WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

June 25, 2020

TO: Internal File

THRU: Steve Christensen, Coal Program Manager

FROM: Amanda Daniels, Environmental Scientist

RE: 4th Quarter 2019 Water Monitoring, Genwal Resources, Inc., Crandall Canyon Mine, C/015/0032 Task ID #6102

Water monitoring requirements for the Crandall Canyon Mine can be found in Sections 7.31.21, *Ground Water Monitoring Plan* and 7.31.22, *Surface Water Monitoring Plan.* Additional information can be found in Tables 7-4, 7-5, 7-8, 7-9 and 7-10.

Water encountered during mining operations was pumped to the portals and discharged to Crandall Creek under UPDES Permit No. UTU0024368. Discharges to Crandall Creek were within the limitations established by the permit with rare exceptions. Prior to 2008 only one sample reported an iron concentration greater than 1 mg/L (July 26, 2004 -1.08 mg/L). UPDES Permit No. UTU002438 was renewed on May 1, 2011 with a total iron maximum daily effluent limitation of 1.24 mg/L.

Following the mine collapse in August 2007, the pumps were removed from the mine and discharge ceased temporarily. From September 2007 through December 2007 water pooled within the mine, flooding the underground workings. In January 2008 the mine began discharging by gravity flow and has been discharging continuously since. The temporary seals placed in the portals following the collapse required modification to control the mine water discharge. Iron concentrations in the mine water discharge occasionally exceeded 1 mg/L from January to November 2008; and have been greater than 1 mg/L continuously since December 2008. Construction of a mine water treatment system began in December 2009 and was approved by the Division in January of 2010.

Since April of 2010, the mine water treatment system has proven effective in reducing total iron concentrations to within the 1.24 mg/L UPDES limit. Additionally, the Permittee began sampling the pre-treatment raw mine water (Pre 002) in April of 2010. The sampling of the raw mine water is conducted in an effort to monitor changes in mine water chemistry that might indicate what (if any) changes are occurring to the iron concentrations.

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

Springs

The approved MRP requires the monitoring of 24 springs each quarter. Of these 24 springs, 9 require laboratory water quality analysis (See Table 7-4). The remaining 15 springs require quarterly monitoring of field parameters (flow, pH, specific conductance and temperature).

The data was submitted as required.

Streams

The approved MRP requires the monitoring of 12 surface water/stream sites. Of these 12 surface water/stream sites, 9 require laboratory water quality analysis (See Table 7-8). The remaining 3 sites require quarterly monitoring of field parameters (flow, pH, specific conductance, temperature and dissolved oxygen).

The data was submitted as required.

Wells

The approved MRP outlines monitoring of 7 in mine wells. According to Table 7-4, all 7 wells required quarterly laboratory water quality analysis. However, due to the mine disaster on August 6th, 2007, the active mine-workings have been sealed thus rendering the wells inaccessible.

UPDES

The UPDES Permit/MRP (UT000024368) requires monthly monitoring of 2 outfalls: 001 and 002. Outfall 001 is associated with the discharge from the primary sediment pond at the main mine facility. Outfall 002 is associated with the mine-water discharge that reports directly to Crandall Creek.

The data was submitted as required.

Pre-Treatment Mine Water Discharge

As part of the permitting process for the mine-water treatment system (Appendix 7-65), the Permittee has committed to monthly sampling of the pre-treatment mine water discharge for the following parameters:

- Iron (total, dissolved and ferrous)
- Manganese (total and dissolved)
- Aluminum (total and dissolved)
- Alkalinity (bicarbonate, carbonate, total)
- Sulfate
- TDS and TSS
- Chloride
- Calcium (Dissolved)
- Potassium (dissolved)
- Sodium (dissolved)
- Magnesium (dissolved)
- Silica (dissolved)
- Hot Acidity
- pH
- Dissolved Oxygen
- Conductivity
- Temperature
- Flow

The required Monthly data was submitted for the pre-treatment mine water discharge and submitted to the EDI.

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

Springs

All required parameters were reported for the surface water monitoring sites that were accessible and produced a measurable flow.

Streams

All required parameters were reported for all surface water monitoring sites that were accessible and produced a measurable flow.

UPDES

Outfall No. 002 discharged continuously throughout the quarter and was sampled as required by the UPDES discharge permit. All required parameters were reported for Outfalls 002. Outfall No. 001 was reported as no flow throughout the quarter.

As part of the approval for the mine-water treatment system (Appendix 7-65), the Permittee committed to obtain additional monthly samples for Outfall 002. The parameters include (T-Fe, D-Fe, FE2+, T-Mn, D-Mn, T-Al, D-Al, Alkalinity, Sulfate, TDS, TSS, and Flow). Concentrations were reported for each of the additional parameters at Outfall 002.

Pre-Treatment Mine Water Discharge

As discussed above, monthly sampling of the Pre-Treatment Mine Water Discharge became a requirement with the approval of the mine-water discharge treatment system. Due to the pipe break in March 2013 the sampling port location was changed and is located in a bend in the pipe 15 feet before the maelstrom unit. The required pre-treatment mine discharge parameters was reported this quarter as required.

