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WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

March 28, 2012

TO: Internal File

THRU: Steve Christensen, Permit Supervisor SKC

FROM: Ken Hoffman, Hydrologist KH

RE: 2011 Third Quarter Water Monitoring, Canyon Fuel Company, LLC, C/007/0005, Task ID #3915

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, 2-38, and 2-39 of the MRP.

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

Second, Third, and Fourth Quarter monitoring requires regular information from 76 sites. Additional locations on streams in the North Lease are monitored for one year before, during, and for one year after their being undermined.

Note: Samples are analyzed for tritium at several sites, plus deuterium, carbon^{14}, and oxygen^{18} at JC-1. Because determinations of isotopic concentrations can require several months, these values are often reported later than those from field measurements and routine laboratory analyses. The Permittee has always been prompt at getting the isotopic data to the Division as soon as they are received from the lab.

In-mine

The MRP requires Third Quarter sampling at 6 sites categorized as "other" or "in-mine, roof drippers". All 6 are monitored at the surface: CS-12, CS-14, 3, MD-1, and SRD-1 are mine discharge stations; CS-13 is a French drain; and ELD-1 is the combined output of JC-1 and JC-3. The Permittee submitted all required information for these sites.

Springs

No springs are monitored during the First Quarter, but 26 springs are monitored during the Second, Third, and Fourth Quarters: *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, WQ4-12, S15-3, S24-1, 2-413, and 8-253* the Permittee submitted all required information for the springs.

Streams

The MRP requires First Quarter sampling at only 4 stream-sites: *CS-6, VC-6, VC-9, and VC-10,* but at 28 sites during the Second, Third, and Fourth Quarters: *CS-3, CS-6, CS-7, CS-8, CS-9, CS-10, CS-11, CS-16, CS-17, CS-18, CS-19, CS-20, CS-21, CS-22, CS-23,F-10, UPL-10, VC-6, VC-9, VC-10, VC-11, VC-12, WRDS-1, WRDS-2, WRDS-3, WRDS-4, EL-1, and EL-2.* EL-1 and EL-2 are for tritium analysis only, and except for EL-1 and EL-2 (See Note above), the Permittee submitted all required information for these stream sites for the Third Quarter 2011.

The Permittee monitors additional stream sites in the North Lease (designated as NL-1 through NL-42) monthly for 12 months before, during, and 12 months after their being undermined by the longwall. Monitoring results are reported in the Annual Hydrologic Report (Sec. 2.4.4) and submitted to the database. The Permittee commits to measuring the flow monthly in June through October, and measuring flow during other months if the sites are accessible. Twelve NL sites were monitored during the Third Quarter 2011.

Wells

Water levels are measured at 14 wells during the Second, Third, and Fourth Quarters: *W79-10-1B, 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, W20-28-1, 91-26-1, W91-35-1, and 92-91-03.* Operational parameters are also measured at 92-91-03. None of these wells are monitored during the First Quarter.

Monthly flow measurements are required year round at JC-1 and JC-3. During the Second, Third, and Fourth Quarters, the Permittee also measures all field parameters, TDS, TSS, and Total Phosphorous at both sites once per quarter, plus isotopes C^{14}, Tritium, Deuterium, and O^{18} at JC-1 once per quarter.

ELD-1 is reported with the "other" or "in-mine, roof drippers" sites. Well JC-3 is permitted as a UPDES point by PacifiCorp. That permit requires PacifiCorp to report flow, oil & grease, TDS, NH3, N as nitrate + nitrite, plus total and dissolved As, Cd, Cr, Cu, Fe, Pb, Hg, Ni, Se, Ag, Zn, and P. Since July 2004, JC-3 has discharged only once, in October 2007.

The Permittee submitted all required information for the well sites for the Third Quarter 2011.

UPDES

The UPDES Permit and 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.* DMR parameters (total Fe, TDS, pH, TSS, flow, oil and grease, and specific conductivity, and temperature) are reported to the database as operational parameters. Total Fe is analyzed twice per month rather than weekly. Parameters that are not included in the operational parameter lists in the MRP - such as sanitary wastes, visible foam, and floating solids - are not reported in the electronic submittal to the Division.

Well JC-3 is permitted as a UPDES point by PacifiCorp. For JC-3, Skyline reports only monthly flow during the First Quarter, and monthly flow and quarterly field parameters, TDS, TSS, and T-P during the Second, Third, and Fourth Quarters. (The UPDES permit for JC-3 requires PacifiCorp to report flow, oil & grease, TDS, NH3, N as nitrate + nitrite, plus total and dissolved As, Cd, Cr, Cu, Fe, Pb, Hg, Ni, Se, Ag, Zn, and P.) Since July 2004, JC-3 has discharged only once, in October 2007.

The Permittee submitted all required information for the UPDES sites for the Third Quarter. Outfall 001 flowed throughout the quarter. Outfalls 002 and 003 reported no flow during the entire quarter.

2. Were all required parameters reported for each site?

Springs **YES [X] NO [ ]**

Streams **YES [X] NO [ ]**

Wells **YES [X] NO [ ]**

UPDES **YES [X] NO [ ]**

3. Were any irregularities found in the data?

Listed parameters were more than two standard deviations from the mean. Parameters in bold typeface were also more than two standard deviations from the mean during the Second Quarter 2011.

