

WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

March 26th, 2019

TO: Internal File

FROM: Steve Christensen, Environmental Scientist



RE: 3rd Quarter 2018 Water Monitoring, West Ridge Resources, West Ridge Mine, Task ID #5803

The West Ridge Mine is currently in-active in the Book Cliff Mountain range of Carbon County, UT. Water monitoring data is submitted quarterly to the Division EDI database. Beginning on page 7-36 of the approved Mining and Reclamation Plan (MRP), water monitoring protocols and sampling requirements are provided for surface water, ground water, monitoring wells and UPDES outfalls in Tables 7-1, 7-2, 7-3 and 7-4 respectively.

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

Springs

The approved MRP outlines the monitoring of 8 springs (SP-8, SP-12, SP-13, SP-101, SP-102, Road Spring, Section 5 Spring and SP-80). Two of the monitored springs (SP-12 and SP-13) discharge from the lower slopes of West Ridge in Whitmore Canyon. Spring SP-8 discharges in the upper drainage of C Canyon. Hanging Rock Spring (S-80) is located near the northwest corner of the permit area and discharges from the east slopes of Whitmore Canyon.

Spring monitoring sites Section 5, SP-102, SP-12 and SP-13 reported a measurable flow. Road Spring, SP-80, SP-101 and SP-8 did not report a measurable flow this quarter.

Streams

The approved MRP outlines the monitoring of nine stream sites (ST-3, ST-6, ST-8, ST-15, Patterfore, LF-1, LF-2, RF-1 and RF-2).

Grassy Trail Creek is the only intermittent/perennial stream in the permit and adjacent areas. The upper drainages of Grassy Trail Creek (i.e. the Left and Right Fork) are monitored quarterly. Four monitoring sites have been established on the Left Fork (LF-1, LF-2, ST-3 and ST-15). Monitoring sites LF-1 and LF-2 are flume sites where continuous monitoring data is obtained during mid- to high-flow periods. During the late summer months, the flows of the Left and Right Forks of Whitmore Canyon decrease to a volume that cannot be measured accurately by the flumes. Site ST-15 monitors flow from the Spring Canyon drainage (tributary to the Left Fork).

Three monitoring sites have been established on the Right Fork (RF-1, RF-2 and Patterfore Stream). RF-1 and RF-2 are flume sites where continuous monitoring data is obtained during mid- to high-flow periods. The Patterfore Stream is a tributary to the Right Fork and was established as a monitoring site in the spring of 2011 in order to obtain additional data on the Right Fork drainage.

Continuous flow readings on the Left and Right Forks of Whitmore Canyon (LF-1, LF-2, RF-1 and RF-2) are typically not possible to obtain during the 1st and 4th quarters of the year due flow volumes below the accuracy of the flumes and/or due to the inability to access the site due to snow conditions. Flows are typically obtained during the high-flow (late spring/early summer months i.e. 2nd quarter) and during the summer (3rd quarter) when flows are of sufficient volume to produce an accurate measurement (given the limitations of the flume).

Stream sites ST-15, ST-6, ST-3, Patterfore, LF-2 and ST-8 did not produce a measurable for 3rd quarter 2018. Data was submitted for the streams that did produce a measurable flow (RF-1, RF-2 and LF-1). Stream monitoring sites RF-1, RF-2, LF-1 and LF-2 produced a measurable flow for 2nd quarter 2018.

Wells

Quarterly operational sampling is required for one groundwater-monitoring well (Site DH 86-2). Data for monitoring well DH 86-2 was submitted by the Permittee.

Underground Mine-Water Sample (UG-1)

As mining has ceased, the pumps and water treatment are no longer operational. Access to the underground mine works were sealed off with the temporary cessation of mining activity in 1st quarter 2016.

UPDES

Operational sampling is required monthly for two active UPDES sites (Permit # UT0025640). Site D001 is the mine sites primary sediment pond discharge to the ephemeral ‘C’ Canyon drainage. Site D002 is the mine-water discharge to the ephemeral ‘C’ Canyon drainage.

Specific limitations and self-monitoring requirements as outlined in the UPDES permit are presented in the table below:

Effluent Characteristics	Effluent Limitations
Flow, MGD (million gallons per day)	1.0
Total Suspended Solids (TSS), ppm	70
Total Iron, ppm	1.0
Oil & Grease, ppm	10
Total Dissolved Solids (TDS), ppm	2,000
pH	9

None of the outfalls reported a discharge this quarter. As mining has ceased at the mine, the Permittee is no longer pumping water from the mine.

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

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

Springs

Road Spring had a slightly elevated field conductivity reading 2nd quarter 2017. No flow was reported for 3rd and 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. No observable flow was reported for 2nd quarter 2018.

Section 5 spring reported reduced concentrations for D-Mg, D-Na, Cl, total hardness and TDS 2nd quarter of 2017. A reduced concentration for TDS was reported for 3rd quarter 2017. An elevated flow was reported that was 9.99 standard deviations from the mean. A flow of 300 gpm was reported. The average flow is 2.35 gpm. All reported concentrations were within the historic range for 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. All reported concentrations were within the historic range for 2nd quarter 2018. An elevated temperature reading was reported for 3rd quarter 2018.

Spring SP-101 had a slightly elevated D-K concentration of 2.88 ppm (average 1.71 ppm) 2nd quarter 2017. The trend continued with a reported D-K concentration of 3.2 ppm for 3rd quarter 2017 (5.52 standard deviations from the mean of 1.71 ppm). No observable flow was reported for 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. No observable flow was reported for 2nd quarter 2018.

