

WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

December 31, 2014

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: Steve Christensen, Environmental Scientist 

RE: 2014 2nd Quarter Water Monitoring, West Ridge Resources, West Ridge Mine, Task ID #4629

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.

Data was submitted for all 8 of the spring monitoring sites. All of them but one (Road Spring) produced a measurable flow.

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). Until the 2nd quarter of 2011, the surface water monitoring plan had included twelve stream monitoring sites; however, an amendment was submitted and approved by the Division (Task ID #3738) in March of 2011 that eliminated five of the sites. The amendment eliminated the monitoring of ST-5, ST-6A, ST-7, ST-11, ST-12 and ST-13. As a result, the monitoring of these stream sites was discontinued the 2nd quarter of 2011.

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.

Data was submitted for all but three of the nine stream monitoring sites. ST-8, ST-15 and LF-2 did not produce a measurable flow this quarter.

Continuous flow readings on the Left and Right Forks of Whitmore Canyon (LF-1, LF-2, RF-1 and RF-2) were submitted for this quarter. 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).

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

Monthly samples of the underground, pre-treatment mine water are required. The requirement was established on August 24th, 2010.

The required monthly samples were submitted for this quarter.

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

Outfall 001 did not report a discharge this quarter. Data was submitted for UPDES Outfall 002.

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

Spring Monitoring Sites: All required data was reported for the spring monitoring sites.

Surface Water Monitoring Sites: Of the stream monitoring sites that had a measurable flow, the required data was submitted to the Division.

Well Monitoring Site DH 86-2: The monitoring well was sampled this quarter. The required data was submitted.

UG-1: All required parameters were reported for underground mine-water monitoring site UG-1.

UPDES: Outfall 001 did not report a discharge this quarter. The required water quality data was reported for Outfall 002 was reported.

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

Surface Water Monitoring Sites-

Patterfore Stream reported a slightly elevated total dissolved solids concentration.

Stream monitoring site LF-1 reported a slightly elevated field conductivity value (2.09 standard deviations from the mean).

For several consecutive quarters, several surface water monitoring sites have been exhibiting fairly significant fluctuations for a numerous parameters: notably surface water monitoring sites ST-3 and ST-6.

In the case of ST-3, there has been a strong upward trend in concentrations for dissolved

magnesium (D-Mg), dissolved sodium (D-Na), sulfate (SO4), total hardness (T-Hdns), total dissolved solids (TDS) and total anions and total cations (T-Cats/T-Anis). Surface water monitoring site ST-3 showed an increase in concentration for numerous parameters for 2nd quarter 2013 (continuing the trend from the last sampling event). The elevated concentrations for the aforementioned parameters continued in the 2nd quarter of 2014.

The data for surface water monitoring site ST-6 has exhibited a wide fluctuation in numerous parameters. In the 2nd quarter of 2012, the data showed a significant drop (well outside 2 standard deviations from the mean) for field conductivity, dissolved calcium (D-Ca), D-Mg, dissolved potassium (D-K), D-Na, Cl, SO4, T-Alk, T-Hdns, TDS, Bcrb, T-Cats and T-Anis. The following quarter (3rd quarter 2012), the data showed elevated concentrations for D-Ca, D-Mg, SO4, T-Alk, T-Hdns, TDS, Bcrb, T-Anis and T-Cats. ST-6 could not be accessed during the 4th quarter of 2012, 1st quarter of 2013 and 2nd quarter 2013. During the 3rd quarter of 2013, the site reported 13 parameters outside of two standard deviations from the mean. Site ST-6 could not be accessed due to snow cover during the 4th quarter of 2013. Numerous parameters were reported at reduced concentrations during the 1st quarter of 2014 (D-Ca, D-Mg, D-K, D-NA, Cl, Sulfate, TDS, Bcrb, CaCO3).

During the 2nd quarter of 2014, stream monitoring site ST-6 produced more reflective concentrations relative to the historical data set. Dissolved calcium was significantly lower than the mean of 72.84 mg/L with a concentration of 35.83 mg/L.

UPDES Sites- (UPDES Permit #UT0025640)

Site D001- UPDES outfall D001 (primary sediment pond at mine site) did not report a discharge this quarter.

Site D002- UPDES Outfall 002 water quality data was obtained each month this quarter. The average flow value for the quarter was 1,973 gpm (see attached graph). All of the reported concentrations were within the established limits of the UPDES permit. The average total iron concentration for the quarter was 0.72 mg/L. Total dissolved solids concentrations averaged 852.3 mg/L (well below the UPDES limit of 2,000 mg/L).

Spring Monitoring Sites

The following data irregularities were identified with the spring monitoring sites during the 3rd quarter of 2013. As access to the spring monitoring sites was not possible for the 4th quarter of 2013 and the 1st quarter of 2014, due to snow-cover, no data was available to determine if the concentrations below were developing a trend.

