WATER QUALITY
M E M O R A N D U M

Utah Coal Regulatory Program

December 30, 2013

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: Steve Christensen, Environmental Scientist

RE: 2013 1st Quarter Water Monitoring, West Ridge Resources, West Ridge Mine, Task ID #4289

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.

A Division Order was issued to the Permittee on April 3rd, 2012 (due July 2nd, 2012). The Division Order required the Permittee to revise their currently approved Probable Hydrologic Consequences (PHC) section of the Mining and Reclamation Plan (MRP). The PHC amendment was submitted and reviewed by the Division (Task ID # 4143). The amendment was found deficient and returned to the Permittee for additional revisions on September 7th, 2012. The amendment was resubmitted and subsequently approved on March 28th, 2013.

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.

None of the springs could be accessed due to snow/ice conditions.

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 the required stream/surface water monitoring points. Due to access issues as a result of snow cover, the 4 flumes installed on the Left and Right fork drainages of Whitmore Canyon (LF-1, LF-2, RF-1 and RF-2) could not be accessed. Additionally, stream monitoring sites Patterfore, ST-15, ST-3 and ST-8 could not be accessed due to winter conditions. Stream monitoring site ST-6 was sampled this quarter.

Wells

Quarterly operational sampling is required for one groundwater-monitoring well (Site DH 86-2).

Monitoring well DH 86-2 was not sampled during this quarter due to access issues brought on by the snow and ice.

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: *None of the spring monitoring sites could be accessed this quarter.*

Surface Water Monitoring Sites: *Due to access issues as a result of snow cover, the 4 flumes installed on the Left and Right fork drainages of Whitmore Canyon (LF-1, LF-2, RF-1 and RF-2) could not be accessed. Additionally, stream monitoring sites Patterfore, ST-15, ST-3 and ST-8 could not be accessed due to winter conditions. Stream monitoring site ST-6 was sampled this quarter.*

Well Monitoring Site DH 86-2: *The well could not be accessed due to winter conditions.*

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.*

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

Surface Water Monitoring Sites-

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, ST-6 and ST-8. Only ST-6 was accessible this quarter. In the case of ST-3 and ST-8, there has been a strong upward trend in concentrations for dissolved magnesium (D-Mg), dissolved sodium (D-Na), chloride (Cl), sulfate (SO4), total alkalinity (T-Alk), total hardness (T-Hdns), total dissolved solids (TDS), bicarbonate (Bcrb), total anions and total cations (T-Cats/T-Anis) as well as conductivity.

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 2013), the data showed elevated concentrations for D-Ca, D-Mg, SO4, T-Alk, T-Hdns, TDS, Bcrb, T-Anis and T-Cats.

ST-3, ST-6 and ST-8 could not be accessed in the 4th quarter of 2012 due to winter conditions. ST-3 and ST-8 were again not accessible due to winter conditions. However; ST-6 was accessible. Numerous irregularities were noted with the ST-6 data. With the exception of flow, thirteen water quality parameters showed a reduction in concentration outside of two standard deviations from the mean.

The following irregularities were identified for the surface water monitoring sites that were accessible this quarter (i.e. ST-6).

Site	Type	Date	Parameter	Value	Std. Dev.	Average
ST-6	Stream	03/31/2013	f-cond	1,370 umhos/cm	2.39	2,076.05 umhos/cm
ST-6	Stream	03/31/2013	Flow	1,790 gpm	2.14	390.98
ST-6	Stream	03/31/2013	D-Ca	29.95 ppm	2.71	72.84 ppm
ST-6	Stream	03/31/2013	D-Mg	29.56 ppm	2.71	72.84 ppm
Site	**Type**	**Date**	**Parameter**	**Value**	**Std. Dev.**	**Average**
ST-6	Stream	03/31/2013	D-K	5.97 ppm	3.59	11.15 ppm
ST-6	Stream	03/31/2013	D-Na	158.03 ppm	3.16	341.35 ppm
ST-6	Stream	03/31/2013	Cl	20 ppm	2.13	29.00 ppm
ST-6	Stream	03/31/2013	SO4	306 ppm	2.91	699.18 ppm
ST-6	Stream	03/31/2013	T-Alk	204 ppm	4.79	427.29 ppm
ST-6	Stream	03/31/2013	T-Hdns.	197 ppm	3.09	438.75 ppm
ST-6	Stream	03/31/2013	Bicarb	190 ppm	4.78	429.21 ppm
ST-6	Stream	03/31/2013	T-Cats	10.95 meq/l	3.31	23.82 meq/l
ST-6	Stream	03/31/2013	T-Anis	11.01 meq/l	3.45	23.87 meq/l
ST-6	Stream	03/31/2013	TDS	666 ppm	3.25	1,499.97 ppm

