W A T E R Q U A L I T Y
MEMORANDUM
Utah Coal Regulatory Program

December 20th, 2017

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: Steve Christensen Environmental Scientist

RE: 2nd Quarter 2017, Water Monitoring, Consolidation Coal Company, LLC, Emery Deep Mine, C/015/0015, Task ID #5531

The Emery Deep Mine is currently an in-active coalmine. The coal mining operation previously utilized room and pillar mining techniques with the use of a continuous miner machine. The mine went into temporary cessation in late 2010. The coal reserves were fully extracted (thus falling into the planned subsidence category).

The approved Mining and Reclamation Plan (MRP) outlines the water monitoring requirements beginning on page VI-28. Table VI-17, Emery Mine Hydrologic Monitoring Program contains a comprehensive list of all groundwater (springs/seeps), surface water, groundwater monitoring wells and Utah Pollutant Discharge Elimination System (UPDES) outfalls. Plate VI-4, Ground Water Monitoring Well and Surface Water Monitoring Site Location Map depicts the locations of the various ground and surface water monitoring sites (including the UPDES discharge/outfall points).

As part of the approved water monitoring requirements cited above, the Permittee is required to submit an annual groundwater evaluation of the two Emery Town wells (Emery Town Well #1 and Emery Town Well #2). The Emery town well information is submitted with the Emery Deep Mine's annual report. The information is in addition to the quarterly monitoring/sampling that is required at the wells.

1. Was data submitted for all of the MRP required sites? YES ☒ NO ☐

Springs

The MRP outlines the sampling of 5 springs within the permit and adjacent area. Flow and field parameters are sampled quarterly with water quality samples collected in the 2nd and 3rd quarters.

Of the 5 spring monitoring sites, only Bryant #1 (SP-10) produced a measurable flow this quarter.

Streams

The MRP outlines the sampling of 10 surface water monitoring stations within the permit and adjacent area.

Of the 10 surface water monitoring sites, SWMS-1A, SWMS-2, SWMS-3, SWMS-4 and SWMS-5 reported a flow. SWMS-8, SWMS-9, SWMS-10, SWMS-11 and SWMS-12 did not produce a measurable flow this quarter.

Wells

The MRP requires the sampling of 20 ground water monitoring wells within the permit and adjacent area (See Table VI-17). However; Table VI-17 identifies 8 monitoring wells for water quality measurements. The number of wells slated for water quality monitoring is in actuality 10 distinct wells. 'Emery Town' is comprised of two wells: Emery #1 and Emery #2.

In the first week of September 2016, the Division approved Task #5243. The MRP was revised to reflect revisions to the approved water monitoring program. Monitoring well T1-U had been compromised and could not be rehabilitated. Monitoring well TP-U (quarterly water quality and quantity sampling) was reinstated into the water monitoring program to compensate for the loss of T1-U. Additionally, Pump 3 MW was added to the ground water monitoring program (quarterly water levels).

Additionally, monitoring well T1-B is still required for monitoring. It was inadvertently omitted from Table VI-17 with the permitting of the Emery No. 2 Mine (See Task ID #5362). It should be noted that the RDA wells (2,4 and 6) are monitored annually during the 2nd quarter of the year.

Ten monitoring wells are identified in Table VI-17 for quarterly water levels. Monitoring wells AA-B, AA-U, AA-M and AA-L were added per Task ID #5362. The wells were picked up for monitoring during the 2nd quarter of 2017.

All required data was submitted for the ground water monitoring sites.

UPDES

The Emery Deep Mine's Utah Pollutant Discharge Elimination system (UPDES) Permit, #UT0022616, identifies 8 outfalls (001, 002, 003, 004, 005, 006, 007, and 009). UPDES Outfall 008 is no longer an active water monitoring site. The discharges from each of the outfalls ultimately report to Quitchupah Creek, a tributary of Muddy Creek. The receiving waters are designated according to Utah Administrative Code (UAC) R317-2-13.1 as 2B, 3C and 4. Historically, only Outfalls 001 and 003 have ever recorded a discharge. UPDES Outfall 008 is no longer active.

The Water Quality Board for the Division of Water Quality (DWQ) approved a rule change that allows for a site specific, in-stream standard for the Emery Deep's effluent limitations based on its sulfate (SO4) concentrations (as opposed to previous total dissolved solids-TDS standard). The new standards are identified in the currently approved UPDES permit (effective July 1st, 2012). The modified standard established an allowable TDS concentration of 4,766 ppm (maximum monthly average) and SO4 concentration of 3,366 ppm (maximum monthly average). The currently approved UPDES permit will expire on June 30th, 2017.

