

WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

August 12, 2009

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: James D. Smith, Environmental Scientist III *JDS 8/13/09*

RE: 2008 Fourth Quarter Water Monitoring, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005, Task ID #3200

The Skyline Mine is an operating longwall mine. Current operations are in the North Lease area of the mine. Many mined-out areas of the mine have been sealed-off. Water monitoring requirements can be found in Section 2 of the MRP, in particular pages 2-35 through 2-39a, 2-44, and 2-45.

*Note: Samples are analyzed for isotopes at several sites. Because determinations of isotopic concentrations can require several months, these values are often reported much later than those for field measurements and routine laboratory analyses; however, the Permittee has always been quite prompt at getting the data to the Division as soon as they receive them from the lab.

1. Were data submitted for all of the MRP required sites? YES NO

In-mine

The MRP requires 4th quarter sampling of 6 sites classified in the database as "in-mine, roof drippers", but mine discharge stations CS-12, CS-14, MD-1, and SRD-1 and french drain CS-13 are reported as stream sites, and ELD-1, the combined output of JC-1 and JC-3, is reported with the wells.

Springs

The MRP requires spring sampling at 26 springs during the 4th quarter (S10-1, S12-1, S13-2, S13-7, S14-4, S15-3, S17-2, S22-5, S22-11, S23-4, S24-1, S24-12, S26-13, S34-12, S35-8, S36-12, 2-413, 3-290, 8-253, WQ1-1, WQ1-39, WQ3-6, WQ3-26, WQ3-41, WQ3-43, and WQ4-12).

The Permittee submitted all required data for the spring monitoring sites for the 4th quarter 2008:

Streams

The MRP requires spring sampling at 36 stream-sites (CS-3, CS-4, CS-6, CS-7, CS-8, CS-9, CS-10, CS-11, CS-12, CS-13, CS-14, CS-16, CS-17, CS-18, CS-19, CS-20, CS-21, CS-22, CS-23, MD-1, SRD-1, F-9, F-10, UP&L-10, VC-6, VC-9, VC-10, VC-11, VC-12, WRDS-1, WRDS-2, WRDS-3, WRDS-4, EL-1, and EL-2).

Flow at sites NL-1 through NL-42 is measured monthly for 12 months before, during, and 12 months after being undermined by the longwall and reported in the Annual Hydrologic Report (Sec. 2.4.4) and is submitted to the database. The Permittee commits to measuring the flow monthly in June through October; flow will be measured during other months if the sites are accessible. For the 4th quarter 2008, flow was reported at 18 of the 19 sites monitored during October.

Wells

The MRP requires spring sampling at 18 wells (JC-1, JC-3, ELD-1, W79-10-1-B, W79-14-2A, W79-26-1, W79-35-1A, W79-35-1B, W2-1, W20-4-1, W20-4-2, W99-4-1, W99-21-1, W99-28-1, W20-28-1, 91-26-1, W91-35-1, and 92-91-03).

The Permittee did not submit monthly flow data for the following wells for the 4th quarter 2008:

- ELD-1: November and December
- JC-1: November (Flow is reported twice for December; is one actually the November measurement?)
- JC-3: November and December.

UPDES

The UPDES Permit/MRP require weekly monitoring of 3 outfalls: UT0023540-001, Sedimentation Pond Discharge to Eccles Creek at the Portal; -002, Sedimentation Pond Discharge to Eccles Creek at the Loadout; and -003, the Sedimentation Discharge at the Waste Rock Disposal Site. Well JC-3 is permitted as a UPDES point by PacifiCorp; JC-3 has not discharged since July of 2004.

The Permittee submitted all required samples for the UPDES sites. Only outfall -001 discharged during the 4th quarter 2008.

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

In addition to the sites for which no data were submitted (listed under Item 1 above) the following parameters were missing from data sets that were submitted:

JC-1 Age Dating: *deuterium, *¹⁴C, and *¹⁸O.

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

Tabulated below are parameters that fell outside two standard deviations from the mean. Site – parameter pairings that were also outside two standard deviations from the mean during the 2nd and 3rd quarters are noted.