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. Flow values continue to rise. The average flow value for the quarter was 1,414.5 gpm.*

During 2nd quarter of 2012, the June 25th sample reported a total iron (T-Fe) concentration of 1.41 ppm. The concentration exceeded the UPDES standard for T-Fe of 1.3 ppm. A non-

compliant T-Fe sample was again obtained on December 12th, 2012 (T-Fe: 1.23 ppm). All of the T-Fe concentrations were within the 1.0 ppm level for this quarter. The Utah Division of Water Quality was alerted to the exceedences for T-Fe.

The following irregularities were identified at Outfall 002 for 4th quarter 2012.

Site	Type	Date	Parameter	Value	Std. Dev.	Average
002	UPDES outfall	10/08/2012	TDS	765 ppm	2.35	1,494 ppm
002	UPDES outfall	11/19/2012	Flow	2,150 ppm	2.23	759.98 ppm
002	UPDES outfall	11/19/2012	f-cond.	1,310 umhos/cm	2.29	2,076.98 umhos/cm
002	UPDES outfall	11/28/2012	TDS	559 ppm	3.01	1,494.8 ppm
002	UPDES outfall	12/12/2012	Flow	2,365 gpm	2.57	759.98 gpm
002	UPDE outfall	12/31/2012	Flow	2,350 gpm	2.55	759.98 gpm
002	UPDES outfall	12/31/2012	f-cond.	1,290 umhos/cm	2.35	2,076.98 umhos/cm

The following irregularities were identified at Outfall 002 for 1st quarter 2013.

Site	Type	Date	Parameter	Value	Std. Dev.	Average
002	UPDES outfall	01/26/2013	Flow	2,100 gpm	2.15	759.98 gpm
002	UPDES outfall	01/31/2013	Flow	2,220 gpm	2.34	759.98 gpm
002	UPDES outfall	01/31/2013	f-cond	1,365 umhos/cm	2.13	2,076.98 umhos/cm
002	UPDES outfall	01/31/2013	TDS	663 ppm	2.68	1,494.80 ppm
002	UPDES outfall	02/25/2013	Flow	2,065 gpm	2.09	759.98 gpm
002	UPDES outfall	02/25/2013	f-cond	1,249 ppm	2.48	2,076.98 ppm
002	UPDES outfall	02/25/2013	TDS	618 ppm	2.82	1,494.80 ppm
002	UPDES outfall	02/26/2013	Flow	2,160 ppm	2.24	759.98 ppm
002	UPDES outfall	02/26/2013	f-cond	1,301 umhos/cm	2.32	2,076 umhos/cm

002	UPDES outfall	03/30/2013	f-cond	1,380 umhos/cm	2.08	2,076.98 umhos/cm
002	UPDES outfall	03/31/2013	TDS	665 ppm	2.67	1,494.80 ppm

Spring Monitoring Sites

The following data irregularities were identified with the spring monitoring sites during the 4th quarter of 2012. The spring monitoring sites could not be accessed this quarter due to snow/wintry conditions.

Site	Type	Date	Parameter	Value	Std. Dev.	Average
SP-101	Spring	12/3/2012	D-Ca	42.18 ppm	3.55	58.41 ppm
SP-101	Spring	12/3/2012	D-Mg	64.64 ppm	2.5	53.35 ppm
SP-101	Spring	12/3/2012	Cl	4 ppm	2.18	2.99 ppm
SP-101	Spring	12/3/2012	SO4	133 ppm	4.49	93.36 ppm
SP-102	Spring	12/3/2012	D-Ca	40.32 ppm	2.72	36.13 ppm
SP-102	Spring	12/3/2012	D-Mg	61.79 ppm	2.72	54.58 ppm
SP-102	Spring	12/3/2012	D-Na	36.02 ppm	2.04	43.87 ppm
SP-102	Spring	12/3/2012	SO4	126 ppm	5.92	87.19 ppm
SP-102	Spring	12/3/2012	T-Alk	290 ppm	2.27	314.29 ppm
SP-102	Spring	12/3/2012	T-Hdns	355 ppm	2.91	315 ppm
SP-13	Spring	12/3/2012	T-Alk	279 ppm	2.02	368.14 ppm
SP-13	Spring	12/3/2012	Bcarb	279 ppm	2.28	389.71 ppm

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.

