

# WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

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August 21, 2007

TO: Internal File

THRU: Pamela Grubaugh-Littig, Permit Supervisor *pgl*

FROM: Dana Dean, P.E., Senior Reclamation Hydrologist

RE: *D* 2006 First Quarter Water Monitoring, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005-WQ06-1, Task ID #2470

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, especially pages 2-36, 2-36a, 2-36b, 2-37, 2-37a, and 2-39aa of the MRP.

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

### ***Springs***

*The MRP does not require winter sampling for springs.*

### ***Streams***

*The MRP requires spring sampling at 15 stream-sites (CS-6, CS-12, CS-13, CS-14, MD-1, SRD-1, VC-6, VC-9, VC-10, MC-1, MC-2, MC-3, MC-4, MC-5, and MC-6).*

The Permittee submitted all required samples for the stream sites.

### ***Wells***

*The MRP requires spring sampling at 3 wells (JC-1, JC-3, and ELD-1).*

The Permittee submitted all required samples for the well sites.

### ***UPDES***

*The UPDES Permit/MRP require weekly monitoring of 3 outfalls: 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, but PacifiCorp is*

*the Permittee, and JC-3 has not discharged since July of 2004.*

The Permittee submitted all required samples for the UPDES sites. Only outfall 001 reported flow.

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

The Permittee failed to report total phosphorous for site VC-9. Confusion in regards to monitoring requirements resulted in a Notice of Violation for the 2-4 quarters of 2005. The Permittee began to clarify the MRP during this quarter, and it is not surprising that one parameter out of the many required was missed at this time. The Division expects the Permittee to include all required parameters in future water monitoring data.

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

Several parameters fell outside of two standard deviations from the mean encountered at the respective sites. They were:

Site	Parameter	Value	Standard Deviations from Mean	Mean
CS-6	Sulfate	338 mg/L	2.10	128.75 mg/L
CS-6	Air Temperature	-5 °C	2.07	13.26 °C
CS-12	Total Dissolved Solids	1720 mg/L	2.04	841.80 mg/L
CS-12	Air Temperature	-5 °C	2.09	11.58 °C
MD-1	Turbidity	1.65 NTU	2.20	8.50 NTU
VC-6	Air Temperature	-5 °C	2.15	13.26 °C
VC-9	Dissolved Potassium	10.8 mg/L	2.06	5.07 mg/L
VC-9	Sulfate	342 mg/L	2.08	130.76 mg/L
VC-9	Air Temperature	-5 °C	2.10	14.08 °C
VC-10	Cation/Anion Balance	2.4 %	2.24	0.94 %
VC-10	Water Temperature	-5 °C	2.06	12.73 °C
MC-1	Dissolved Oxygen	8.85 mg/L	2.85	7.42 mg/L
MC-2	Dissolved Oxygen	9.30 mg/L	4.31	7.32 mg/L
MC-3	Dissolved Oxygen	10.10 mg/L	6.98	7.23 mg/L
MC-4	Dissolved Oxygen	9.04 mg/L	3.00	7.44 mg/L
MC-5	Dissolved Oxygen	10.90 mg/L	3.95	7.87 mg/L

It is not surprising that air temperature, a very flux parameter, has values outside of two standard deviations at some sites. This winter was a bit colder than some of the more recent ones and therefore some colder than usual temperatures were recorded.

The cation/anion balance at VC-10 is outside 2 standard deviations, but below the 5% attention value. The previous values have been quite close together, and this value is

not of concern.

The dissolved oxygen has been unusually high at MC-1 through MC-5 through the fall and winter. With the relatively cool water temperatures, higher dissolved oxygen levels are necessary for acceptable oxygen saturation. The oxygen saturation for MC-1 through MC-5 ranged from 80% to 90% for this quarter.

There is a fairly strong upward trend in the dissolved potassium at VC-9 ( $R^2=0.4608$ ). There is a very weak positive correlation to flow. There are no standards for this metal, and 10.8 mg/L is a low concentration. This does not represent degradation of water quality.

There is a weak upward trend in sulfate at VC-9, with no real correlation to flow. Though the sulfate reading is rather high, it has dropped from 396 mg/L to 342 mg/L since the November 2005 reading. There is no indication of acid mine drainage (AMD), since the pH has remained at or above 7, there is alkalinity (>178 mg/L), and the levels of iron, manganese and aluminum have remained low. Sulfate is not toxic to plants or animals (even at very high concentration), but has a cathartic effect on humans in concentrations over 500 mg/L. For this reason, the EPA has set the secondary standard for drinking water as 250 mg/L. The sulfate at VC-9 it has been greater than 250 mg/L in just 14% of the samples, scattered throughout the sampling period. The Division will continue to closely monitor the trend of this parameter.

