10.8g						
Volume of Water Actually Purged Prior to Sampling: 12g				**Flow Rate:** 1.4 gpm		
Method of Purging/Equipment: 12V Pump			**Voltage:** 14V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 10V Controller			
FIELD PARAMETERS						
	Units	**1 (4g)**	**2 (8g)**	**3 (12g)**	**4**	**5**
pH	**pH units**	7.22	7.28	7.30		
Temperature	**°F**	59.6	58.8	57.8		
Conductance	**mS/cm**	2.42	2.48	2.50		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Clear					
Odor	None					
Appearance	Clean					

NOTES:

Slightly turbid first two purged gallons. Slight chloride odor, went away during purge.

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: AMW-1						
Sampled by: SJE				**Date:** 5/1/2022		
Weather during sampling: Windy, Cloudy, 60F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 1415		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 56.85' (Measured 9/18/2020)						
Depth to Groundwater from Measuring Point: 28.34'						
Height of Water Column: 28.51'						
Single Casing/Tubing Volume of Water: 28.5g						
Volume of Water to Purge Prior to Sampling: 85.5g						
Volume of Water Actually Purged Prior to Sampling: ~90g				**Flow Rate:** 1.6gpm		
Method of Purging/Equipment: 12V Pump			**Voltage:** 15V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 12V Controller			
FIELD PARAMETERS						
	Units	**1 (30g)**	**2 (60g)**	**3 (90g)**	**4**	**5**
pH	**pH units**	7.56	7.22	7.27		
Temperature	**°F**	59.4	60.3	61.3		
Conductance	**mS/cm**	1.68	1.74	1.75		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Brownish Grey					
Odor	None					
Appearance	Turbid					

NOTES:
5" Well → CV = 1 g/ft

Dup Collected

Tanish grey turbid at start of purge. Darker and more turbid after 60 gallons purged.

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: AMW-2						
Sampled by: SJE				**Date:** 4/30/2022		
Weather during sampling: Windy, Cloudy, Slight Sprinkle, 60F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 18:45		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 53.60'						
Depth to Groundwater from Measuring Point: 24.02'						
Height of Water Column: 29.58'						
Single Casing/Tubing Volume of Water: 44.4 gallons						
Volume of Water to Purge Prior to Sampling: 135 gallons						
Volume of Water Actually Purged Prior to Sampling: ~50 gallons				**Flow Rate:** 1.1 gal/min		
Method of Purging/Equipment: 12V Pump			**Voltage:** 14V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 12V Controller			
FIELD PARAMETERS						
	Units	**1**	**2**	**3**	**4**	**5**
pH	**pH units**	6.93				
Temperature	**°F**	59.0				
Conductance	**mS/cm**	5.30				
Turbidity	**NTU/FTU**	--				
Color of Groundwater	Clear					
Odor	None					
Appearance	Clean					

NOTES:
6" Well → CV = 1.5 g/ft
45' Cord

Purged on 4/30/2022. Started purge at 14:15. Expect to purge dry at 15:00 based on 1.1 gal/min flow rate.
Flow stopped at 14:59. Sample 5/1/2022
Field Parameters taken immediately before sample collection.

AEC *AMERICAN ENVIRONMENTAL CONSULTING, LLC*

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: SMW-2						
Sampled by: SJE				**Date:** 5/1/2022		
Weather during sampling: Cloudy, Windy, 60F				**Date Sampled:** 5/1/2022		
Well Condition: Good				**Time Sampled:** 17:30		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 96' (Measured 9/18/2020)						
Depth to Groundwater from Measuring Point: 33.35'						
Height of Water Column: 62.65'						
Single Casing/Tubing Volume of Water: 52 gallons						
Volume of Water to Purge Prior to Sampling: 156 gallons						
Volume of Water Actually Purged Prior to Sampling: 156 gallons				**Flow Rate:** 1.3 gal / min		
Method of Purging/Equipment: 12V Pump			**Voltage:** 15V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 12V Controller			
FIELD PARAMETERS						
	Units	**1**	**2**	**3**	**4**	**5**
pH	**pH units**	6.88	6.93	6.93		
Temperature	**°F**	59.2	58.9	59.1		
Conductance	**mS/cm**	5.78	5.71	5.69		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Clear					
Odor	None					
Appearance	Clear					

NOTES:
4.5" Well → Single Casing = 0.83 g/ft

Start purge at 15:30. 1.3 gal/min → 120 minutes to purge 156 gallons. Sample at 17:30.
Field Parameters taken every 40 minutes.

ATTACHMENT 1.2

SEPTEMBER 2022 FORMS

AEC *AMERICAN ENVIRONMENTAL CONSULTING, LLC*

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-1						
Sampled by: SJE				**Date:** 9/27/2022		
Weather during sampling: Warm, Calm, Clear				**Date Sampled:** 9/28/2022		
Well Condition: Good				**Time Sampled:** 4:45PM		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 50.15'						
Depth to Groundwater from Measuring Point: 20.97'						
Height of Water Column: 29.18'						
Single Casing/Tubing Volume of Water: 4.9 gallons						
Volume of Water to Purge Prior to Sampling: 15 gallons						
Volume of Water Actually Purged Prior to Sampling: 9 gallons				**Flow Rate:** 1.33 gal/min		
Method of Purging/Equipment: 12V Pump			**Voltage:** 15V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 11V Controller			
FIELD PARAMETERS						
	Units	**1 (5 gal)**	**2 (Sample)**	**3**	**4**	**5**
pH	**pH units**	7.45	7.41			
Temperature	**°F**	60.4	59.3			
Conductance	**mS/cm**	2.61	2.64			
Turbidity	**NTU/FTU**	--	--			
Color of Groundwater	Clear					
Odor	None					
Appearance	Slightly Turbid					

NOTES:
2-inch well → Water Column * 0.167 = Casing Volume
45' Cord → 15V Controller for purge

Purging slowed to a trickle after ~9 gallons. Allowed well to recharge overnight.

Clear during purge.
Slightly turbid during sample collection after recharge.

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY	**LOCATION: Keenesburg Mine, Keenesburg, Colorado**
WELL NAME: PC-2	
Sampled by: SJE	**Date:** 9/27/2022
Weather during sampling: Warm, Clear, Calm	**Date Sampled:** 9/28/2022
Well Condition: Good	**Time Sampled:** 11:45$_{AM}$

EVACUATION DATA

Description of Measuring Point: Top of PVC	
Depth of Well From Measuring Point: 74.78'	
Depth to Groundwater from Measuring Point: 36.53'	
Height of Water Column: 38.25'	
Single Casing/Tubing Volume of Water: 6.4 gallons	
Volume of Water to Purge Prior to Sampling: 19.2 gallons	
Volume of Water Actually Purged Prior to Sampling: 20 gallons	**Flow Rate:** ~ 1 gpm
Method of Purging/Equipment: 12V Pump	**Voltage:** 14 V Controller
Method of Sampling/Equipment: 12V Pump	**Voltage:** 13 V Controller

FIELD PARAMETERS

	Units	1	2	3	4	5
pH	**pH units**	6.90				
Temperature	**°F**	61.2				
Conductance	**mS/cm**	6.97				
Turbidity	**NTU/FTU**	--	--			
Color of Groundwater	Clear					
Odor	None					
Appearance	Clear					

