

WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

January 4, 2006

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

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

RE: 2005 First Quarter Water Monitoring, Company Foundation Coal Company, Willow Creek Mine, C/007/0038, Task #2167

Foundation Coal Company completed reclamation work on the final areas they plan to reclaim at Willow Creek in late 2005.

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

Springs

No springs are included in the current monitoring requirements.

Streams

Foundation Coal is required to monitor 6 stream sites at the Willow Creek Mine once each quarter. They are: B3N, B5, B6, B151, B25, and B26. Table 4.7.2 lists the required parameters for these sites.

Foundation Coal properly submitted all required monitoring information in a timely and complete manner for the streams at Willow Creek.

Wells

No wells are included in the current monitoring requirements.

UPDES

There is just one UPDES site left at the Willow Creek Mine, Outfall 001. Foundation Coal monitors it monthly.

Foundation Coal properly submitted all required monitoring information in a timely and complete manner for the UPDES site at Willow Creek. All DMR's reported "no flow."

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

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

Several parameters fell outside of 2 standard deviations from the mean. They were:

| Site | Parameter | Value | Deviations from Mean | Mean |
|------|------------------------|--------------|----------------------|-----------------|
| B5 | Sp. Conductivity | 746 µmhos/cm | 2.00 | 475.53 µmhos/cm |
| B5 | Dissolved Magnesium | 38.5 mg/L | 2.69 | 23.55 mg/L |
| B5 | Dissolved Sodium | 46.6 mg/L | 3.20 | 19.95 mg/L |
| B5 | Chloride | 54 mg/L | 4.54 | 17.64 mg/L |
| B5 | Sulfate | 83 mg/L | 2.06 | 46.33 mg/L |
| B5 | Total Hardness | 312 mg/L | 2.18 | 220.64 mg/L |
| B5 | Total Dissolved Solids | 473 mg/L | 3.05 | 277.62 mg/L |
| B5 | Total Cations | 8.3 meq/L | 2.52 | 5.30 meq/L |
| B6 | Dissolved Magnesium | 37.6 mg/L | 2.61 | 23.71 mg/L |
| B6 | Dissolved Sodium | 44.5 mg/L | 2.36 | 20.90 mg/L |
| B6 | Chloride | 53 mg/L | 4.48 | 17.85 mg/L |
| B6 | Sulfate | 80 mg/L | 2.16 | 46.71 mg/L |
| B6 | Total Hardness | 310 mg/L | 2.01 | 223.80 mg/L |
| B6 | Total Dissolved Solids | 476 mg/L | 3.11 | 278.35 mg/L |
| B6 | Total Cations | 8.2 meq/L | 2.20 | 5.46 meq/L |

Though there is a slight upward trend, the chloride values for B5 and B6 are still extremely low compared to the EPA's secondary drinking water standard of 250 mg/l. They are also in line with other first quarter values in relation to flow. At both sites, as the flow decreases, the chloride values tend to increase. However, these samples were taken in spring runoff conditions, with high turbidity. The high number of cations measured in the samples is also most likely due to the turbid conditions.

There is no water quality standard for magnesium, but it does affect water hardness. The water at B5 and B6 has always fallen in the “hard” (150-300 mg/L total hardness) to “very hard” (>300 mg/L total hardness) categories. There is a slight upward trend in dissolved magnesium and at both sites, as the flow decreases, the magnesium values generally tend to increase.

There is a slight upward trend in dissolved sodium, and a slight negative correlation to flow at B5 and B6. There is no water quality standard for sodium, but it does affect water hardness (making it “soft”), and water with more sodium than calcium + magnesium can negatively affect plant growth (if used for such purposes). This condition has never occurred B5 or B6, and the water is quite hard.

The specific conductivity and total dissolved solids (TDS) at B5 and B6 have a slight upward trend, with a negative correlation to flow. Specific conductivity is closely related to TDS. Even the highest TDS reading (476 mg/L) is below the EPA’s secondary standard of 500 mg/L for drinking water, and the water was quite turbid, so the readings are not of concern.

The sulfate at B5 and B6 also has a slight upward trend and a generally negative correlation to flow. 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 as 250 mg/L. The sulfate at B5 and B6 has always been much less than 250 mg/L (85 mg/L maximum).

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

| Site | Reliability Check | Value Should Be... | Value is... |
|------|------------------------|--------------------|-------------|
| B3N | Mg/(Ca + Mg) | < 40 % | 54 % |
| B3N | Conductivity / Cations | >90 & <110 | 88 |
| B5 | Mg/(Ca + Mg) | < 40 % | 51 % |
| B5 | Conductivity / Cations | >90 & <110 | 89 |
| B6 | Mg/(Ca + Mg) | < 40 % | 50 % |
| B151 | Conductivity / Cations | >90 & <110 | 87 |
| B151 | Mg/(Ca + Mg) | < 40 % | 52% |

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. 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 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.

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 required at this time.

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