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WATER QUALITY MEMORANDUM
Utah Coal Regulatory Program

August 23, 2010

TO: Internal File

FROM: April A. Abate, Environmental Scientist II aaa 8/26/2010

THRU: James D. Smith, Permit Supervisor JS 31 Aug 2010

SUBJECT: 2009 4th Quarter Water Monitoring: Bear Canyon Mine, C/015/0025, Task ID # 3423

The monitoring plan is described on pages 7-48 through 7-60A of the MRP. It includes Tables 7-12 through 7-17. The mine is currently in the process of transitioning to new management. Subsequently, Norwest Corporation – a consulting firm located in Salt Lake City, Utah has taken over the water sampling program.

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.

SBC-9A was sampled during the 4th quarter for operational parameters and was the only sample location required for 4th quarter sampling. SCC-3 was also sampled in October, although it was not required.

Springs YES ☒ NO ☐

Most of the spring samples in and around the Bear Canyon mine are sampled for field, or either operational or baseline parameters. During the fourth quarter, springs are monitored during the month of October only. Spring sample SBC-5A did not report a flow rate reported on 10/7/2009.

Streams YES ☒ NO ☐

Stream sampling required for the fourth quarter of each year is performed in the month of

October only. Five-year baseline sampling was performed on sample locations FC-3, FC-4, and MH-2.

UPDES YES ☒ NO ☐

Five stations are monitored for the Bear Canyon UPDES permit on a monthly basis. None of these stations reported any monthly flow data from the five stations during the fourth quarter of 2009. The exception was discharge point UTG040006-004 - Mine Water to Bear Canyon Creek, which was reported as flowing during the months of October and December of 2009.

Wells YES ☐ NO ☒

Four wells are monitored for depth to water measurements only from May through October. None of the four wells were gauged for depth to water levels during October 2009, as required in the current water monitoring plan (Table 7-14).

2. Were all required parameters reported for each site?

In-mine YES ☒ NO ☐

Springs YES ☐ NO ☒

SBC-5 was missing a flow rate.

Streams YES ☒ NO ☐

UPDES YES ☐ NO ☒

There was no pH reading from UPDES point UTG040006-004 - Mine Water to Bear Canyon Creek in October 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 spring samples from the 4th quarter. Parameters outside of conventional ranges are bolded.
The most frequent inconsistencies are shown in the conductivity ranges divided by the cation sums. 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 in four of the samples showed elevated levels outside of the standard of less than 20%, but only slightly above in most cases. The ratio of magnesium to calcium in two of the samples showed levels outside of the standard of less than 40%. The ratio of calcium to sulfate in three of the samples showed lower levels outside of the standard of greater than 50%. The ratio of sodium to chloride in one sample was outside the standard of greater than 50%.

Reliability Check	Acceptable Range	16-8-18-5	SBC-14	SBC-16A	SBC-16B	SBC-17	SBC-3	SBC-4	SBC-5
TDS/Conductivity	>0.55 - <0.75	0.56	**1.00**	0.60	0.75	**0.91**	**1.09**	0.57	0.59
Conductivity/Cations	>90 - <110	**84.10**	**59**	**81**	**59**	**68**	**73**	**85**	**84**
K/(Na + K)	<20%	18%	**25%**	8%	12%	**45%**	9%	**23%**	**26%**
Mg/(Ca + Mg)	<40%	31%	31%	32%	38%	**61%**	**59%**	30%	34%
Ca/(Ca + SO4)	>50%	74%	**16%**	74%	73%	**13%**	**15%**	68%	52%
Na/(Na + Cl)	>50%	50%	53%	76%	70%	50%	**37%**	59%	52%

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 4th quarter. Parameters outside of conventional ranges are bolded.