NOTES:
2-inch well

70' Cord

Purged dry after ~ 6 gallons
Recovered for sampling

AEC *AMERICAN ENVIRONMENTAL CONSULTING, LLC*

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-5						
Sampled by: SJE				**Date:** 9/27/2022		
Weather during sampling: Warm, Calm, Clear				**Date Sampled:** 9/27/2022		
Well Condition: Good				**Time Sampled:** 10:30$_{AM}$		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 50.40'						
Depth to Groundwater from Measuring Point: 32.81'						
Height of Water Column: 17.59'						
Single Casing/Tubing Volume of Water: 2.94 gallons						
Volume of Water to Purge Prior to Sampling: 9 gallons						
Volume of Water Actually Purged Prior to Sampling: 9g				**Flow Rate**:~ 1 gpm		
Method of Purging/Equipment: 12V Pump			**Voltage:** 14V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 12V Controller			
FIELD PARAMETERS						
	Units	**1 (3g)**	**2 (6g)**	**3 (9g)**	**4**	**5**
pH	**pH units**	6.50	6.69	6.70		
Temperature	**°F**	59.3	58.1	57.6		
Conductance	**mS/cm**	2.61	2.70	2.72		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Tanish Clear					
Odor	None					
Appearance	Opaque					

NOTES:
Single Casing Volume = Height of Water Column x 0.167

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: PC-6						
Sampled by: SJE				**Date:** 9/27/2022		
Weather during sampling: Warm, Calm, Clear				**Date Sampled:** 9/27/2022		
Well Condition: Good				**Time Sampled:** 11:15$_{AM}$		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well from Measuring Point: 49.00'						
Depth to Groundwater from Measuring Point: 27.82'						
Height of Water Column: 21.18'						
Single Casing/Tubing Volume of Water: 3.53 gallons						
Volume of Water to Purge Prior to Sampling: 12 gallons						
Volume of Water Actually Purged Prior to Sampling: 12 gallons				**Flow Rate:** ~1 gpm		
Method of Purging/Equipment: 12V Pump			**Voltage:** 12V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 12V Controller			
FIELD PARAMETERS						
	Units	**1 (4g)**	**2 (8g)**	**3 (12g)**	**4**	**5**
pH	**pH units**	7.56	7.67	7.49		
Temperature	**°F**	59.3	58.2	58.2		
Conductance	**mS/cm**	2.30	2.25	2.22		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Clear					
Odor	None					
Appearance	Clean					
NOTES:						

AEC *AMERICAN ENVIRONMENTAL CONSULTING, LLC*

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY	**LOCATION: Keenesburg Mine, Keenesburg, Colorado**
WELL NAME: AMW-1	
Sampled by: SJE	**Date:** 9/27/2022
Weather during sampling: Warm, Calm, Clear	**Date Sampled:** 9/27/2022
Well Condition: Good	**Time Sampled:** 12:00PM

EVACUATION DATA

Description of Measuring Point: Top of PVC		
Depth of Well From Measuring Point: 56.85' (Measured 9/18/2020)		
Depth to Groundwater from Measuring Point: 28.20'		
Height of Water Column: 28.65'		
Single Casing/Tubing Volume of Water: 28.65 gallons		
Volume of Water to Purge Prior to Sampling: 90 gallons		
Volume of Water Actually Purged Prior to Sampling: 90 gallons		**Flow Rate:** 1.5 gpm
Method of Purging/Equipment: 12V Pump	**Voltage:** 14V Controller	
Method of Sampling/Equipment: 12V Pump	**Voltage:** 12V Controller	

FIELD PARAMETERS

	Units	1 (30g)	2 (60g)	3 (90g)	4	5
pH	**pH units**	7.48	7.45	7.44		
Temperature	**°F**	59.6	53.4	59.2		
Conductance	**mS/cm**	1.56	1.56	1.64		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Brown					
Odor	None					
Appearance	Turbid					

NOTES:
5" Well → CV = 1 g/ft

Dup Collected, labeled 12:30pm on CoC

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY			**LOCATION: Keenesburg Mine, Keenesburg, Colorado**			
WELL NAME: AMW-2						
Sampled by: SJE				**Date:** 9/27/2022		
Weather during sampling: Warm, Calm, Clear				**Date Sampled:** 9/28/2022		
Well Condition: Good				**Time Sampled:** 5:00PM		
EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 53.60'						
Depth to Groundwater from Measuring Point: 24.79'						
Height of Water Column: 28.81'						
Single Casing/Tubing Volume of Water: 43.22 gallons						
Volume of Water to Purge Prior to Sampling: 130 gallons						
Volume of Water Actually Purged Prior to Sampling: ~50 gallons				**Flow Rate:** 1 gal/min		
Method of Purging/Equipment: 12V Pump			**Voltage:** 14V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 12V Controller			
FIELD PARAMETERS						
	Units	**1**	**2**	**3**	**4**	**5**
pH	**pH units**	6.56				
Temperature	**°F**	59.6				
Conductance	**mS/cm**	5.06				
Turbidity	**NTU/FTU**	--				
Color of Groundwater	Clear					
Odor	None					
Appearance	Clean					

NOTES:
6" Well → CV = 1.5 g/ft
45' Cord

Purged on 9/27/2022. Purged dry after approximately 50 gallons. Sample collected 9/28/2022
Field Parameters taken immediately before sample collection.

AEC *AMERICAN ENVIRONMENTAL CONSULTING, LLC*

GROUNDWATER SAMPLING FIELD DATA FORM

OWNER: COORS ENERGY	**LOCATION: Keenesburg Mine, Keenesburg, Colorado**
WELL NAME: SMW-2	
Sampled by: SJE	**Date:** 9/27/2022
Weather during sampling: Warm, Gusty, Partly Cloudy	**Date Sampled:** 9/27/2022
Well Condition: Good	**Time Sampled:** 3:45PM

EVACUATION DATA						
Description of Measuring Point: Top of PVC						
Depth of Well From Measuring Point: 96' (Measured 9/18/2020)						
Depth to Groundwater from Measuring Point: 33.45'						
Height of Water Column: 62.55'						
Single Casing/Tubing Volume of Water: 52 gallons						
Volume of Water to Purge Prior to Sampling: 156 gallons						
Volume of Water Actually Purged Prior to Sampling: 165 gallons				**Flow Rate:** 1 gal / min		
Method of Purging/Equipment: 12V Pump			**Voltage:** 15V Controller			
Method of Sampling/Equipment: 12V Pump			**Voltage:** 13V Controller			

