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WATER QUALITY MEMORANDUM
Utah Coal Regulatory Program

April 6, 2010

TO: Internal File

FROM: April A. Abate, Environmental Scientist II aaa 4-7-10

THRU: James D. Smith, Permit Supervisor JDS 7 Apr 2010

SUBJECT: 2009 3rd Quarter Water Monitoring: REVISED REPORT, CW Mining Company, Bear Canyon Mine, C/015/0025, Task ID # 3373

The monitoring plan is described on pages 7-48 through 7-60A of the MRP. It includes Tables 7-12 through 7-17.

1. Were data submitted for all of the MRP required sites?

In-mine YES ☐ NO ☒

A total of four in-mine samples are listed in the Bear Canyon water monitoring plan: SBC-9A, 16-8-8-10, UG-1 and UG-2. Samples UG-1 and UG-2, which represent inflow to Mine #4, do not have any specified sampling protocol in the operational water monitoring plan. Furthermore, UG-1 was last sampled in May 2009 and UG-2 was last sampled in February 2008. Please update the Division as to the status of the Mine #4 inflow monitoring area by providing an update to the water monitoring plan in the MRP.

SBC-9A and Mohrland Portal 16-8-8-10 were sampled during the 3rd quarter. Sample SBC-9A was sampled for operational parameters during the 3rd quarter. Sample 16-8-8-10 was sampled for field parameters only.

Springs YES ☒ NO ☐

Most of the spring samples in and around the Bear Canyon mine are sampled for field or baseline parameters. Springs are monitored for operational parameters on a quarterly basis include: SBC-3 through SBC-5, SBC-14, and SBC-17. Springs that are monitored for baseline parameters include: SBC-16A, SBC-16B, SBC-22, and SMH-5. Springs monitored during the 3rd quarter for field parameters included: SBC-12, SBC-15, SBC-16, SBC-18, SBC-20, SBC-21, SBC-23, SCC-1, SCC-2, SCC-5, and SMH-1 thru 4.

Streams YES ☒ NO ☐

Stream samples BC-1 through BC-4 and CK-1 and CK-2 are monitored for operational parameters in February, May, August, and October and field parameters in June, July and September. Stream samples FC-1 and FC-2 are monitored monthly for field parameters in May/June through August and again in October. FC-3 through FC-8 are monitored for baseline parameters in those same months. MH-1 and MH-2 are monitored for baseline in July, August, and October.

UPDES YES ☒ NO ☐

Five stations are monitored for the Bear Canyon UPDES permit on a monthly basis. All five stations were monitored during the third quarter of 2009.

Discharge point UTG040006-004 - Mine Water to Bear Canyon Creek, was the only sample that yielded flow.

Wells YES ☒ NO ☐

Four wells are monitored for depth to water measurements only from May through October. All four wells were monitored during the 3rd quarter of 2009.

2. **Were all required parameters reported for each site?**

In-mine YES ☒ NO ☐

Springs YES ☒ NO ☐

Streams YES ☒ NO ☐

UPDES YES ☒ NO ☐

Only one location, UPDES sample #004 yielded flow during the 3rd Quarter 2009. This location was monitored semi-monthly, except August 2009.

3. **Were any irregularities found in the data?**

In-mine YES ☐ NO ☒

Springs YES ☐ NO ☒

The following quality control checks were performed on the sample data from the 3rd quarter. Parameters outside of conventional ranges are highlighted in red.

	Reliability Check	Acceptable Range	SBC-14	SBC-15	SBC-16A	SBC-16B	SBC-17	SBC-22	SBC-3	SBC-4	SBC-5	SMH-5
Aug-09	Cation/ Anion Balance	<5%	2	1	0	0	4	1	3	2	3	0
Jul-09	Cation/ Anion Balance	<5%		2	0	-	-	3	-	-	-	1
Aug-09	TDS/Conductivity	>0.55 - <0.75	0.61	-	0.65	0.60	0.65	0.56	1.09	0.67	0.76	0.59
Jul-09	TDS/Conductivity	>0.55 - <0.75	-	-	0.57	0.61	-	0.62	-	-	-	0.66
Aug-09	Conductivity/Cations	>90 - <110	99	-	76	82	98	89	73	-	68	90
Jul-09	Conductivity/Cations	>90 - <110	-	-	81	76	-	80	-	-	-	76
Aug-09	K/(Na + K)	<20%	24%	-	6%	8%	47%	11%	9%	22%	25%	26%
Jul-09	K/(Na + K)	<20%	-	-	8%	11%	-	12%	-	-	-	14%
Aug-09	Mg/(Ca + Mg)	<40%	59%	-	32%	37%	63%	25%	59%	30%	33%	31%
Jul-09	Mg/(Ca + Mg)	<40%	-	-	31%	37%	-	25%	-	-	-	-
Aug-09	Ca/(Ca + SO4)	>50%	16%	-	72%	79%	12%	90%	15%	68%	53%	92%
Jul-09	Ca/(Ca + SO4)	>50%	-	-	74%	82%	-	91%	-	-	-	92%
Aug-09	Na/(Na + Cl)	>50%	53%	-	75%	57%	75%	55%	37%	60%	52%	69%
Jul-09	Na/(Na + Cl)	>50%	-	-	70%	-	-	56%	-	-	-	68%