Parameter	Site	Value	Standard Deviations	Mean
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			from Mean	
NO2+NO3 as N				
	CS-3	4.49 mg/L	3.19	0.89 mg/L
	CS-11 (2 nd Qtr)	4.22 mg/L	3.27	0.45 mg/L
	CS-12 (3 rd Qtr)	3.50 mg/L	3.33	0.59 mg/L
	UPL-10	3.53 mg/L	7.30	0.32 mg/L
	WQ1-39 (2 nd and 3 rd Qtr)	2.18 mg/L	2.44	0.78 mg/L
	WQ3-6	1.54 mg/L	2.13	0.71 mg/L
	WQ3-41 (2 nd and 3 rd Qtr)	3.25 mg/L	3.15	0.27 mg/L
Bicarbonate as CaCO3				
	WQ3-6	295 mg/L	3.24	258.17 mg/L
	CS-20 (2 nd Qtr)	242 mg/L	2.88	170.92 mg/L
	F-10 (2 nd Qtr)	308 mg/L	2.98	217.64 mg/L
Cation/anion balance				
	CS-4	5.0 %	2.29	2.06 %
	CS-11 (2 nd and 3 rd Qtr)	4.2 %	3.46	1.35 %
	CS-20	8.0 %	5.92	2.19 %
	UPL-10 (2 nd Qtr)	5.0 %	2.14	1.93 %
TDS				
	CS-3 (3 rd Qtr)	399 mg/L	2.17	275.01 mg/L
Cl				
	CS-3 (3 rd Qtr)	62 mg/L	2.29	17.40 mg/L
Total Fe				
	CS-13	2.90 mg/L	2.61	0.42 mg/L
	UPL-10	12.18mg/L	9.99	0.32 mg/L
Field water temperature				
	2-413	8.90 Deg. C	2.23	6.69 Deg. C
Field specific conductivity				
	UPL-10	3.06 umhos/cm	4.16	309.8 umhos/cm
	UT0023540-001	7.10 umhos/cm	3.31	1015.2 umhos/cm
Dissolved Na				
	S13-7	3.96 mg/L	2.21	1.6 mg/L

Total Alkalinity				
	CS-20	242 mg/L	2.97	174.22 mg/L
	F-10 (2 nd Qtr)	308 mg/L	3.61	216.13 mg/L

This is the third quarter in row that the cation/anion balance at CS-11 has been more than 2 standard deviations from the mean. The difference was below 5 % during this quarter and the 2nd quarter but greater than 5 % during the 3rd quarter.

Field specific conductivity values at UPL-10 and UT0023540-001 are questionably low. The low reported values may be due to transcription errors. The Permittee has assured the Division that the meter is checked and calibrated regularly, but the Permittee may need to check the procedures used to measure and record this parameter in the field.

Up through the 1st quarter 2008, chloride values were increasing steadily at CS-3; however, the value dropped to 29 mg/L during the 2nd quarter 2008. The value jumped back up in the 3rd (63 mg/L) and 4th quarters (62 mg/L). See the attached chart. The National Secondary Drinking Water standard for chloride is 250 mg/L.

Seven sites had elevated NO₂+NO₃ as N: 1 in-mine site, 3 stream sites, and 3 springs. See the attached charts. There is no evident explanation for so many sites with elevated N values. It is particularly unusual for the in-mine samples and springs to have high values for this parameter, and this is the third quarter in which values at springs WQ3-39 and WQ3-41 have been elevated.

Reliability Checks

The Division calculated the following Reliability Checks, based on previous Water Quality Reports for the Skyline Mine (for further information on Reliability Checks, see Chapter 4, *Water Quality Data: Analysis and Interpretation* by Arthur W. Hounslow.) Several routine Reliability Checks found a number of values outside of those expected.