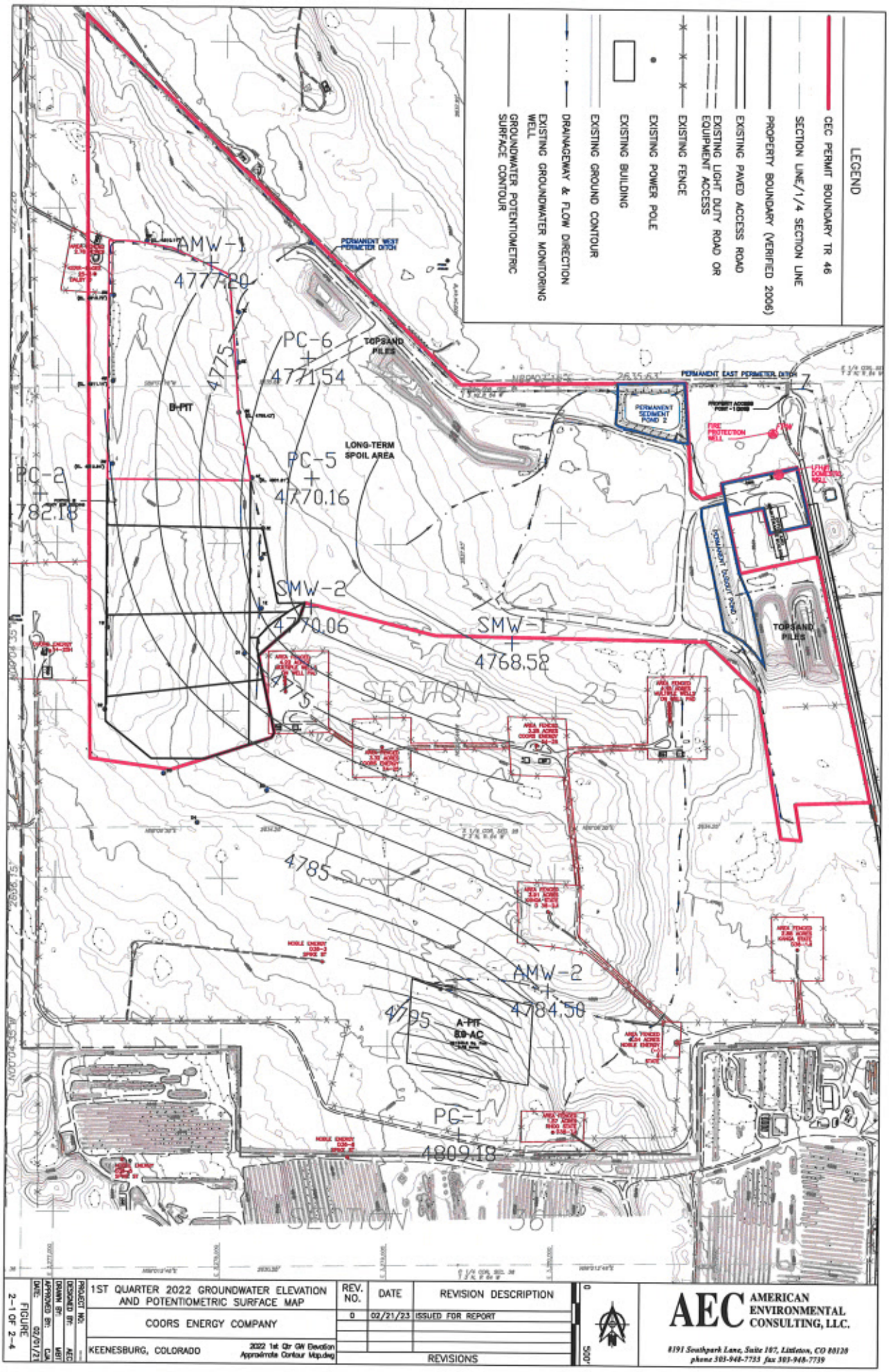
FIELD PARAMETERS						
	Units	**1**	**2**	**3**	**4**	**5**
pH	**pH units**	6.96	6.85	7.05		
Temperature	**°F**	59.4	60.2	60.4		
Conductance	**mS/cm**	5.27	5.28	5.16		
Turbidity	**NTU/FTU**	--	--	--		
Color of Groundwater	Clear					
Odor	None					
Appearance	Clear					

NOTES:
4.5" Well → Single Casing = 0.83 g/ft

Start purge ~ 1 gpm, Field Parameters checked every 55 minutes.

ATTACHMENT 2

QUARTERLY POTENTIOMETRIC SURFACE CONTOUR MAPS


LEGEND
CEC PERMIT BOUNDARY TR 46
SECTION LINE/1/4 SECTION LINE
PROPERTY BOUNDARY (VERIFIED 2006)
EXISTING PAVED ACCESS ROAD
EXISTING LIGHT DUTY ROAD OR EQUIPMENT ACCESS
EXISTING FENCE
EXISTING POWER POLE
EXISTING BUILDING
EXISTING GROUND CONTOUR
DRAINAGEWAY & FLOW DIRECTION
EXISTING GROUNDWATER MONITORING WELL
GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR
AMW-1
4777.20
PC-6
4771.54
PC-5
4770.16
PC-2
4782.18
SMW-2
4770.06
SMW-1
4768.58
AMW-2
4784.50
PC-1
4809.18
4775
4785
4795
TOPSOIL PILES
LONG-TERM SPOIL AREA
B-PIT
A-PIT
8.9 AC
PERMANENT WEST PERIMETER DITCH
PERMANENT EAST PERIMETER DITCH
PERMANENT SEDIMENT POND 2
PERMANENT RUNOFF POND
FIRE PROTECTION WELL
SECTION 25
SECTION 36
1ST QUARTER 2022 GROUNDWATER ELEVATION AND POTENTIOMETRIC SURFACE MAP
COORS ENERGY COMPANY
KEENESBURG, COLORADO
2022 1st Qtr GW Elevation Approximate Contour Map.dwg
PROJECT NO.
DESIGNED BY: AEC
DRAWN BY: MST
APPROVED BY: CJK
DATE: 02/21/23
FIGURE 2-1 OF 2-4
REV. NO. | DATE | REVISION DESCRIPTION
0 | 02/21/23 | ISSUED FOR REPORT
REVISIONS
0
500'
AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC.
8191 Southpark Lane, Suite 107, Littleton, CO 80120
phone 303-948-7733 fax 303-948-7739

