

# WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

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June 28<sup>th</sup>, 2017

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: Steve Christensen, Environmental Scientist



RE: 2016 4<sup>th</sup> Quarter Water Monitoring, West Ridge Resources, West Ridge Mine, Task ID #5395

The West Ridge Mine is currently operational 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-0102, 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.

Springs SP-80, SP-101, SP-102, SP-8 and Road Spring did not produce a measurable flow this quarter. Section 5 spring, SP-12 and SP-13 did produce a flow and were sampled for laboratory analysis.

## 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 1<sup>st</sup> and 4<sup>th</sup> quarters of the year due to 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. 2<sup>nd</sup> quarter) and during the summer (3<sup>rd</sup> quarter) when flows are of sufficient volume to produce an accurate measurement (given the limitations of the flume).

Stream monitoring sites ST-15, ST-3, LF-2, ST-6 and ST-8 did not produce a measurable flow for 4<sup>th</sup> quarter 2016. Data was provided for Patterfore Stream, RF-1, RF-2 and LF-1.

## Wells

Quarterly operational sampling is required for one groundwater-monitoring well (Site DH 86-2). Monitoring well DH 86-2 was sampled during this quarter.

## Underground Mine-Water Sample (UG-1)

The underground mine-water sampling point was not accessible during March the 1<sup>st</sup> quarter of 2016. Zero flow was reported for 2<sup>nd</sup> and 3<sup>rd</sup> quarter 2016. As mining has ceased, the pumps and water treatment are no longer operational.

## 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

Due to issues associated with the Division's database as well as the laboratory conducting the analysis, the data for the spring, stream and well monitoring points that produced measurable flows could not be uploaded to the water quality database. However; the Permittee provided the laboratory analytical reports for the aforementioned spring monitoring sites thus providing evidence that the required sampling was conducted and the required parameters sampled for.

Once the database issues are resolved, the following monitoring sites will have their 4<sup>th</sup> quarter 2016 data uploaded into the Division's water quality database:

Spring Monitoring Sites: SP-12, SP-13 and Section 5 spring.

Stream Monitoring Sites: Patterfore Stream, RF-1, RF-2 and LF-1.

Monitoring Well: DH 86-2

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

Analysis of the data for the spring, stream and well monitoring sites was not possible for 4<sup>th</sup> quarter 2016. For reasons discussed above relative to the database, it was not possible to bring the data into the system for analysis. Once the database issues have been resolved, the sites can be uploaded and will be analyzed/reported with the 1<sup>st</sup> quarter of 2017 data.

#### **Surface Water Monitoring Sites-**

Patterfore Stream reported a reduced concentration for both D-Na and SO<sub>4</sub>. RF-1 reported a percent difference between cations and anions outside of two standard deviations from the mean. RF-2 reported reduced concentrations for D-Ca, T-Hardness and T-Cations. LF-1 could not be accessed the 1<sup>st</sup> quarter of 2016 due to snow conditions. Reduced concentrations for D-Mg, D-Na, SO<sub>4</sub>, and T-Cations were reported the 2<sup>nd</sup> quarter of 2016. The aforementioned parameters for LF-1 returned to within historic ranges the 3<sup>rd</sup> quarter of 2016. LF-2 reported an elevated TSS concentration for the 2<sup>nd</sup> quarter of 2016 (65 ppm versus the mean of 18.60 ppm). During the 3<sup>rd</sup> quarter of 2016, LF-2 reported reduced concentrations for D-Ca, Total Alkalinity, Total Hardness and bicarbonate. A slightly elevated D-K concentration was reported for 3<sup>rd</sup> quarter 2016.

#### **UPDES Sites- (UPDES Permit #UT0025640)**

Neither of the two UPDES sites reported a flow each month for 4<sup>th</sup> quarter 2016.