Site	Type	Date	Parameter	Value	Std. Dev.	Average
SP-101	Spring	9/29/2013	f-cond	433 umhos/cm	4.59	724.18 umhos/cm
SP-101	Spring	9/29/2013	D-Mg	87.38 ppm	7.53	53.55 ppm
SP-101	Spring	9/29/2013	D-K	2.28 ppm	2.37	1.68 ppm
SP-101	Spring	9/29/2013	D-Na	69.82 ppm	9.99	35.45 ppm
SP-101	Spring	9/29/2013	Cl	8 ppm	9.99	2.99 ppm
SP-101	Spring	9/29/2013	SO4	241 ppm	9.99	93.36 ppm
SP-101	Spring	9/29/2013	T-Alk	395 ppm	3.06	343 ppm
SP-101	Spring	9/29/2013	T-Hdns	497 ppm	5.33	365.51 ppm
SP-101	Spring	9/29/2013	TDS	712 ppm	7.9	464.06 ppm
SP-101	Spring	9/29/2013	Bcrb	395 ppm	3.06	343 ppm
SP-101	Spring	9/29/2013	T-Cats	13.02 meq/l	6.21	8.89 meq/l
SP-101	Spring	9/29/2013	T-Anis	13.14 meq/l	3.8	8.89 meq/l
SP-80	Spring	9/27/2013	SO4	182 ppm	2.32	118.84 ppm
SP-80	Spring	9/27/2013	T-Alk	323	3.09	425.94 ppm
SP-80	Spring	9/27/2013	Bcrb	283 ppm	3.47	408.73
SP-102	Spring	9/29/2013	f-cond	488 umhos/cm	3.3	674.65 umhos/cm
SP-102	Spring	9/29/2013	D-Ca	54.57 ppm	9.9	36.13 ppm
SP-102	Spring	9/29/2013	D-Mg	87.23 ppm	9.99	54.58 ppm
SP-102	Spring	9/29/2013	D-Na	69.85 ppm	6.76	43.87 ppm
SP-102	Spring	9/29/2013	Cl	8 ppm	3.07	5.51 ppm
SP-102	Spring	9/29/2013	SO4	240 ppm	9.99	87.19 ppm
SP-102	Spring	9/29/2013	T-Alk	39.2 ppm	7.25	314.29 ppm
SP-102	Spring	9/29/2013	T-Hdns	495 ppm	9.99	315 ppm
SP-102	Spring	9/29/2013	TDS	704 ppm	9.99	426.06 ppm
SP-102	Spring	9/29/2013	Bcrb	392 ppm	7.88	308.24 ppm
SP-102	Spring	9/29/2013	T-Cats	13 meq/l	9.99	8.25 meq/l
SP-102	Spring	9/29/2013	T-Anis	13.07 meq/l	5.67	8.25 meq/l
SP-8	Spring	9/27/2013	f-cond	933 umhos/cm	2.07	1,685.5 umhos/cm
SP-8	Spring	9/27/2013	D-Ca	59.53 ppm	2.32	76.22 ppm
SP-8	Spring	9/27/2013	D-Mg	61.74 ppm	3.93	140.03 ppm
SP-8	Spring	9/27/2013	D-K	1.62 ppm	3.38	4.08 ppm
SP-8	Spring	9/27/2013	D-Na	48.36 ppm	3.18	181.94 ppm
SP-8	Spring	9/27/2013	Cl	6 ppm	2.6	15.64 ppm
SP-8	Spring	9/27/2013	SO4	182 ppm	3.22	542.45 ppm
Site	Type	Date	Parameter	Value	Std. Dev.	Average

SP-8	Spring	9/27/2013	T-Alk	403 ppm	3.3	583.366 ppm
SP-8	Spring	9/27/2013	T-Hdns	403 ppm	3.85	767 ppm
SP-8	Spring	9/27/2013	TDS	560 ppm	3.6	1,328.03 ppm
SP-8	Spring	9/27/2013	Bcrb	292 ppm	2.71	578.78 ppm
SP-8	Spring	9/27/2013	T-Cats	10.19 meq/l	3.66	23.34 meq/l
SP-8	Spring	9/27/2013	T-Anis	10.43 meq/l	3.31	23.36 meq/l

Spring SP-8 had produced reduced concentrations for numerous parameters (see above). SP-8 reported a reduced field conductivity concentration of 905 umhos/cm versus the mean of 1,671.03 umhos/cm. The aforementioned parameters returned to within the established historical range of values.

For the second consecutive quarter, Spring SP-80 has reported an elevated sulfate concentration. However; reduced concentrations were produced for dissolved calcium, total alkalinity and total hardness.

Spring SP-101 and SP-102 produced numerous parameters outside of two standard deviations from the mean in the 3rd quarter of 2013. Dissolved sodium, chloride, sulfate and dissolved magnesium reported concentrations over seven standard deviations from the mean. This quarter, SP-101 reported concentrations much more in line with historical values. However; slightly elevated concentrations for chloride and sulfate were still reported.

SP-102 concentrations were much more within historical ranges. Field conductivity was the only value outside of two standard deviations from the mean with a reduced value of 549 umhos/cm versus the average of 674.65 umhos/cm.

Spring SP-12 reported elevated concentrations for field conductivity and sulfate.

SP-13 reported slightly elevated concentrations for cation/anion difference and field conductivity.

Monitoring Well DH 86-2

Monitoring well DH 86-2 had produced elevated D-K concentrations for the 2nd and 3rd quarter of 2013 quarters. The well was frozen the 4th quarter of 2013 and could not be sampled. The D-K concentration returned to within normal values this quarter.

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

The previous quarter, UG-1 reported several elevated concentrations above two standard deviations from the mean for total alkalinity and bicarbonate. UG-1 reported reduced concentrations for sulfate in April, May and June. However; the total alkalinity concentration for May was again

elevated outside two standard deviations from the mean.

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 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

West Ridge: Mine Water Discharge