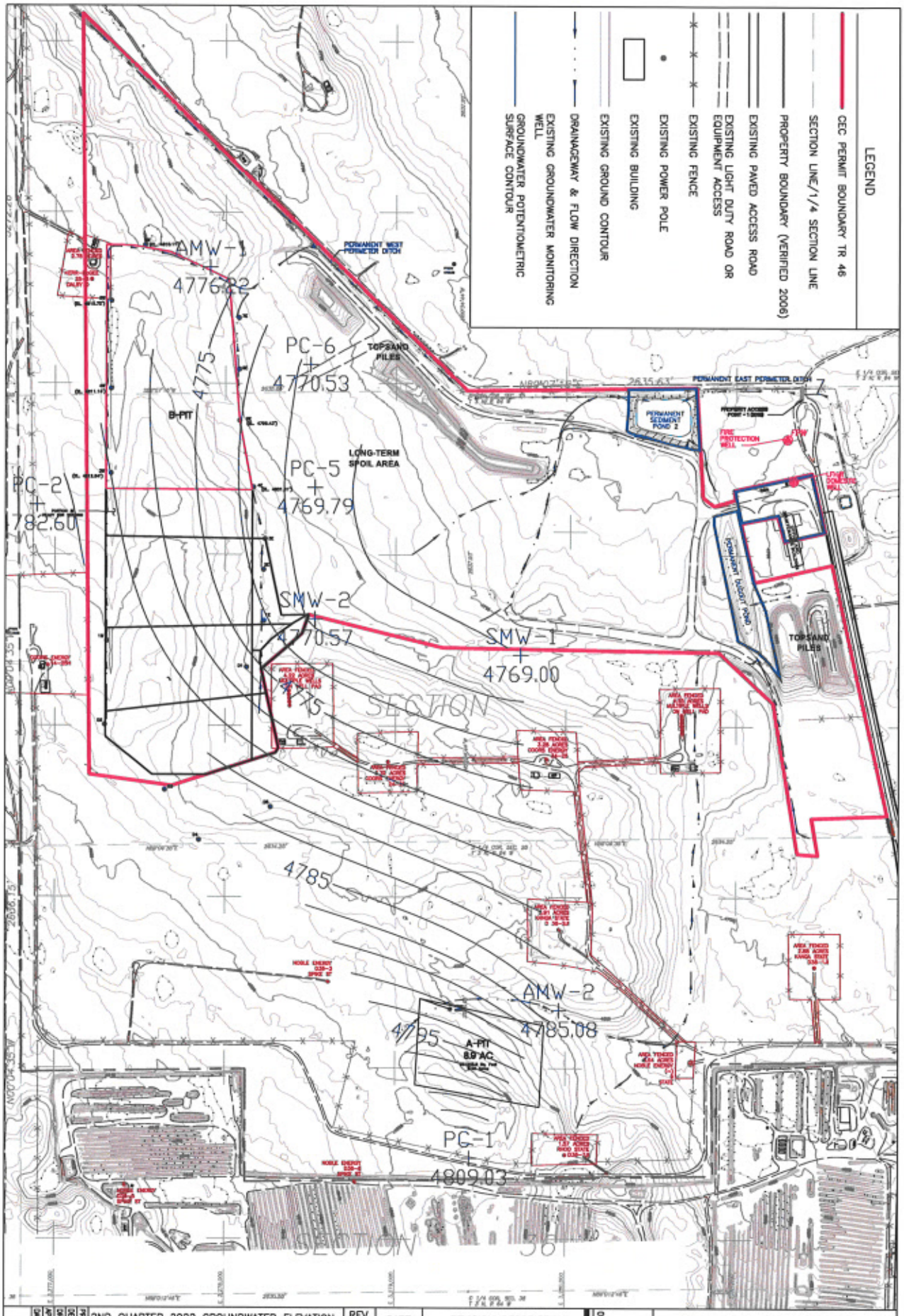


FIGURE	2-2 OF 2-4
PROJECT NO.	---
DESIGNED BY:	AEC
DRAWN BY:	MET
APPROVED BY:	GJA
DATE:	02/01/23

2ND QUARTER 2022 GROUNDWATER ELEVATION AND POTENTIOMETRIC SURFACE MAP

COORS ENERGY COMPANY

KEENESBURG, COLORADO

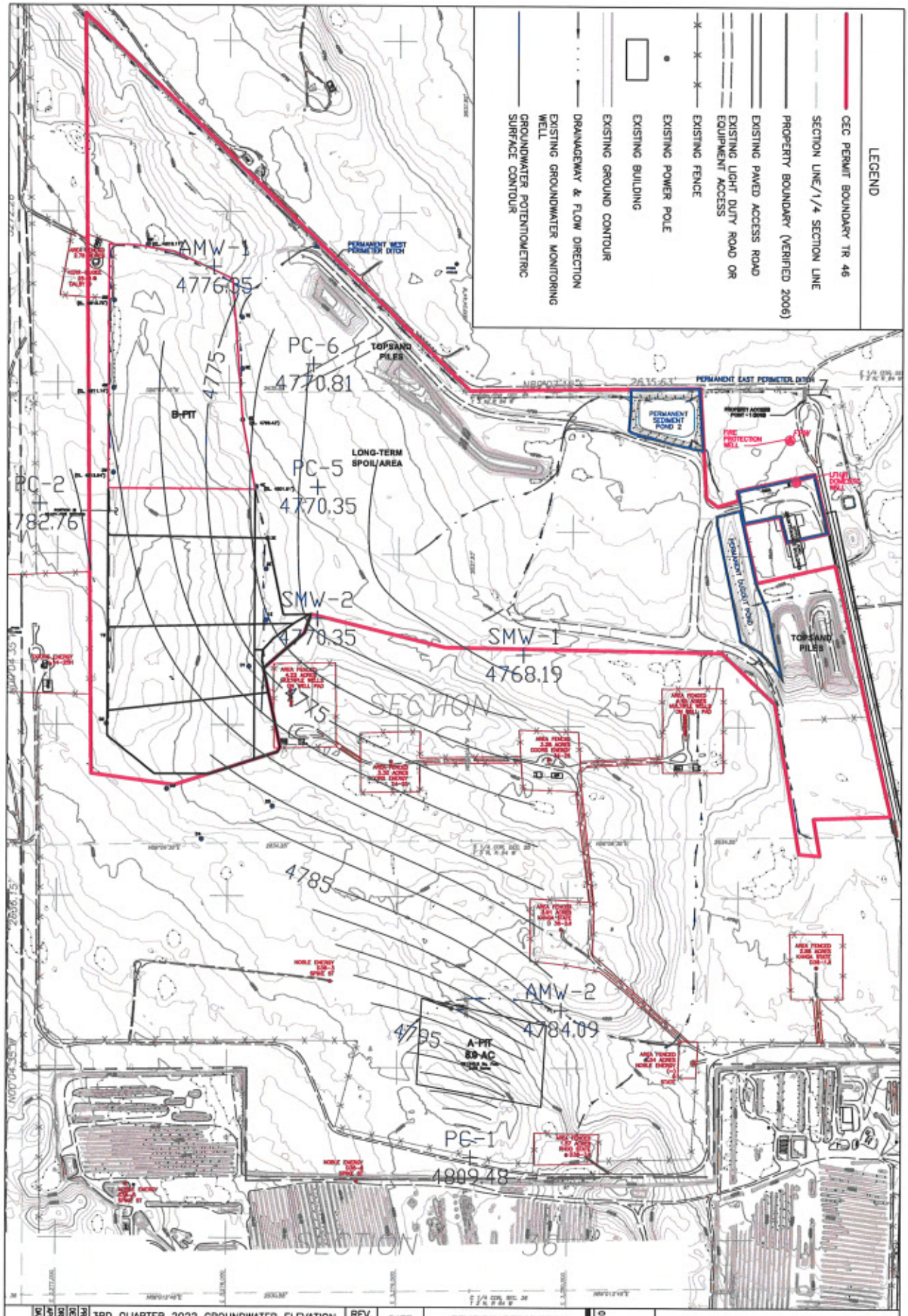
2022 2nd Qtr GW Elevation Approximate Contour Map.dwg

REV. NO.	DATE	REVISION DESCRIPTION
0	02/21/23	ISSUED FOR REPORT

REVISIONS

0 500'

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC.
8191 Southpark Lane, Suite 107, Littleton, CO 80120
phone 303-948-7733 fax 303-948-7739



PROJECT NO.	3RD QUARTER 2022 GROUNDWATER ELEVATION AND POTENTIOMETRIC SURFACE MAP	REV. NO.	DATE	REVISION DESCRIPTION	
DESIGNED BY: AEC		0	02/21/23	ISSUED FOR REPORT	
DRAWN BY: MRT	COORS ENERGY COMPANY				
APPROVED BY: GJA	KEENESBURG, COLORADO — 2022 3rd Qtr GW Elevation Approximate Contour Mapping			REVISIONS	
DATE: 02/01/23					

FIGURE 2-3 OF 2-4

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC.