Springs **YES [X] NO [ ]**

S13-2 September: cation-anion balance, nitrite+nitrate
S13-7 September: cation-anion balance
S15-3 September: tritium
S17-2 September: cation-anion balance, total hardness
WQ3-41 September: **sulfate, chloride**
WQ3-43 September: cation-anion balance
WQ3-6 September: **flow**, cation-anion balance
WQ4-12 August: cation-anion balance

Streams **YES [X] NO [ ]**

CS-9 September: nitrite+nitrate
CS-11 September: oil and grease
CS-19 September: chloride

Wells **YES [X] NO [ ]**

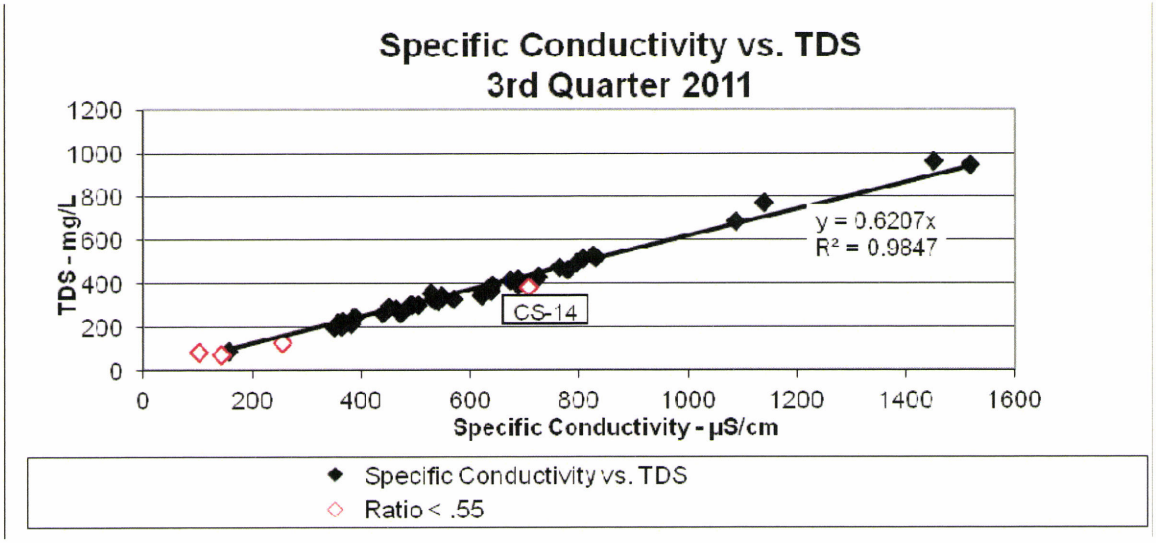
JC-1 July: **flow**
W91-35-1 September: depth
92-91-03 September: total alkalinity, cation-anion balance, total anions, **bicarbonate**, **chloride**.

UPDES YES [ ] NO [X]

UPDES permit UT0023540 (effective December 1, 2009) allows for a maximum daily effluent limitation (MDEL) for total dissolved solids (TDS) of 1,200 mg/L and a 30-day average of 500 mg/L. There is no tons/day loading limit unless the 30-day average exceeds 500 mg/l; then a 7.1 tons/day limit is imposed. During the Third Quarter of 2011, discharge at Outfall 001 exceeded the 30 day average of 500 mg/L for TDS in July so the loading limitation was not triggered. In addition, the 7.1 tons/day limit was exceeded during July because of ongoing exceedances, particularly at Outfall 001, Canyon Fuel Company participates in the Salinity Offset Plan that was approved by DWQ on January 5, 2005 (retroactive to September 2004). Due to the offsets generated by this program these exceedances are not considered violations as stated in the UPDES Permit.

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.)

- TDS/Conductivity
  - Out of 33 samples for which both field specific conductivity and TDS were determined, 32 have a TDS/Conductivity ratio in the expected range between 0.55 and 0.76.
    - The linear trendline has a slope of 0.62 (see chart).
    - UPDES discharges account for 6 of the 33 samples.



- For 27 samples, the Division calculated Reliability Checks that involve dissolved Ca, Mg, K, Na, Cl, and SO4. There were not data on dissolved ions at other sites.

    - **Mg/(Ca + Mg) ratio**
        - Ideally the Mg/(Ca + Mg) ratio is < 40%.
        - 26 of 27 samples have a ratio < 40%
        - The CS-12 ratio is right above 40%; CS-12 frequently has the highest ratio, right at or slightly above 40%.
        - These results are consistent with results from recent quarters.

    - **Ca/(Ca + SO4) ratio**
        - Ideally the Ca/(Ca + SO4) ratio is ≥ 50%.
        - Of the 27 samples, 6 have a Ca/(Ca + SO4) ratio < 50%.
        - The lowest ratio is 17%.
        - Because Mg/(Ca + Mg) values are within the expected range, SO4 values may bear watching; however, these results are consistent with results from recent quarters.

    - **K/(K+ Na) ratio**
        - The K/(K+ Na) ratio should be ≤20%.
        - For 15 of the samples, the ratio is >20%.
        - At the other 12 sites, the ratio ranges from 8 to 19%.
        - These values are consistent with recent results.

    - **Na/(Na + Cl) ratio**
        - The Na/(Na + Cl) ratio should be ≥ 50 %.
        - The ratio ranges from 50% to 86% at 12 sites, slightly under half the sites.
        - These are the very similar to the results from previous quarters

When these Reliability Checks do not meet the target value, it 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. 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. However, the consistent results of these reliability checks from quarter to quarter might also indicate that local conditions do not match those upon which these Reliability Checks were formulated.

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?

No further actions are necessary at this time.

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.

None.

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

There were no missing or irregular data.

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