UPDES Parameter	Established Limit
TSS	70 ppm (daily maximum)
T-Fe	1.4 ppm
Oil/Grease	10 ppm
pH	6.5-9.0
TDS	4,766 ppm (max. monthly avg)
SO4	3,366 ppm (max. monthly avg)

The Permittee submitted data for all required UPDES sites. None of the outfalls reported a discharge this quarter. The Permittee has indicated that the underground pump that had historically produced a discharge at Outfall 003 has been turned off. As a result, the outfall is not discharging at this time.

2. Were all required parameters reported for each site? YES ☒ NO ☐

Spring Monitoring Sites

All required parameters were reported for SP-10.

Surface Water Monitoring Sites

The Permittee submitted all required water quality data this quarter for the surface water monitoring sites that produced a measurable flow and could be accessed. Surface water monitoring sites SWMS-1A, SWMS-2, SWMS-3, SWMS-4 and SWMS-5 reported all required parameters.

Water Monitoring Wells

All required data was reported for the water monitoring wells.

UPDES Monitoring Sites

None of the UPDES monitoring sites produced a flow this quarter.

3. Were any irregularities found in the data? YES ☒ NO ☐

Wells:

Monitoring well T1-B reported an elevated carbonate concentration of 48 ppm (3.93 standard deviations from the mean of 4.0 ppm) in 2nd quarter 2016. The carbonate concentration was within the established range for 3rd quarter 2016. An elevated concentration for total hardness (12,508 mg/l) was reported the 4th quarter of 2016. All required parameters were within their historic ranges for 1st quarter 2017. An elevated concentration for D-K was reported 2nd quarter 2017.

Kemmerer-L reported an elevated field conductivity value 4.91 standard deviations from the mean (2,640 umhos/cm versus 1,034.48 umhos/cm) 3rd quarter 2016. Field conductivity was again reported very high (2.75 standard deviations outside the mean) 4th quarter of 2016. Field conductivity for 1st quarter 2017 was reported within historic range; however, an elevated concentration for D-K was reported. D-K remained high for 2nd quarter 2017. Additionally, a slightly elevated concentration for D-Mg was reported 2nd quarter 2017.

SM1-3 reported reductions in concentration for total hardness, dissolved magnesium and dissolved sodium 1st quarter 2016. These concentrations were within normal ranges for 2nd quarter 2016. An increased concentration for D-Fe was reported 3rd quarter 2016 (2.08 standard deviations from the mean of 131.97 ppm with a reported concentration of 421.31 ppm). Several parameters reported increased concentrations for 4th quarter 2016: D-Na, D-K, D-Fe and SO4. Total hardness was slightly lower than the average of the data set with a reported concentration of 489 mg/l (mean of 7,923.18 mg/l) for 4th quarter 2016. 1st quarter 2017 reported a highly elevated D-K concentration and a slightly elevated value for D-Na. The trend continued into 2nd quarter 2017 for D-K and D-Na. It's unclear what has caused the spikes in concentration for D-K and D-NA in the last two quarters (i.e. 4th quarter 2016, 1st quarter 2017 and 2nd quarter 2017).

Monitoring well H-U had steadily reported declines in water elevation. However; a significant increase in water level occurred with a reported depth to water of 115.4' (a reduction in depth of 132.9') during the 3rd quarter of 2016. It's unclear what caused such a dramatic change in water level. A reported depth of 115.3' was reported for 4th quarter 2016. The water level held steady for the 1st quarter of 2017 with a reported depth of 115.3'.

The water level for RDA-2 was 2.02 standard deviations from the mean for 1st quarter 2017. The reported water level for 2nd quarter 2017 was within normal range. The D-K concentration was slightly elevated. Field conductivity was slightly lower in 2nd quarter 2017.

Monitoring well RDA-4 reported an elevated D-K concentration 2nd quarter 2017 as well as a slightly reduced field conductivity value.

Monitoring well RDA-6 reported an elevated concentration for D-K for 1st quarter 2017 (9.99 standard deviations from the mean). The reported depth for 2nd quarter 2017 was

2.07 standard deviations from the mean. The reported depth was 22.8' (15.51 mean).