8191 Southpark Lane, Suite 107, Littleton, CO 80120
phone 303-948-7733 fax 303-948-7739

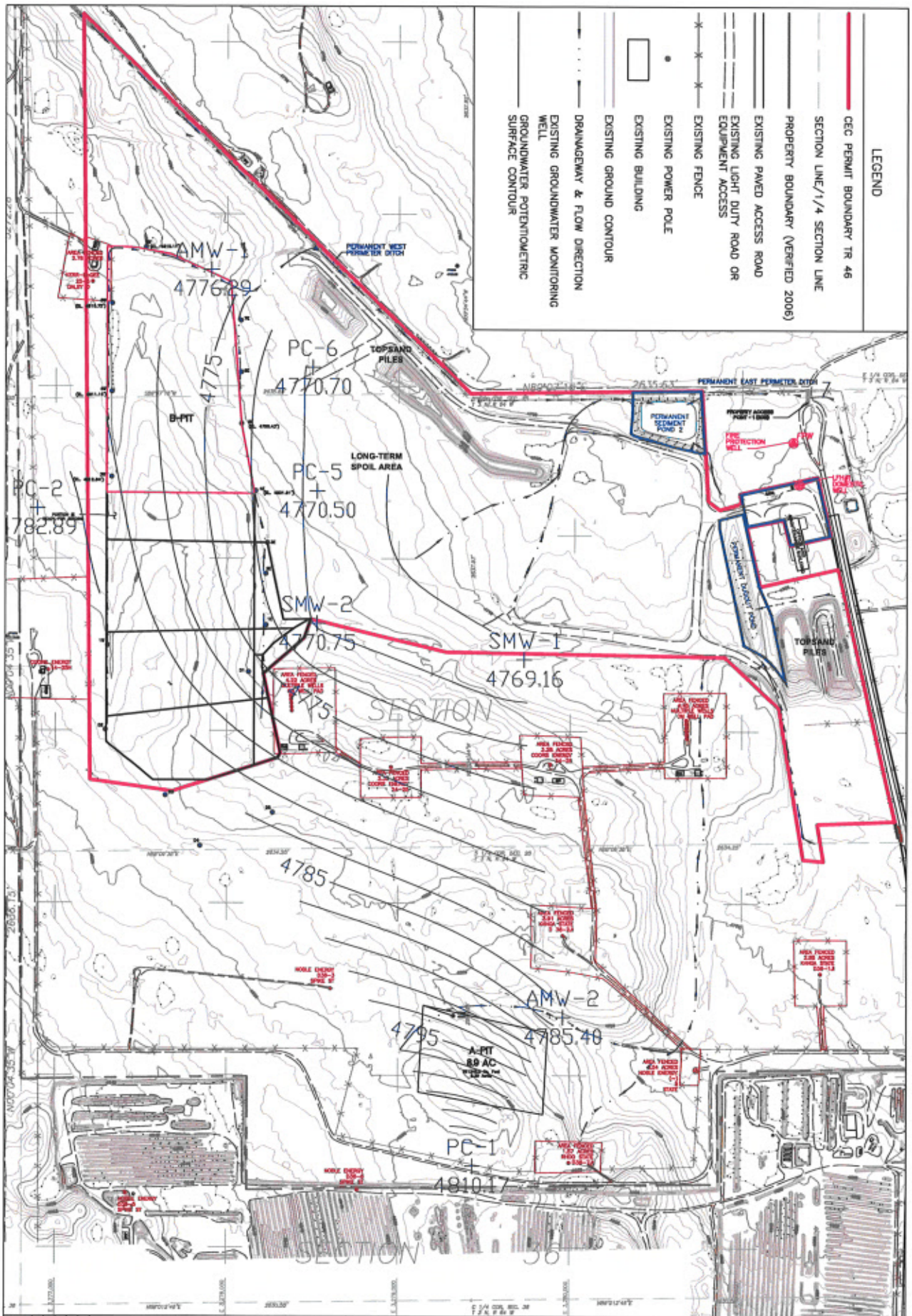


FIGURE 2-4 OF 2-4	DATE: 02/01/23	4TH QUARTER 2022 GROUNDWATER ELEVATION AND POTENTIOMETRIC SURFACE MAP	REV. NO.	DATE	REVISION DESCRIPTION
	APPROVED BY: CJA	COORS ENERGY COMPANY	0	02/21/23	ISSUED FOR REPORT
	DRAWN BY: MBT	KEENESBURG, COLORADO — 2022 4th Qtr GW Elevation Approximate Contour Map.dwg			
	DESIGNED BY: AEC				
	PROJECT NO. —				REVISIONS

AEC AMERICAN ENVIRONMENTAL CONSULTING, LLC.

8191 Southpark Lane, Suite 197, Littleton, CO 80120
phone 303-948-7733 fax 303-948-7719

ATTACHMENT 3

LABORATORY ANALYTICAL REPORTS

ATTACHMENT 3.1

APRIL 2022 REPORT

ANALYTICAL REPORT

May 17, 2022

American Environmental - CO

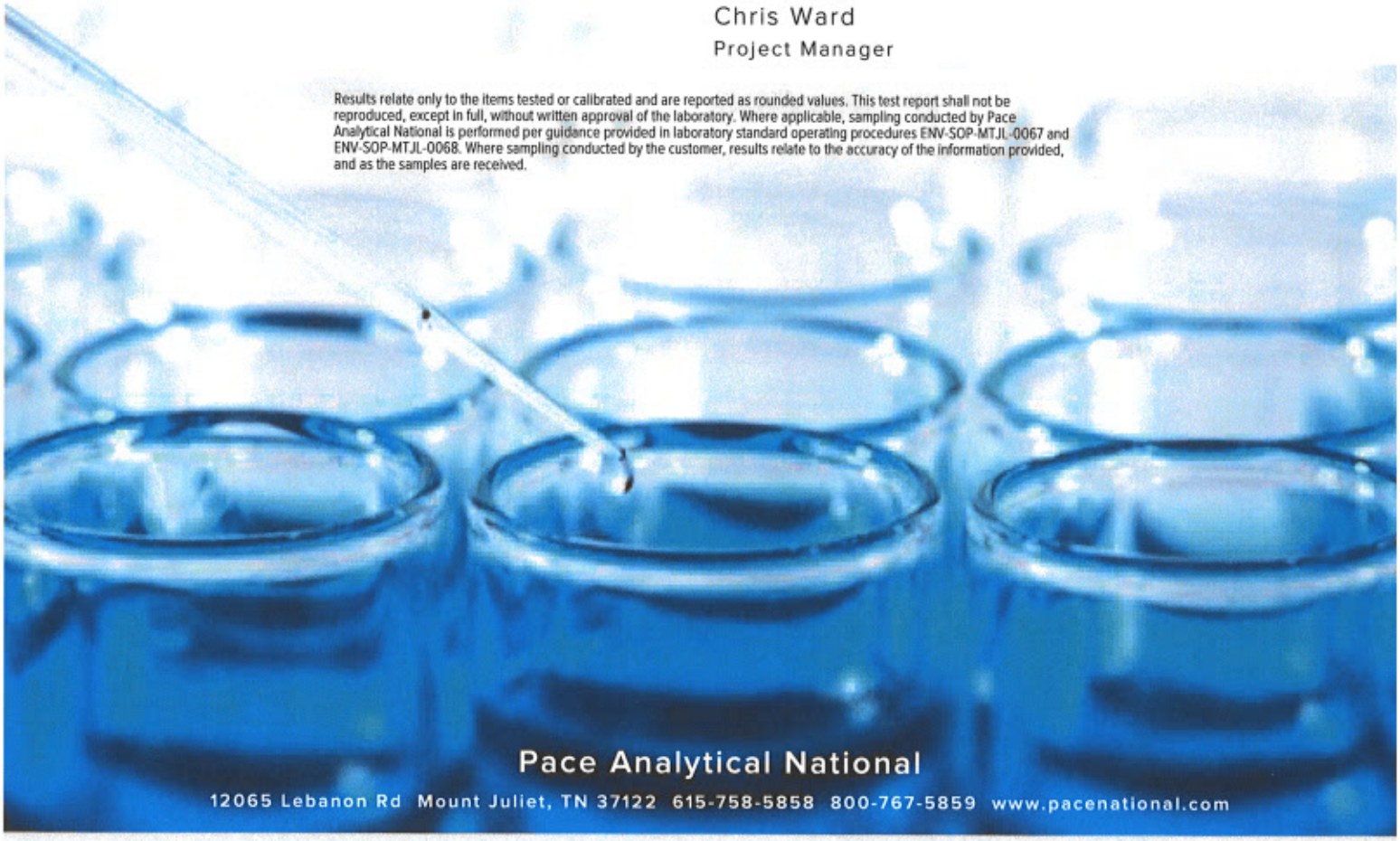
Sample Delivery Group:	L1489440
Samples Received:	05/03/2022
Project Number:	COORS
Description:	Keenesburg Mine

Report To:

Skyler Elder
8191 Southpark Lane
Suite 107
Littleton, CO 80120

Entire Report Reviewed By: Chris Ward

Chris Ward
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

PC-1 L1489440-01 GW

Collected by: SJE | Collected date/time: 05/01/22 19:00 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861139	1	05/11/22 21:46	05/11/22 21:46	CCE	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859974	1	05/06/22 13:17	05/06/22 16:48	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:15	05/08/22 08:15	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	100	05/14/22 20:44	05/14/22 20:44	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	5	05/14/22 20:31	05/14/22 20:31	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 14:33	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 08:45	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861139	1	05/09/22 19:00	05/11/22 21:46	CCE	Mt. Juliet, TN