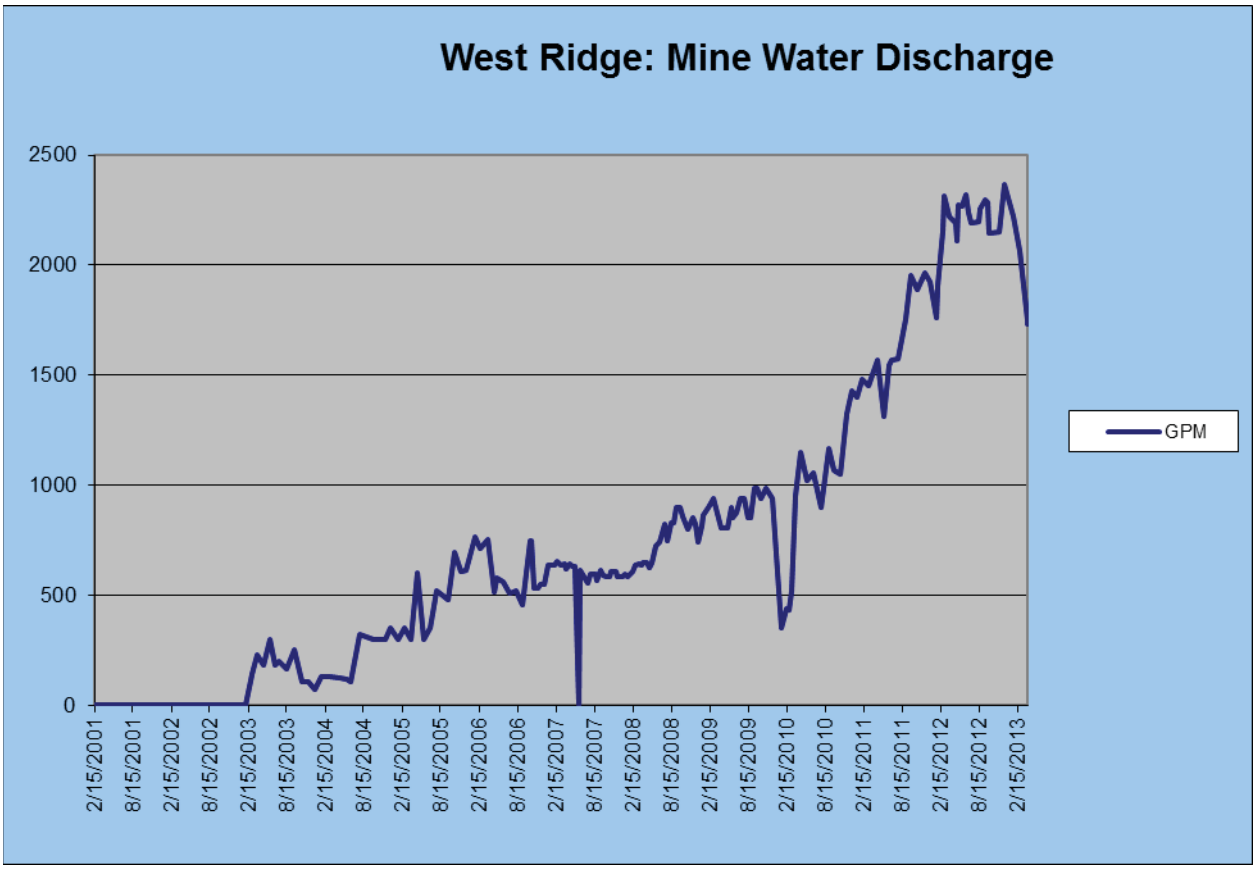
5. Based on your review, what further actions, if any, do you recommend?

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 ☒

The Operator submitted the missing 4th quarter 2012 data for spring monitoring site SP-8. The Operator was alerted to the missing data (via e-mail) on December 18th, 2013.

7. Follow-up from last quarter, if necessary. YES ☐ NO ☒



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