The most frequent inconsistencies are shown in the conductivity ranges divided by the cation sums. The usual range should equal approximately 100. Conductivity can be analyzed by the laboratory, as well as a measurement collected in the field and used for comparison. The ratio of potassium to sodium also showed elevated levels outside of the standard less than 20%, but only slightly above in most cases. Spring samples SBC-14 and SBC-17 showed the following ratios were outside of acceptable ranges: Potassium: Sodium, Magnesium: Calcium, and Calcium: Sulfate. Spring sample SBC-3 showed the following ratios were outside of acceptable ranges: Magnesium: Calcium, and Calcium: Sulfate, and Sodium: Chloride.

These inconsistencies do not necessary mean something is wrong only that something unusual may be occurring. The Permittee should work with the sampling personnel to assure that all field instruments are properly calibrated. The Permittee should also work with the laboratory to assure that all quality controls are being implemented. Water quality reliability checks are found in Chapter 4: *Water Quality Data: Analysis and Interpretation* by Arthur Hounslow, 1995: Lewis Publishers.

Streams YES ☐ NO ☒

The following quality control checks were performed on the sample data from the 3rd quarter. Parameters outside of conventional ranges are highlighted in red.

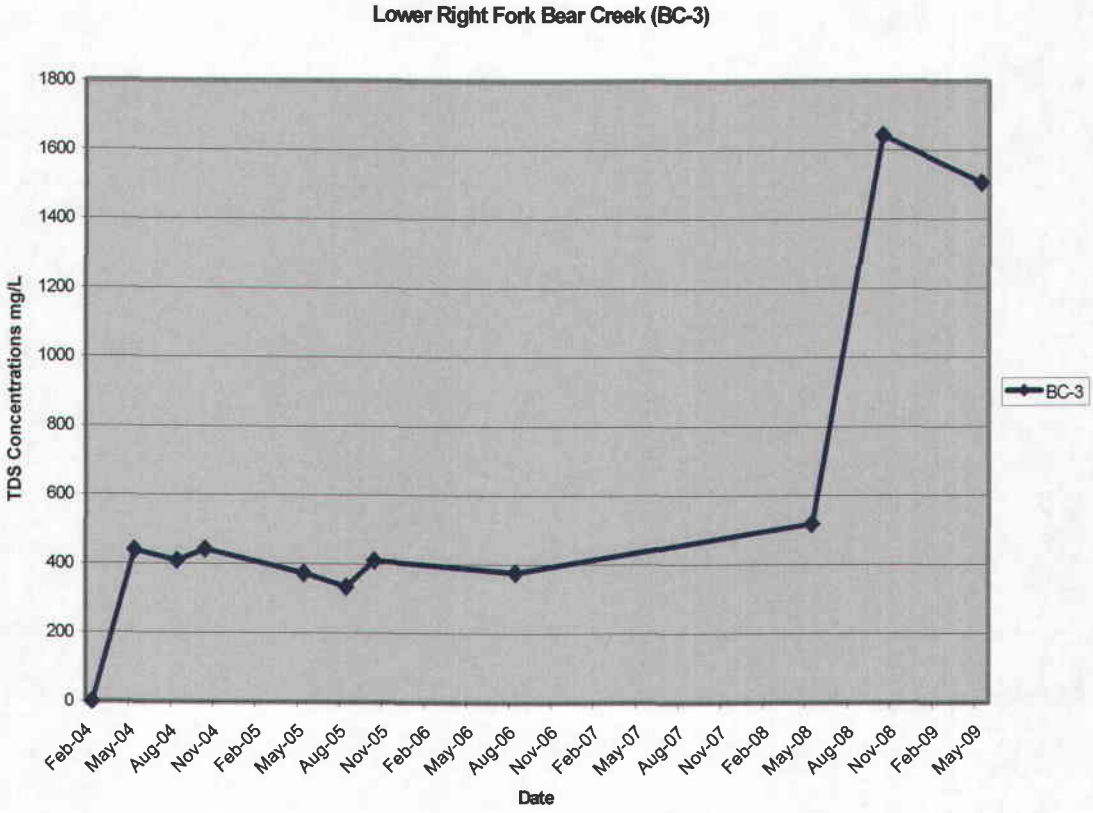
	Reliability Check	Acceptable Range	CK-1	CK-2	FC-4	BC-2	MH-2
Sep-09	Cation/ Anion Balance	<5%	1.44	1.53	1.5	-	2.02
Aug-09	Cation/ Anion Balance	<5%	3.5	2.7	3.8	1.5	1.3
Sep-09	TDS/Conductivity	>0.55 - <0.75	0.80	0.76	0.62	-	0.49
Aug-09	TDS/Conductivity	>0.55 - <0.75	0.91	0.75	0.69	0.77	0.70
Jul-09	TDS/Conductivity	>0.55 - <0.75	-	-	-	-	0.63
Sep-09	Conductivity/Cations	>90 - <110	79	73	82	-	110
Aug-09	Conductivity/Cations	>90 - <110	59	80	73	73	84
Jul-09	Conductivity/Cations	>90 - <110	-	-	-	-	85
Sep-09	K/(Na + K)	<20%	35%	20%	12%	-	47%
Aug-09	K/(Na + K)	<20%	20%	50%	12%	12%	50%
Jul-09	K/(Na + K)	<20%	-	-	-	-	50%
Sep-09	Mg/(Ca + Mg)	<40%	41%	45%	28%	-	19%
Aug-09	Mg/(Ca + Mg)	<40%	47%	42%	28%	51%	18%
Jul-09	Mg/(Ca + Mg)	<40%	-	-	-	-	17%
Sep-09	Ca/(Ca + SO4)	>50%	27%	35%	83%	-	93%
Aug-09	Ca/(Ca + SO4)	>50%	34%	27%	84%	15%	94%
Jul-09	Ca/(Ca + SO4)	>50%	-	-	-	-	93%
Sep-09	Na/(Na + Cl)	>50%	62%	64%	35%	-	48%
Aug-09	Na/(Na + Cl)	>50%	58%	61%	41%	93%	35%
Jul-09	Na/(Na + Cl)	>50%	-	-	-	-	54%