- The TDS and Conductivity
 - Out of 40 samples for which both field specific conductivity and TDS were determined, 21 have TDS/Conductivity ratios within the typical range of 0.55 and 0.76.
 - Two sites, CS-20 and JC-1, are slightly < 0.55.
 - Thirteen of the nineteen sites where this TDS/Conductivity ratio is > 0.76 are UPDES discharge points, and only one UPDES site has a ratio within the 0.55 and 0.76 range.
 - UPL-10 and UT0023540-001 (10/29/08) have ratios >70, and the specific conductivity values are <10, too low to be valid.
 - The Conductivity/Total Cations ratio should be close to 1.00.
 - For 24 of the 25 samples that had both parameters determined, this ratio ranges from 0.63 to 0.88.
 - The ratio at UPL-10 was 0.007; this is again due to the invalid specific conductivity value.
 - These two checks indicate that the field specific conductivity measurements at UPL-10 and UT0023540-001 (10/29/08) are invalid.

- The Permittee needs to routinely clean and calibrate the conductivity meter and verify that the values recorded are reasonable.
- The Division calculated Reliability Checks that involve dissolved Ca, Mg, K, Na, Cl, and SO₄. There were 25 samples that were analyzed for these five ions.
 - Ideally the Mg/(Ca + Mg) ratio is < 40%.
 - Of the 25, 24 have a ratio < 40%.
 - The 25th sample, CS-12, is right at 40%, the same as during the First and Second Quarters 2008 for this site.
 - Ideally the Ca/(Ca + SO₄) ratio is > 50%.
 - Of the 25 samples, 7 have a ratio < 50%.
 - These same 7 sites that had a Ca/(Ca + SO₄) ratio < 50% during the 3rd Quarter 2008.
 - Because Mg/(Ca + Mg) values are within the expected range, SO₄ values may bear watching at these sites.
 - The K/(K+ Na) ratio should be < 20%.
 - Just over half the sites (13) have a ratio > 20 %.
 - The highest is 36%, at WQ3-26.
 - The Na/(Na + Cl) ratio should be > 50%.
 - Only 13 of the 25 sites are > 50 %
 - The ratio is as low as 14 % at CS-3, which also had the lowest ratio during the 3rd Quarter.
 - As has been noted in previous reports, the analyses for ions should be watched during the coming quarters for quality and consistency.

Reliability Checks not meeting the target value does not necessarily mean that the analyses are in error; however, it does indicate the collection and analysis procedures might benefit from some extra scrutiny by the Permittee. An analysis and explanation of the inconsistencies by the Permittee would help to increase the Division's confidence in the procedures used for sample collection and analysis. The Permittee should work with the lab to make sure that samples pass all quality checks so that the reliability of the samples does not come into question.

UPDES

The UPDES permit (dated Nov. 23, 2004) allows for a DML for TDS of 1,310 mg/l and a 30-day average of 500 mg/l. There is no tons/day DML unless the 30-day average exceeds 500 mg/l; then a 7.1 tons/day limit is imposed. For the 4th quarter of 2008, the discharge at UPDES Permit discharge points UT0023540-001 did not exceed the DML for TDS; however, the 30-day average remained well above 500 mg/l and the tons/day load during the 4th quarter averaged over 10 tons/day (as calculated from the TDS and flow data in the database).

Because of such ongoing exceedences, Canyon Fuel Company participates in the Salinity Offset Plan that was approved by DWQ on January 5, 2005 (retroactive to September 2004). A copy of the agreement can be found in the Division's Incoming files, and at:
<https://fs.ogm.utah.gov/FILES/COAL/PERMITS/007/C0070005/2005/INCOMING/0006.pdf>.

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

Beginning in 2010 and every five years thereafter, baseline analyses are to be done on samples collected during the 3rd Quarter (MRP p. 2-44).

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

Although overall data quality appears excellent, the Permittee needs to routinely clean and calibrate the conductivity meter and verify that the values recorded in the field are reasonable.

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

Because of the long time involved in isotopic analyses, deuterium, C¹⁴, and O¹⁸ isotopic data for JC-1 will be entered into the database as soon as they become available.

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

Deuterium, C¹⁴, and O¹⁸ isotopic data for JC-1 for the 3rd quarter 2008 are still not in the database.

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

Yes (except for the deuterium, C¹⁴, and O¹⁸ isotopic data that will be entered into the database as soon as they become available).