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

The following parameters were more than 2 standard deviations from the mean historical values:

Streams

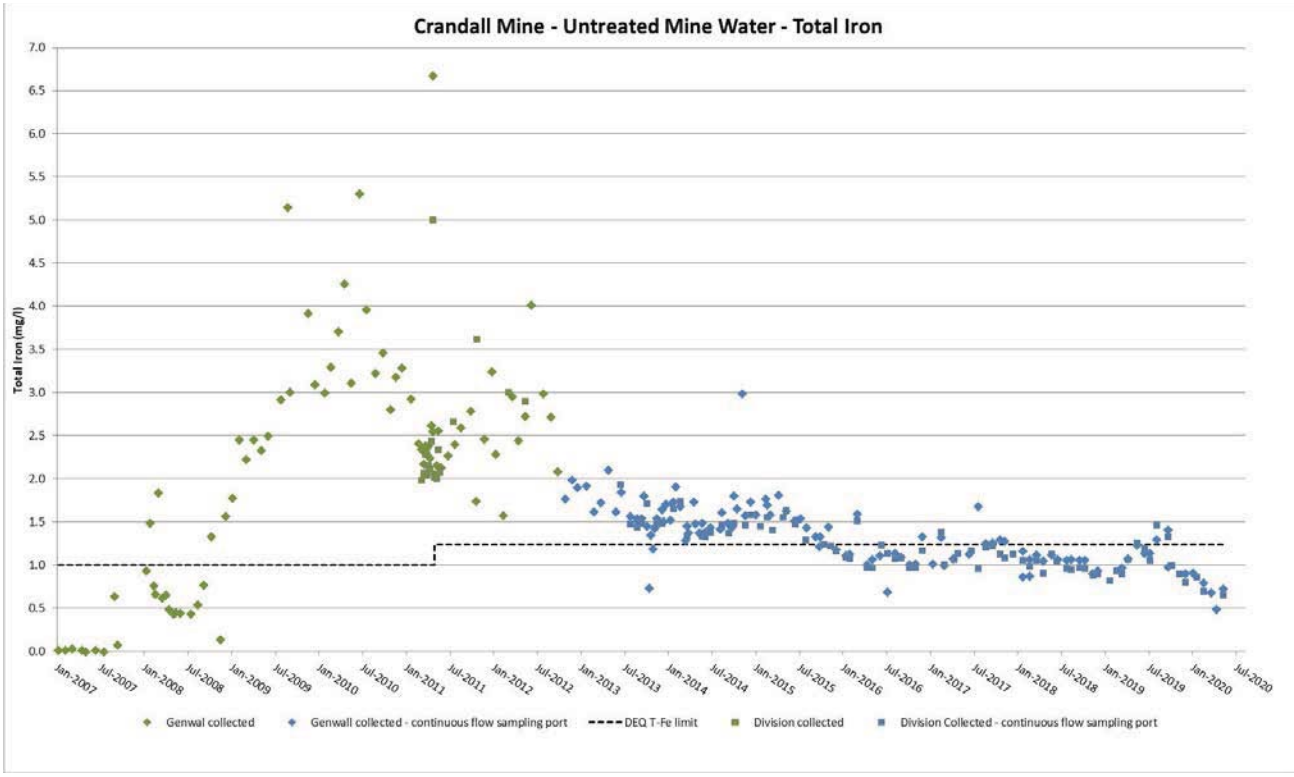
**As the total iron concentrations in the mine-water discharge began to increase, a concern was that a similar rise would be observed in stream monitoring site LOF-1 (lower Crandall Canyon flume). An upward trend of total iron began to surface the second quarter of 2008 in correspondence with the increase in iron concentrations of the mine-water discharge. A total iron concentration of 1.479 mg/L was reported the Fourth Quarter of 2009. Once the mine-water treatment system became operational during the First Quarter of 2010, the iron concentrations detected at LOF-1 have dropped significantly. The total iron concentration for LOF-1 this quarter was 0.15 mg/L.

UPDES Sites (001 and 002)

Based upon three sampling events, Outfall 002 reported an average flow value of 265 gpm. The total iron concentrations of the water discharging from the mine-water treatment basin were within the 1.24 mg/L standard established by the UPDES permit.

Pre-Treatment Mine Water Discharge

The total iron concentrations in the pre-treatment mine water for 4th quarter 2019 were compliant to the 1.24 mg/L UPDES limit. The three Genwal sampling events for this quarter in October, November, and December yielded total iron concentrations of 0.98, 1.05, and 0.9 mg/L, respectively. The graph provided below displays total iron trends.



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

Page 7-33 of the MRP states that groundwater samples collected during the low flow period (typically the 4th quarter) every 5 years will be analyzed for baseline parameters (See Tables 7-5). Baseline sampling was conducted during the First Quarter of 2016. The next sampling event will be the First Quarter of 2021.

Page 7-35 of the MRP states that surface water samples collected during the low flow period every 5 years will be analyzed for baseline parameters (See Table 7-9). The Fourth Quarter of 2020 will be the next sampling event where baseline data will be required.

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

Continued monitoring of the mine-water discharge is necessary to evaluate the need for any future

treatment of the discharge. Therefore, it is critical to submit timely sampling results for pre-treatment (Pre-002) and Outfall 002 to DOGM, as required by Appendix 7-65.