PC-2 L1489440-02 GW

Collected by: SJE | Collected date/time: 05/01/22 19:15 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/12/22 00:04	05/12/22 00:04	CCE	Mt. Juliet, TN
Calculated Results	WG1861143	1	05/11/22 17:05	05/11/22 17:05	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859814	1	05/06/22 09:32	05/06/22 12:06	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:19	05/08/22 08:19	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	100	05/14/22 21:09	05/14/22 21:09	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	5	05/14/22 20:56	05/14/22 20:56	JD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 14:45	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	5	05/09/22 22:23	05/13/22 09:05	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	5	05/10/22 05:13	05/12/22 00:04	CCE	Mt. Juliet, TN

PC-5 L1489440-03 GW

Collected by: SJE | Collected date/time: 05/01/22 15:15 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:08	05/11/22 17:08	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859974	1	05/06/22 13:17	05/06/22 16:48	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:22	05/08/22 08:22	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	100	05/14/22 21:33	05/14/22 21:33	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	5	05/14/22 21:21	05/14/22 21:21	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 14:49	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:13	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:08	ZSA	Mt. Juliet, TN

PC-6 L1489440-04 GW

Collected by: SJE | Collected date/time: 05/01/22 14:45 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:17	05/11/22 17:17	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859814	1	05/06/22 09:32	05/06/22 12:06	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:25	05/08/22 08:25	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	100	05/14/22 21:58	05/14/22 21:58	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	5	05/14/22 21:46	05/14/22 21:46	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 14:52	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:16	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:17	ZSA	Mt. Juliet, TN

SAMPLE SUMMARY

AMW-1 L1489440-05 GW

Collected by: SJE | Collected date/time: 05/01/22 14:15 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:20	05/11/22 17:20	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859974	1	05/06/22 13:17	05/06/22 16:48	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:29	05/08/22 08:29	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	1	05/14/22 22:11	05/14/22 22:11	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	50	05/14/22 22:48	05/14/22 22:48	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 14:55	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:19	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:20	ZSA	Mt. Juliet, TN

AMW-2 L1489440-06 GW

Collected by: SJE | Collected date/time: 05/01/22 18:45 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/12/22 00:07	05/12/22 00:07	CCE	Mt. Juliet, TN
Calculated Results	WG1861143	1	05/11/22 17:23	05/11/22 17:23	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859974	1	05/06/22 13:17	05/06/22 16:48	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:32	05/08/22 08:32	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	100	05/14/22 23:13	05/14/22 23:13	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	5	05/14/22 23:01	05/14/22 23:01	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 15:04	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	5	05/09/22 22:23	05/13/22 09:22	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	5	05/10/22 05:13	05/12/22 00:07	CCE	Mt. Juliet, TN

SMW-2 L1489440-07 GW

Collected by: SJE | Collected date/time: 05/01/22 17:30 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/12/22 00:10	05/12/22 00:10	CCE	Mt. Juliet, TN
Calculated Results	WG1861143	1	05/11/22 17:26	05/11/22 17:26	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859814	1	05/06/22 09:32	05/06/22 12:06	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:35	05/08/22 08:35	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	100	05/14/22 23:38	05/14/22 23:38	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1863425	5	05/14/22 23:25	05/14/22 23:25	JD	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 15:07	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	5	05/09/22 22:23	05/13/22 09:25	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	5	05/10/22 05:13	05/12/22 00:10	CCE	Mt. Juliet, TN

DUP L1489440-08 GW

Collected by: SJE | Collected date/time: 05/01/22 00:00 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:29	05/11/22 17:29	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859974	1	05/06/22 13:17	05/06/22 16:48	MMF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:39	05/08/22 08:39	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864750	1	05/17/22 00:43	05/17/22 00:43	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864750	20	05/17/22 00:58	05/17/22 00:58	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 15:11	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:28	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:29	ZSA	Mt. Juliet, TN

SAMPLE SUMMARY

FPW L1489440-09 GW

Collected by: SJE | Collected date/time: 04/30/22 16:45 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:32	05/11/22 17:32	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859268	1	05/05/22 11:51	05/05/22 17:03	SJF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:50	05/08/22 08:50	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864750	1	05/17/22 01:14	05/17/22 01:14	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864750	5	05/17/22 02:02	05/17/22 02:02	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 15:14	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:30	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:32	ZSA	Mt. Juliet, TN

DH-96 L1489440-10 GW

Collected by: SJE | Collected date/time: 04/30/22 16:30 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:35	05/11/22 17:35	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859268	1	05/05/22 11:51	05/05/22 17:03	SJF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:53	05/08/22 08:53	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864161	1	05/16/22 02:26	05/16/22 02:26	KEG	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864161	20	05/16/22 02:39	05/16/22 02:39	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 15:17	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:33	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:35	ZSA	Mt. Juliet, TN

DH-122 L1489440-11 GW

Collected by: SJE | Collected date/time: 04/30/22 12:30 | Received date/time: 05/03/22 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Calculated Results	WG1861143	1	05/11/22 17:38	05/11/22 17:38	ZSA	Mt. Juliet, TN
Gravimetric Analysis by Method 2540 C-2011	WG1859268	1	05/05/22 11:51	05/05/22 17:03	SJF	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1860440	1	05/08/22 08:57	05/08/22 08:57	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1864161	20	05/16/22 02:52	05/16/22 02:52	KEG	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/12/22 15:20	ZSA	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861136	1	05/09/22 22:23	05/13/22 09:36	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1861143	1	05/10/22 05:13	05/11/22 17:38	ZSA	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris Ward

Chris Ward
Project Manager

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	4.29		1	05/11/2022 21:46	WG1861139

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	1660		2.50	1	05/11/2022 21:46	WG1861139

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3310		50.0	1	05/06/2022 16:48	WG1859974

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	286		20.0	1	05/08/2022 08:15	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:15	WG1860440

Sample Narrative:
L1489440-01 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	16.4		5.00	5	05/14/2022 20:31	WG1863425
Fluoride	1.71		0.750	5	05/14/2022 20:31	WG1863425
Sulfate	2010		500	100	05/14/2022 20:44	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 14:33	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 14:33	WG1861136
Barium,Dissolved	0.0122		0.00500	1	05/12/2022 14:33	WG1861136
Boron,Dissolved	0.529		0.200	1	05/12/2022 14:33	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 14:33	WG1861136
Calcium	505		1.00	1	05/11/2022 21:46	WG1861139
Calcium,Dissolved	485	O1 V	1.00	1	05/12/2022 14:33	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 14:33	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 14:33	WG1861136
Magnesium	95.6		1.00	1	05/11/2022 21:46	WG1861139
Magnesium,Dissolved	90.8	V	1.00	1	05/13/2022 08:45	WG1861136
Manganese,Dissolved	ND		0.0100	1	05/12/2022 14:33	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 14:33	WG1861136
Potassium,Dissolved	12.7		2.00	1	05/12/2022 14:33	WG1861136
Selenium,Dissolved	0.0913		0.0100	1	05/12/2022 14:33	WG1861136
Sodium	401		3.00	1	05/11/2022 21:46	WG1861139
Sodium,Dissolved	382	O1 V	3.00	1	05/12/2022 14:33	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	22.1		1	05/12/2022 00:04	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	2670		2.50	1	05/11/2022 17:05	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	10200		200	1	05/06/2022 12:06	WG1859814

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	883		20.0	1	05/08/2022 08:19	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:19	WG1860440