There is a strong to fairly strong upward trend in TDS at CS-12 ( $R^2=0.436$ ), with no real correlation to flow. The TDS at CS-12 has almost always been above the secondary drinking water standard of 500 mg/L (75% of the 154 samples), and periods of high TDS have generally been followed by periods of low TDS. In fact the level has dropped from 2167 mg/L in October 2005 to 1720 mg/L.

There is a very weak downward trend in the turbidity readings at MD-1. There is no water quality standard for turbidity, but it closely relates to the amount of solids in the water, particularly TSS. Lower turbidity is a positive trend in the water quality.

Several routine Reliability Checks were outside of standard values. They were:

Site	Reliability Check	Value Should Be...	Value is...
CS-6	Conductivity/Cations	>90 & < 110	86
CS-6	Mg/(Ca + Mg)	< 40 %	53%
CS-6	Ca/ (Ca + SO4)	> 50 %	39%
CS-12	Mg/(Ca + Mg)	< 40 %	52%
CS-12	Ca/ (Ca + SO4)	> 50 %	34%
CS-14	Conductivity/Cations	>90 & < 110	80
CS-14	Mg/(Ca + Mg)	< 40 %	47%
CS-14	Ca/ (Ca + SO4)	> 50 %	47%
MD-1 2/22	Conductivity/Cations	>90 & < 110	83

MD-1 2/22	Mg/(Ca + Mg)	< 40 %	48%
MD-1 2/22	Ca/ (Ca + SO4)	> 50 %	44%
VC-6	Mg/(Ca + Mg)	< 40 %	51%
VC-6	Ca/ (Ca + SO4)	> 50 %	41%
VC-9	Conductivity/Cations	>90 & < 110	89
VC-9	Mg/(Ca + Mg)	< 40 %	54%
VC-9	Ca/ (Ca + SO4)	> 50 %	38%
VC-10	Conductivity/Cations	>90 & < 110	87
VC-10	K/(Na + K)	< 20%	22%
UT0023540-001 3/29	TDS/Conductivity	>0.55 & <0.75	0.78
UT0023540-001 3/23	TDS/Conductivity	>0.55 & <0.75	0.75
UT0023540-001 3/15	TDS/Conductivity	>0.55 & <0.75	0.79
UT0023540-001 3/1	TDS/Conductivity	>0.55 & <0.75	0.75
UT0023540-001 2/1	TDS/Conductivity	>0.55 & <0.75	0.77
UT0023540-001 1/19	TDS/Conductivity	>0.55 & <0.75	0.76
UT0023540-001 1/4	TDS/Conductivity	>0.55 & <0.75	0.76

These inconsistencies do not necessarily mean that a sample is wrong, but it does indicate that something is unusual. An analysis and explanation of the inconsistencies by the Permittee would help to increase the Division's confidence in the samples. 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. The Permittee can learn more about these reliability checks and some of the geological and other factors that could influence them by reading Chapter 4 of *Water Quality Data: Analysis and Interpretation* by Arthur W. Hounslow.

The Utah Division of Water Quality (DWQ) issued the current UPDES permit on Nov. 23, 2004. It allows for a daily maximum of total dissolved solids discharged (TDS) of 1310 mg/l and a 30-day average of 500 mg/l. There is no tons per day (tpd) daily maximum, unless the 30-day average exceeds 500 mg/l; then a 7.1-tpd limit is imposed. The permit also states:

*Upon determination by the Executive Secretary that the permittee is not able to meet the 500 mg/L 30-day average or the 7.1 tons per day loading limit, the permittee is required to participate in and/or fund a salinity offset project to include TDS offset credits, within six (6) months of the effective date of this permit.*

The Division of Water Quality approved a Salinity Offset Plan for the Skyline Mine on January 5, 2005, which is retroactive to September 2004.

For the first quarter of 2006, the Permittee has not exceeded the daily max of 1310 mg/L for TDS. However, the 20-day average has remained well above 500 mg/l and the tons per day are much greater than 7.1. Because of these exceedences, Canyon Fuel Company continues to participate in the salinity-offset program.

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

There is no commitment in the MRP to resample for baseline parameters.

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

No further actions are necessary at this time.

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