Spring SP-102 reported a slightly elevated concentration of D-K for 3rd quarter 2017. All reported concentrations were within the historic range for 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. An elevated water temperature reading was reported for both 2nd and 3rd quarter 2018.

SP-12 reported increased concentrations outside two standard deviations from the mean for: water temperature and flow. However; reduced concentrations were reported for D-Mg, D-Na, SO₄, total alkalinity, total hardness, TDS, bicarbonate, total cations and total anions in 2nd quarter 2017. In 3rd quarter 2017, elevated values were reported for flow and D-K. Reductions were reported in the 3rd quarter for D-Mg, D-Na, total alkalinity, TDS, bicarbonate as well as total cations/anions. SP-12 reported a large spike in flow with a reading of 6 gpm for 4th quarter 2017. The average flow is 0.86 gpm. An increase in D-Ca was reported for 4th quarter 2017. Reduced concentrations for D-Mg and D-Na were reported for 4th quarter 2017. A slightly elevated D-K concentration was reported for 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. Slightly elevated readings were reported for water temperature and D-Ca for 2nd quarter 2018. An elevated temperature reading was reported for 3rd quarter 2018.

Spring SP-13 reported a slightly elevated concentration for D-K in 3rd quarter 2017. All reported concentrations were within the historic range for 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. An elevated D-K concentration was produced

2nd quarter 2018 (2.79 ppm reported, mean of 1.97 ppm).

Spring SP-8 reported an elevated concentration for D-K of 10.36 ppm (mean 4.03 ppm) in 2nd quarter 2017. The trend continued in the 3rd quarter with an elevated D-K concentration that was 5.73 standard deviations from the mean. The reported concentration was 8.49 ppm. The average is 4.03 ppm. No observable flow as reported for 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. No observable flow was reported for 2nd or 3rd quarter 2018.

Streams

During the 2nd quarter of 2017, Patterfore Stream reported a large flow volume of 8,920 gpm. The average is 142.11 gpm. A slightly reduced D-Na concentration of 21.55 ppm was also reported (26.42 ppm average) for 2nd quarter. A slightly elevated TSS concentration was reported for 3rd quarter 2017. All reported parameters for 4th quarter 2017 were within the established historic range. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. No observable flow was reported 2nd and 3rd quarter 2018.

RF-1 reported a significantly high flow of 8,900 gpm (average of 877.82 gpm) as well as reduced concentrations for D-Ca, D-MG, D-Na, SO₄, total hardness, TDS and total cations in the 2nd quarter of 2017. Parameters were reported within historic ranges for 3rd and 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. A reduced field dissolved oxygen reading was reported for 2nd and 3rd quarter 2018.

RF-2 reported a significantly high flow of 8,920 gpm (average of 1,333.38 gpm) as well as reduced concentrations for D-Mg, D-Na, SO₄ total hardness and total cations in 2nd quarter 2017. Parameters were reported within historic ranges for 3rd and 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. A reduced field dissolved oxygen reading was reported for 2nd quarter 2018. Field DO returned to its normal range for 3rd quarter 2018; however, a slightly elevated temperature reading was reported.

LF-1 reported a flow of 2,150 gpm (206.63 gpm average) as well as reduced concentrations for D-Mg, D-Na, SO₄, total hardness, TDS and total cations in 2nd quarter 2017. In 3rd quarter 2017, a flow of 510 gpm was reported. The average flow is 206.63 pm. Reductions in D-Mg, D-Na and SO₄ were also reported for 3rd quarter 2017. All reported parameters for 4th quarter 2017 were within the established historic range. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. All reported concentrations were within the historic range for 2nd quarter 2018. A slightly reduced value was reported for field conductivity 3rd quarter 2018.

LF-2 reported a flow of 1,382 gpm (89.72 average) in 2nd quarter 2017. No observable flow was reported for LF-2. All reported parameters for 4th quarter 2017 were within the established historic range. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. No observable flow was observed at the time the Permittee went to sample the site. Based on the flume data provided, it appears that the flow at LF-2 went below the detection level of the flume in approximately in early May. No observable flow was reported for 3rd quarter 2018.

ST-3 had elevated concentrations for D-Ca, D-Mg and D-Na in 2nd quarter 2017. No observable

flow was reported for 3rd and 4th quarter 2017. The site could not be accessed during the 1st quarter of 2018 due to snow conditions. No observable flow was reported for 2nd and 3rd quarter 2018.

The Permittee provided the flume flow data for both the Left and Right Forks of Whitmore Canyon (LF-1, LF-2 and RF-1 and RF-2).

Surface water monitoring site ST-6 has not recorded a flow since January of 2016. The reason for that is that this location is in C' Canyon directly below the mine site. As mining activity has ceased, so has the mine water discharge that would produce a measurable flow at this location.

Monitoring Well

Monitoring well DH 86-2 reported a slightly elevated concentration for dissolved potassium (D-K) in the 1st quarter of 2018. The reported concentration (20.44 ppm) was 2.24 standard deviations from the mean (12.00 ppm). D-K was slightly elevated again in the 2nd quarter of 2018. The reported value of 31.4 ppm is 2.49 standard deviations from the mean of 12.0 ppm. An elevated temperature and acidity concentration was reported for 3rd quarter 2018.

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

On page 7-36 of the approved MRP, the Permittee commits to collecting baseline samples “from each spring in the monitoring program during the low flow (fall) sampling and from each stream monitoring sites during low flow every five years beginning with the first mid-term review.”

Baseline sampling of ground and surface water sites will be required during the 3rd quarter of 2021.

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

NA

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

YES NO

7. Follow-up from last quarter, if necessary.

YES NO