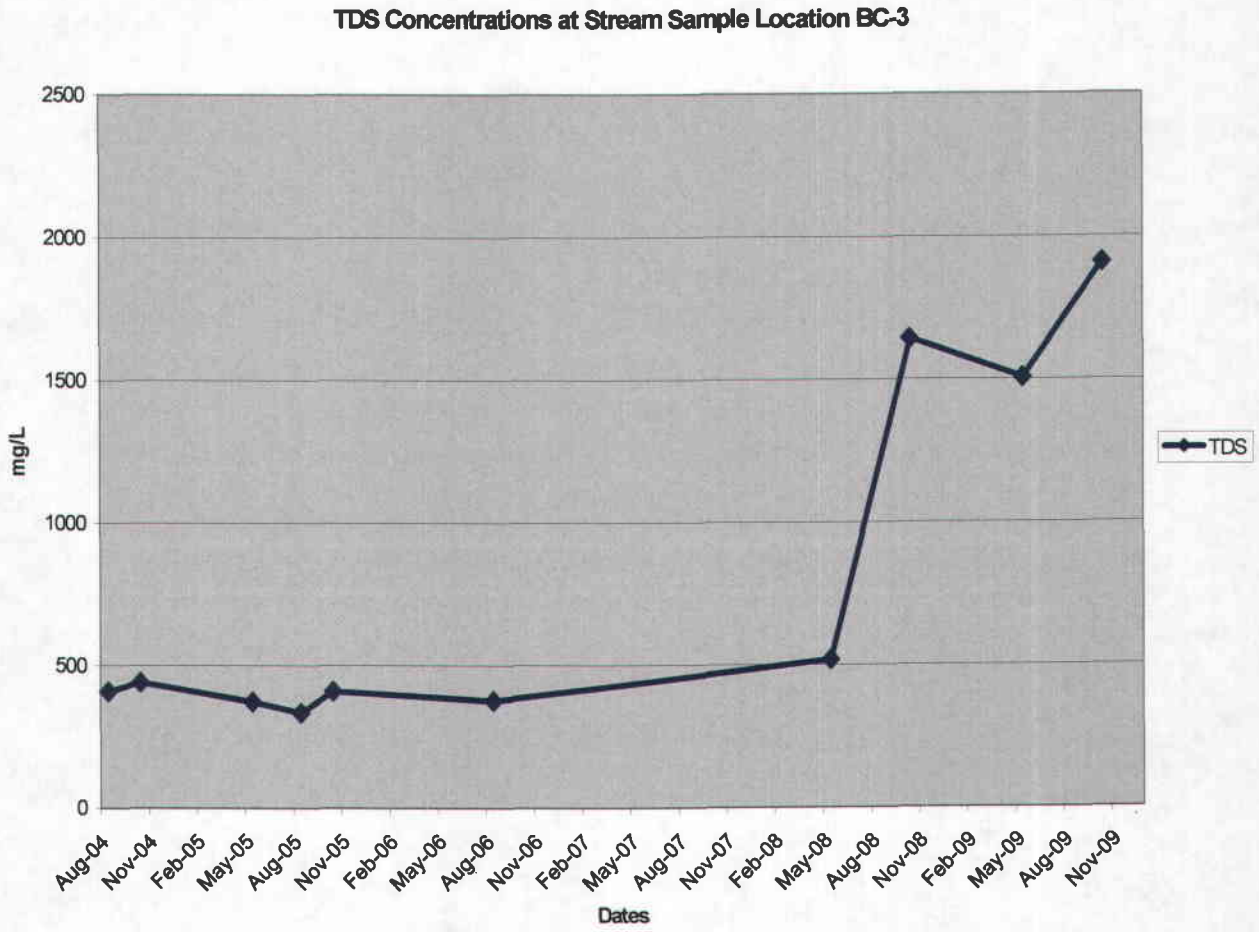
	Reliability Check	Acceptable Range	CK-1	CK-2	FC-4	BC-2	BC-1	FC-3	MH-2	BC-3
Oct-09	TDS/Conductivity	>0.55 - <0.75	**0.80**	0.76	0.62	0.70	**0.26**	0.71	0.60	**0.88**
Oct-09	Conductivity/Cations	>90 - <110	**79**	**73**	**82**	**84**	**206**	**76**	**79**	**69**
Oct-09	K/(Na + K)	<20%	**35%**	20%	12%	13%	**34%**	20%	**45%**	20%
Oct-09	Mg/(Ca + Mg)	<40%	**41%**	**45%**	28%	**51%**	**56%**	**45%**	21%	**63%**
Oct-09	Ca/(Ca + SO4)	>50%	**27%**	**35%**	83%	**16%**	**22%**	**35%**	92%	**13%**
Oct-09	Na/(Na + Cl)	>50%	62%	64%	**35%**	64%	**35%**	64%	54%	66%

Similar to the springs data, 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. 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 May 2008 (see chart shown below). Prior to this increase, TDS levels have averaged around 400 mg/L since 2004. State water quality standards for the Bear Creek stream reach for TDS is 4,800 mg/L. The most recent data result for TDS from BC-3 showed TDS at a concentration of 1,909 mg/L. The sampling plan as currently written only specifies the collection of operational parameters during the months of February, August, and October and field parameters during the months of July and September.



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 October 6, 2009. This sample has been reporting a discharge since May thru October 2009. All other parameters were compliant with effluent limitations in the Bear Canyon UPDES permit.

Wells YES ☐ NO ☒

Depths 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. None of these wells were gauged during the fourth quarter sampling event.

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; therefore, the baseline analyses should be done on samples collected in August 2010.

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

6. Does the Mine Operator need to submit more information to fulfill this quarter's monitoring requirements? YES ☒ NO ☐

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.

7. Follow-up from last quarter, if necessary.

The same recommendations from 3rd quarter apply to the fourth quarter results from 2009. The mine is presently going through a management change. A revision to the existing water monitoring plan has been submitted as an amendment by the environmental consulting firm representing the new management.

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

YES ☐ NO ☒

There were several monitoring points that do not include complete data:

Gauging data from all wells were not collected for the 4th quarter.
Spring: SBC-5 did not report a flow rate reported on 10/7/2009
UPDES point 004 does not include a pH reading on October 2009.