## **Spring Monitoring Sites**

The Section 5 spring has reported a higher than normal flow value for the first three quarters of 2015. A reported flow of 14 gpm was reported (3.69 standard deviations from the average of 2.35 gpm) during the 4<sup>th</sup> quarter of 2015. The site could not be accessed during the 1<sup>st</sup> quarter of 2016. Section 5 spring reported reduced concentrations for D-Mg, D-K, D-Na, Cl and TDS. A flow of 200 gpm was reported which is 10 standard deviations from the mean of 2.35 gpm was reported for 2<sup>nd</sup> quarter 2016. An elevated flow was again reported for the 3<sup>rd</sup> quarter of 2016 (230 gpm versus average of 2.35 gpm). Additionally, reduced concentrations for D-Mg, D-Na and TDS were reported.

Spring SP-101 reported an elevated temperature reading the 2<sup>nd</sup> quarter of 2016. An elevated temperature was again recorded the 3<sup>rd</sup> quarter of 2016 (14.4 degrees C versus the average of 8.89 degrees C).

Spring monitoring site SP-102 recorded an elevated temperature reading the 2<sup>nd</sup> quarter of 2016. Temperature was again elevated for the 3<sup>rd</sup> quarter of 2016. A reduction in field pH was reported along with an elevated bicarbonate concentration (2.11 standard deviations from the mean).

Spring monitoring site SP-8 reported a reduced concentration for dissolved calcium (46.31 ppm versus the average of 75.40 ppm) during the 3<sup>rd</sup> quarter of 2015. SP-8 could not be accessed during the 3<sup>rd</sup> or 4<sup>th</sup> quarter of 2015 and the 1<sup>st</sup> quarter of 2016. A slightly elevated concentration for D-K was reported the 2<sup>nd</sup> quarter of 2016. An elevated concentration for D-K was again reported the 3<sup>rd</sup> quarter of 2016. .

Spring monitoring site SP-12 reported reduced concentrations for numerous parameters for the 3<sup>rd</sup> quarter of 2015 (dissolved magnesium, dissolved sodium, total alkalinity, bicarbonate and total anions). The site could not be accessed during the 4<sup>th</sup> quarter of 2015 or the 1<sup>st</sup> quarter of 2016 due to snow and ice conditions. During the 2<sup>nd</sup> quarter of 2016, SP-12 reported a significant increase in flow (250 gpm versus the average of 0.86 gpm). Additionally, reduced concentrations were reported for D-Mg, D-Na, SO<sub>4</sub>, total alkalinity, total hardness, TDS, bicarbonate and total cations/anions the 2<sup>nd</sup> quarter of 2016. During the 3<sup>rd</sup> quarter, elevated flow was again reported, but not by as significant a margin as the previous quarter (3.5 gpm versus the average 0.86 pm). Reductions in concentration were reported for field pH, D-Mg, D-Na, total alkalinity, bicarbonate, total cations/anions. A slightly elevated concentration was reported for water temperature and D-K.

## **Monitoring Well DH 86-2**

Monitoring well DH 86-2 did not report any water quality parameters outside two standard deviations from the mean the 2<sup>nd</sup> quarter of 2016. A slightly elevated temperature reading was reported the 3<sup>rd</sup> quarter of 2016.

## **Underground pre-treatment mine water sample (UG-1)**

The reported field dissolved oxygen reading was slightly elevated for the month of November 2015. An elevated field dissolved oxygen reading was again reported the 1<sup>st</sup> quarter of 2016. The reported value of 6.7 mg/L is 2.82 standard deviations from the mean of 2.92 mg/L. No observable

flow was reported for all of 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarter of 2016 as the in-mine water is no longer being pumped to the surface and access to the mine is not possible.

**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 3<sup>rd</sup> quarter of 2016.

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

Continue to monitor the data irregularities cited above for any trends.

**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

Once the database issues are resolved, the following monitoring sites will have their 4<sup>th</sup> quarter 2016 data uploaded into the Division’s water quality database and analyzed:

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Stream Monitoring Sites: Patterfore Stream, RF-1, RF-2 and LF-1.

Monitoring Well: DH 86-2