Sample Narrative:
L1489440-02 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	882		100	100	05/14/2022 21:09	WG1863425
Fluoride	ND		0.750	5	05/14/2022 20:56	WG1863425
Sulfate	6150		500	100	05/14/2022 21:09	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 14:45	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 14:45	WG1861136
Barium,Dissolved	0.0143		0.00500	1	05/12/2022 14:45	WG1861136
Boron,Dissolved	0.288		0.200	1	05/12/2022 14:45	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 14:45	WG1861136
Calcium	467		5.00	5	05/12/2022 00:04	WG1861143
Calcium,Dissolved	440		1.00	1	05/12/2022 14:45	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 14:45	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 14:45	WG1861136
Magnesium	355		5.00	5	05/12/2022 00:04	WG1861143
Magnesium,Dissolved	316		5.00	5	05/13/2022 09:05	WG1861136
Manganese,Dissolved	1.90		0.0100	1	05/12/2022 14:45	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 14:45	WG1861136
Potassium,Dissolved	28.1		2.00	1	05/12/2022 14:45	WG1861136
Selenium,Dissolved	ND		0.0100	1	05/12/2022 14:45	WG1861136
Sodium	2610		15.0	5	05/12/2022 00:04	WG1861143
Sodium,Dissolved	2290		15.0	5	05/13/2022 09:05	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	2.59		1	05/11/2022 17:08	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	2200		2.50	1	05/11/2022 17:08	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	3720		50.0	1	05/06/2022 16:48	WG1859974

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	563		20.0	1	05/08/2022 08:22	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:22	WG1860440

Sample Narrative:
L1489440-03 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	141		5.00	5	05/14/2022 21:21	WG1863425
Fluoride	ND		0.750	5	05/14/2022 21:21	WG1863425
Sulfate	1920		500	100	05/14/2022 21:33	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 14:49	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 14:49	WG1861136
Barium,Dissolved	0.0363		0.00500	1	05/12/2022 14:49	WG1861136
Boron,Dissolved	ND		0.200	1	05/12/2022 14:49	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 14:49	WG1861136
Calcium	609		1.00	1	05/11/2022 17:08	WG1861143
Calcium,Dissolved	597		1.00	1	05/12/2022 14:49	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 14:49	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 14:49	WG1861136
Magnesium	165		1.00	1	05/11/2022 17:08	WG1861143
Magnesium,Dissolved	154		1.00	1	05/13/2022 09:13	WG1861136
Manganese,Dissolved	18.6		0.0100	1	05/12/2022 14:49	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 14:49	WG1861136
Potassium,Dissolved	22.0		2.00	1	05/12/2022 14:49	WG1861136
Selenium,Dissolved	0.0134		0.0100	1	05/12/2022 14:49	WG1861136
Sodium	279		3.00	1	05/11/2022 17:08	WG1861143
Sodium,Dissolved	271		3.00	1	05/12/2022 14:49	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	7.00		1	05/11/2022 17:17	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	809		2.50	1	05/11/2022 17:17	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	2310		50.0	1	05/06/2022 12:06	WG1859814

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity,Bicarbonate	309		20.0	1	05/08/2022 08:25	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:25	WG1860440

Sample Narrative:
L1489440-04 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	56.1		5.00	5	05/14/2022 21:46	WG1863425
Fluoride	2.72		0.750	5	05/14/2022 21:46	WG1863425
Sulfate	1270		500	100	05/14/2022 21:58	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 14:52	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 14:52	WG1861136
Barium,Dissolved	0.00874		0.00500	1	05/12/2022 14:52	WG1861136
Boron,Dissolved	0.568		0.200	1	05/12/2022 14:52	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 14:52	WG1861136
Calcium	184		1.00	1	05/11/2022 17:17	WG1861143
Calcium,Dissolved	174		1.00	1	05/12/2022 14:52	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 14:52	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 14:52	WG1861136
Magnesium	84.9		1.00	1	05/11/2022 17:17	WG1861143
Magnesium,Dissolved	78.1		1.00	1	05/13/2022 09:16	WG1861136
Manganese,Dissolved	ND		0.0100	1	05/12/2022 14:52	WG1861136
Molybdenum,Dissolved	0.00582		0.00500	1	05/12/2022 14:52	WG1861136
Potassium,Dissolved	8.43		2.00	1	05/12/2022 14:52	WG1861136
Selenium,Dissolved	0.0736		0.0100	1	05/12/2022 14:52	WG1861136
Sodium	458		3.00	1	05/11/2022 17:17	WG1861143
Sodium,Dissolved	439		3.00	1	05/12/2022 14:52	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.81		1	05/11/2022 17:20	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	1080		2.50	1	05/11/2022 17:20	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	1730		20.0	1	05/06/2022 16:48	WG1859974

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	215		20.0	1	05/08/2022 08:29	WG1860440
Alkalinity,Bicarbonate	215		20.0	1	05/08/2022 08:29	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:29	WG1860440
Alkalinity,Hydroxide	ND		20.0	1	05/08/2022 08:29	WG1860440

Sample Narrative:

L1489440-05 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	30.8		1.00	1	05/14/2022 22:11	WG1863425
Fluoride	0.871		0.150	1	05/14/2022 22:11	WG1863425
Sulfate	826		250	50	05/14/2022 22:48	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 14:55	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 14:55	WG1861136
Barium,Dissolved	0.0293		0.00500	1	05/12/2022 14:55	WG1861136
Boron,Dissolved	ND		0.200	1	05/12/2022 14:55	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 14:55	WG1861136
Calcium	298		1.00	1	05/11/2022 17:20	WG1861143
Calcium,Dissolved	254		1.00	1	05/12/2022 14:55	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 14:55	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 14:55	WG1861136
Magnesium	82.0		1.00	1	05/11/2022 17:20	WG1861143
Magnesium,Dissolved	69.1		1.00	1	05/13/2022 09:19	WG1861136
Manganese,Dissolved	0.0128		0.0100	1	05/12/2022 14:55	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 14:55	WG1861136
Potassium,Dissolved	4.05	B	2.00	1	05/12/2022 14:55	WG1861136
Selenium,Dissolved	0.0242		0.0100	1	05/12/2022 14:55	WG1861136
Sodium	137		3.00	1	05/11/2022 17:20	WG1861143
Sodium,Dissolved	127		3.00	1	05/12/2022 14:55	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	14.6		1	05/12/2022 00:07	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	1940		2.50	1	05/11/2022 17:23	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	6550		100	1	05/06/2022 16:48	WG1859974

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	754		20.0	1	05/08/2022 08:32	WG1860440
Alkalinity,Bicarbonate	754		20.0	1	05/08/2022 08:32	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:32	WG1860440
Alkalinity,Hydroxide	ND		20.0	1	05/08/2022 08:32	WG1860440

Sample Narrative:
L1489440-06 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	381		5.00	5	05/14/2022 23:01	WG1863425
Fluoride	ND		0.750	5	05/14/2022 23:01	WG1863425
Sulfate	3840		500	100	05/14/2022 23:13	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 15:04	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 15:04	WG1861136
Barium,Dissolved	0.0192		0.00500	1	05/12/2022 15:04	WG1861136
Boron,Dissolved	0.236		0.200	1	05/12/2022 15:04	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 15:04	WG1861136
Calcium	478		5.00	5	05/12/2022 00:07	WG1861143
Calcium,Dissolved	463		1.00	1	05/12/2022 15:04	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 15:04	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 15:04	WG1861136
Magnesium	180		5.00	5	05/12/2022 00:07	WG1861143
Magnesium,Dissolved	165		5.00	5	05/13/2022 09:22	WG1861136
Manganese,Dissolved	3.41		0.0100	1	05/12/2022 15:04	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 15:04	WG1861136
Potassium,Dissolved	34.9		2.00	1	05/12/2022 15:04	WG1861136
Selenium,Dissolved	ND		0.0100	1	05/12/2022 15:04	WG1861136
Sodium	1480		15.0	5	05/12/2022 00:07	WG1861143
Sodium,Dissolved	1370		15.0	5	05/13/2022 09:22	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	15.4		1	05/12/2022 00:10	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	1950		2.50	1	05/11/2022 17:26	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	6680		100	1	05/06/2022 12:06	WG1859814