Monitoring well TP-U (which could not be accessed 4th quarter 2016) reported elevated concentrations for Cl, SO4, total hardness, TDS, field conductivity, D-Ca, D-K, D-Na and bicarbonate 1st quarter 2017. The trend continued in 2nd quarter 2017 with elevated values for Cl, SO4, TDS, D-Ca, D-K, D-Na and bicarbonate.

A lower temperature reading was reported for the Emery #1 well. A temperature of 12.4 degrees C was reported for 4th quarter 2016. A reduced temperature reading was again reported 1st quarter 2017 as well as an elevated D-K concentration. An elevated D-K concentration was reported again in 2nd quarter 2017. A reduction in D-Mg was reported for 2nd quarter. Slightly elevated field pH was also reported 2nd quarter 2017.

Springs/Streams:

Spring SP-10 elevated concentrations for lab specific conductance and field conductivity during the 2nd quarter of 2016. The concentrations were reported within the historic data range for 3rd quarter 2016. No flow was observed 4th quarter of 2016 or 1st quarter 2017. SP-10 reported a flow of 493 gpm 2nd quarter 2017. A reduction in concentration was reported for D-Mg and T-Alkalinity 2nd quarter 2017. Increased concentrations were reported for field pH and acidity.

Surface water monitoring site SWMS-1A reported relative high concentration increases for T-Fe, T-Ca, T-Mg, TSS and D-Ca the 3rd quarter of 2016. An elevated concentration for T-Ca was reported for the 1st quarter of 2017. Slightly elevated acidity was reported the 2nd quarter of 2017.

Surface water monitoring site SWMS-2 reported elevated concentrations for TDS, T-Ca, D-Ca, D-K and bicarbonate (CaCO3) for 4th quarter 2016. First quarter 2017 reported elevated concentrations for T-Ca and TSS. Elevated concentrations for T-K and D-K were reported 2nd quarter 2017. Settleable solids and T-Ca returned to within historic ranges 2nd quarter 2017.

Surface water monitoring site SWMS-3 reported an elevated temperature reading of 25.5 degrees C (average 8.90 degrees C) for the 2nd quarter of 2016. The temperature reading for 3rd quarter returned to within normal range. However; elevated concentrations were reported for T-Fe, T-Ca, T-K and TSS in the 3rd quarter of 2016. All elevated concentrations returned to within historic ranges for 4th quarter 2016. First quarter 2017 reported elevated concentrations for T-Mn, T-Ca, TSS and bicarbonate. Only acidity was reported outside of two standard deviations the 2nd quarter of 2017.

Surface water monitoring site SWMS-4 reported an elevated temperature reading of 25.2 degrees C (average 9.28 degrees C) for the 2nd quarter of 2016. The temperature reading for 3rd quarter returned to within normal range. However; elevated concentrations were reported for T-Fe, T-Ca and T-Mg during 3rd quarter 2016. No parameters were reported outside of historic ranges for 4th quarter 2016 or 1st quarter 2017. An elevated acidity

concentration was reported 2nd quarter 2017.

Surface water monitoring sites SWMS-5 reported elevated temperature readings for the 2nd quarter of 2016. The temperature reading for 3rd quarter returned to within normal range. Elevated concentrations were reported for T-Ca and D-Ca for 3rd quarter 2016. Several parameters produced fairly high concentrations, namely Cl, T-Ca, T-Mg, T-K, T-Na, D-Ca, D-K and bicarbonate for 4th quarter 2016. Elevated concentrations for settable solids, T-Ca and TSS were reported the 1st quarter of 2017. 2nd quarter 2017 reported spikes in concentration for T-Ca, T-Mg, T-K, D-Ca, D-K and acidity.

Surface water monitoring site SWMS-9 reported several parameters during the 1st quarter of 2016 that were slightly outside of two standard deviations from the mean. Concentrations for chloride, sulfate, TDS, total cations, total anions and total magnesium noted slightly elevated values. SWMS-9 did not report a flow for the 2nd, 3rd or 4th quarter of 2016 or 1st and 2nd quarter 2017.

4. On what date does the MRP require a five-year re-sampling of baseline water data.

There is no commitment in the MRP to resample for baseline parameters.

5. Based on your review, what further actions, if any, do you recommend?

The Permittee needs to submit a revised Table VI-17 to show the on-going monitoring at well T1-B. Monitoring well T1-B was inadvertently removed during the revision to the ground water monitoring program as a result of impacted wells. However; monitoring well T1-B is still required for quarterly water quality monitoring.

6. Does the Mine Operator need to submit more information to fulfill this quarter's monitoring requirements?

YES ☐ **NO** ☒