The stream data show that all of the conductivity ranges divided by the cation sums are outside of the standard acceptable ranges for these data. The usual range should equal approximately 100. Conductivity can be analyzed by the laboratory, as well as a measurement collected in the field and used for comparison. The ratios of several of the other water quality parameters were also shown to be outside of acceptable ranges.

These inconsistencies do not necessary mean something is wrong only that something unusual may be occurring and the Permittee should work with the sampling personnel to assure

all field instruments are properly calibrated. The Permittee should also work with the laboratory to assure that all quality controls are being implemented.

Sample BC-3 at the Lower Right Fork of Bear Creek has shown a recent increase in the levels of Total Dissolved Solids (TDS) since Fall 2008. Prior to this increase, TDS levels have averaged around 400 mg/L since 2004 (see chart below). This sample location was dry in August and September 2009 and therefore, a TDS data point could not be collected.



UPDES YES ☒ NO ☐

UPDES sample UTG040006-004 (004) exceeded the 30-day average discharge limitation of 500 mg/L for TDS based on data collected on July 22, 2009. All other parameters were compliant with effluent limitations in the Bear Canyon UPDES permit.

Wells YES ☐ NO ☒

Depth to groundwater levels only are collected from four wells in/adjacent to the permit area. None of these wells are currently sampled for analytical parameters. It is recommended that this aspect of the water monitoring plan be reevaluated.

Wells SDH-2 and SDH-3 were installed for the purpose of monitoring water levels on the east and west sides of the Blind Canyon fault. Wells MW-114 and MW-117 were installed to monitoring the groundwater levels east of the Bear Canyon fault.

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

Baseline parameters are to be taken in August of year 5 prior to each permit renewal (Table 7.14). The next permit renewal date is November 02, 2010, so the baseline analyses should be done on samples collected in August 2010.

MRP:

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

- Sample BC-3 at the Lower Right Fork of Bear Creek has shown a recent increase in the levels of Total Dissolved Solids (TDS) since Fall 2008. This indicates that excess sediment may be discharging into the creek. The operator should evaluate sediment controls in this area and determine if there is any mitigation needed to control the level of sediment entering the water body. The location of stream sample BC-3 is an important one due to the fact that it is located adjacent to the main road. A high likelihood of this area receiving sediment from the disturbed area exists. Therefore, the Division recommends that Permittee modify the water monitoring plan to sample this location for operational parameters whenever flow is present. Currently, the water monitoring plan only requires the location be sampled for operational parameters during the months of February, August, and October.

- UPDES Sample 004 exceeded the 30-day average discharge limitation of 500 mg/L for TDS during July 2009. More data points are recommended to be collected within the 30-day period to determine if UPDES compliance point 004 is meeting effluent standards.

- Depth to water levels only from the groundwater monitoring wells is measured quarterly under the existing water monitoring plan. It is recommended that the operator reevaluate the current water monitoring plan and compare it against the current mining plan to determine important locations where groundwater monitoring should be conducted in order to protect the hydrologic balance of the area.

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.

The mine did not address the Division's concerns outlined in the 2nd Quarter 2009 quarterly water monitoring report.

8. Did the Mine Operator submit all the missing and/or irregular data?

YES ☒ NO ☐

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CC: K. Houskeeper