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	1020		20.0	1	05/08/2022 08:35	WG1860440
Alkalinity,Bicarbonate	1020		20.0	1	05/08/2022 08:35	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:35	WG1860440
Alkalinity,Hydroxide	ND		20.0	1	05/08/2022 08:35	WG1860440

Sample Narrative:
L1489440-07 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	750		100	100	05/14/2022 23:38	WG1863425
Fluoride	ND		0.750	5	05/14/2022 23:25	WG1863425
Sulfate	3320		500	100	05/14/2022 23:38	WG1863425

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 15:07	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 15:07	WG1861136
Barium,Dissolved	0.0114		0.00500	1	05/12/2022 15:07	WG1861136
Boron,Dissolved	0.335		0.200	1	05/12/2022 15:07	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 15:07	WG1861136
Calcium	453		5.00	5	05/12/2022 00:10	WG1861143
Calcium,Dissolved	476		1.00	1	05/12/2022 15:07	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 15:07	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 15:07	WG1861136
Magnesium	163		5.00	5	05/12/2022 00:10	WG1861143
Magnesium,Dissolved	160		5.00	5	05/13/2022 09:25	WG1861136
Manganese,Dissolved	0.496		0.0100	1	05/12/2022 15:07	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 15:07	WG1861136
Potassium,Dissolved	20.7		2.00	1	05/12/2022 15:07	WG1861136
Selenium,Dissolved	ND		0.0100	1	05/12/2022 15:07	WG1861136
Sodium	1500		15.0	5	05/12/2022 00:10	WG1861143
Sodium,Dissolved	1470		15.0	5	05/13/2022 09:25	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.65		1	05/11/2022 17:29	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	1130		2.50	1	05/11/2022 17:29	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	1660		20.0	1	05/06/2022 16:48	WG1859974

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	214		20.0	1	05/08/2022 08:39	WG1860440
Alkalinity,Bicarbonate	214		20.0	1	05/08/2022 08:39	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:39	WG1860440
Alkalinity,Hydroxide	ND		20.0	1	05/08/2022 08:39	WG1860440

Sample Narrative:
L1489440-08 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	33.1		1.00	1	05/17/2022 00:43	WG1864750
Fluoride	0.792		0.150	1	05/17/2022 00:43	WG1864750
Sulfate	940		100	20	05/17/2022 00:58	WG1864750

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Antimony,Dissolved	ND		0.0100	1	05/12/2022 15:11	WG1861136
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 15:11	WG1861136
Barium,Dissolved	0.0303		0.00500	1	05/12/2022 15:11	WG1861136
Boron,Dissolved	ND		0.200	1	05/12/2022 15:11	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 15:11	WG1861136
Calcium	315		1.00	1	05/11/2022 17:29	WG1861143
Calcium,Dissolved	264		1.00	1	05/12/2022 15:11	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 15:11	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 15:11	WG1861136
Magnesium	83.1		1.00	1	05/11/2022 17:29	WG1861143
Magnesium,Dissolved	70.6		1.00	1	05/13/2022 09:28	WG1861136
Manganese,Dissolved	0.0123		0.0100	1	05/12/2022 15:11	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 15:11	WG1861136
Potassium,Dissolved	3.93	B	2.00	1	05/12/2022 15:11	WG1861136
Selenium,Dissolved	0.0276		0.0100	1	05/12/2022 15:11	WG1861136
Sodium	128		3.00	1	05/11/2022 17:29	WG1861143
Sodium,Dissolved	122		3.00	1	05/12/2022 15:11	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	1.33		1	05/11/2022 17:32	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	550		2.50	1	05/11/2022 17:32	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	913		13.3	1	05/05/2022 17:03	WG1859268

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	194		20.0	1	05/08/2022 08:50	WG1860440
Alkalinity,Bicarbonate	194		20.0	1	05/08/2022 08:50	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:50	WG1860440
Alkalinity,Hydroxide	ND		20.0	1	05/08/2022 08:50	WG1860440

Sample Narrative:
L1489440-09 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	46.6		1.00	1	05/17/2022 01:14	WG1864750
Sulfate	207		25.0	5	05/17/2022 02:02	WG1864750

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 15:14	WG1861136
Barium,Dissolved	0.0700		0.00500	1	05/12/2022 15:14	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 15:14	WG1861136
Calcium	150		1.00	1	05/11/2022 17:32	WG1861143
Calcium,Dissolved	144		1.00	1	05/12/2022 15:14	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 15:14	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 15:14	WG1861136
Magnesium	42.8		1.00	1	05/11/2022 17:32	WG1861143
Magnesium,Dissolved	39.8		1.00	1	05/13/2022 09:30	WG1861136
Manganese,Dissolved	ND		0.0100	1	05/12/2022 15:14	WG1861136
Molybdenum,Dissolved	ND		0.00500	1	05/12/2022 15:14	WG1861136
Selenium,Dissolved	ND		0.0100	1	05/12/2022 15:14	WG1861136
Sodium	71.8		3.00	1	05/11/2022 17:32	WG1861143
Sodium,Dissolved	67.8		3.00	1	05/12/2022 15:14	WG1861136

Calculated Results

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
Sodium Adsorption Ratio	5.32		1	05/11/2022 17:35	WG1861143

Calculated Results

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (calculated) as CaCO3	487		2.50	1	05/11/2022 17:35	WG1861143

Gravimetric Analysis by Method 2540 C-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Dissolved Solids	1390		25.0	1	05/05/2022 17:03	WG1859268

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	295		20.0	1	05/08/2022 08:53	WG1860440
Alkalinity,Bicarbonate	295		20.0	1	05/08/2022 08:53	WG1860440
Alkalinity,Carbonate	ND		20.0	1	05/08/2022 08:53	WG1860440
Alkalinity,Hydroxide	ND		20.0	1	05/08/2022 08:53	WG1860440

Sample Narrative:
L1489440-10 WG1860440: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	34.7		1.00	1	05/16/2022 02:26	WG1864161
Sulfate	751		100	20	05/16/2022 02:39	WG1864161

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.0100	1	05/12/2022 15:17	WG1861136
Barium,Dissolved	0.00933		0.00500	1	05/12/2022 15:17	WG1861136
Cadmium,Dissolved	ND		0.00200	1	05/12/2022 15:17	WG1861136
Calcium	112		1.00	1	05/11/2022 17:35	WG1861143
Calcium,Dissolved	108		1.00	1	05/12/2022 15:17	WG1861136
Iron,Dissolved	ND		0.100	1	05/12/2022 15:17	WG1861136
Lead,Dissolved	ND		0.00600	1	05/12/2022 15:17	WG1861136
Magnesium	50.4		1.00	1	05/11/2022 17:35	WG1861143
Magnesium,Dissolved	47.0		1.00	1	05/13/2022 09:33	WG1861136
Manganese,Dissolved	0.519		0.0100	1	05/12/2022 15:17	WG1861136
Molybdenum,Dissolved	0.00743		0.00500	1	05/12/2022 15:17	WG1861136
Selenium,Dissolved	ND		0.0100	1	05/12/2022 15:17	WG1861136
Sodium	270		3.00	1	05/11/2022 17:35	WG1861143
Sodium,Dissolved	258		3.00	1	05/12/2022 15:17	WG1861136