

WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

JK

February 21, 2008

TO: Internal File

THRU: Daron Haddock, Permit Supervisor 

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

RE: 2007 Third Quarter Water Monitoring, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005-WQ07-3, Task ID #2639

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.

There are 42 stream sampling sites in the North Lease where the Permittee will measure flow on a monthly basis for 12 months prior to, during and 12 months after longwall mining below each site. The Division will check this monitoring in conjunction with the Annual Report.

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

Springs

The MRP requires third quarter sampling at 25 springs.

The Permittee submitted all required samples for the spring sites.

Streams

The MRP requires third quarter sampling of 35 stream sites.

The Permittee submitted all required samples for the stream sites.

Wells

The MRP requires third quarter monitoring at 18 wells.

The Permittee submitted the required well site samples.

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

Tritium was not reported at EL-1, EL-2, S15-3, S24-1, 2-413, JC-1 or 8-253. JC-1 is also missing Oxygen 18, Carbon 14, and Deuterium. The laboratory that provides the age dating data quite often takes a long time to report the data back to the Permittee. The Permittee has always been quite prompt at getting the data to the Division as soon as they receive it from the lab.

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

Some 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-3	Total Dissolved Solids	396 mg/L	2.25	272.4 mg/L
CS-3	Chloride	70 mg/L	3.37	14.61 mg/L
CS-3	Nitrate + Nitrite	4.12 mg/L	7.76	0.53 mg/L
CS-4	Dissolved Potassium	1.92 mg/L	2.04	1.02 mg/L
CS-9	Nitrate + Nitrite	4.28 mg/L	5.25	1.12 mg/L
CS-12	Nitrate + Nitrite	2.43 mg/L	3.65	0.31 mg/L
CS-13	Cation/Anion Balance	2.7%	2.17	0.56%
CS-14	Nitrate + Nitrite	3.83 mg/L	3.09	0.81 mg/L
CS-20	Cation/Anion Balance	4.4%	2.47	1.26%
UPL-10	Nitrate + Nitrite	2.29 mg/L	23.56	0.17 mg/L
VC-9	Cation/Anion Balance	3.4%	3.10	0.96%
2-413	Water Temperature	9.4 °C	4.20	6.49 °C
WQ1-39	Water Temperature	9.7 °C	2.85	6.87 °C
WQ1-39	Total Suspended Solids	140 mg/L	3.95	22 mg/L
WQ3-26	Dissolved Potassium	2.05 mg/L	3.71	1.01 mg/L
WQ3-6	Dissolved Potassium	2.54 mg/L	2.19	1.80 mg/L

WQ3-6	Chloride	5 mg/L	2.01	3.92 mg/L
WQ3-41	Water Temperature	11.2 °C	2.50	7.94 °C
WQ3-43	Water Temperature	6.8 °C	2.17	4.51 °C
WQ3-43	Dissolved Potassium	1.93 mg/L	2.11	1.24 mg/L

The cation/anion balance at CS-13, CS-20, and VC-9 is not of concern, since it is within the expected range (<5%) at each site.

There is a no trend in chloride at WQ3-6. There are only 17 samples in the population, twelve of which are 4 mg/L, one is 3 mg/L, and four are 5mg/L. This level is well below any water quality standards, and is not of concern. There is a fairly strong upward trend in chloride at CS-3 ($R^2 = 0.6904$), but levels are well below the drinking water criterion of 250 mg/L, and the criteria for protection of aquatic life of 600 mg/L.

There is a weak downward trend in the dissolved potassium at WQ3-6 ($R^2 = 0.3793$), and no trend in the dissolved potassium at CS-4, WQ3-26, or WQ3-43. There is no water quality standard for potassium and all levels are below 3 mg/L.

There is no trend in nitrate+nitrite at CS-3, CS-9, CS-12, CS-14, or UPL-10 ($R^2 < 0.16$ for all sites). The combined nitrate/nitrite level is below the recommended limit of 10 mg/L at all sites.

There is a weak upward trend in the TDS at CS-3 ($R^2 = 0.5264$). The TDS at CS-3 remains well below the secondary drinking water standard of 500 mg/L, and periods of high TDS have generally been followed by periods of low TDS.

There is no trend in the TSS at WQ1-39 ($R^2 = 0.02$).

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

Site	Reliability Check	Value Should Be...	Value is...
CS-3	Na/(Na + Cl)	> 50%	20%
CS-4	Conductivity/Cations	>90 & < 110	83
CS-4	Na/(Na + Cl)	> 50%	49%
CS-6	Conductivity/Cations	>90 & < 110	89
CS-6	Mg/(Ca + Mg)	< 40 %	51%
CS-6	Ca/ (Ca + SO4)	> 50 %	45%
CS-9	Conductivity/Cations	>90 & < 110	84
CS-11	Conductivity/Cations	>90 & < 110	87
CS-11	Na/(Na + Cl)	> 50%	47%
CS-12	Conductivity/Cations	>90 & < 110	81
CS-12	Mg/(Ca + Mg)	< 40 %	52%
CS-12	Ca/ (Ca + SO4)	> 50 %	37%
CS-13	Conductivity/Cations	>90 & < 110	85
CS-13	Na/(Na + Cl)	> 50%	46%

CS-14	Mg/(Ca + Mg)	< 40 %	46%
CS-19	Conductivity/Cations	>90 & < 110	88
CS-20	Conductivity/Cations	>90 & < 110	78
CS-21	Conductivity/Cations	>90 & < 110	85
F-10 Sep 21	Conductivity/Cations	>90 & < 110	75
F-10 Sep 21	K/(Na + K)	< 20%	21%
UPL-10	Conductivity/Cations	>90 & < 110	82
UPL-10	Na/(Na + Cl)	> 50%	39%
VC-6	Conductivity/Cations	>90 & < 110	87
VC-6	Mg/(Ca + Mg)	< 40 %	49%
VC-6	Ca/ (Ca + SO4)	> 50 %	47%
VC-9	Conductivity/Cations	>90 & < 110	88
VC-9	Mg/(Ca + Mg)	< 40 %	51%
VC-9	Ca/ (Ca + SO4)	> 50 %	45%
S10-1	Conductivity/Cations	>90 & < 110	86
S10-1	K/(Na + K)	< 20%	39%
S10-1	Na/(Na + Cl)	> 50%	46%
S13-7	Conductivity/Cations	>90 & < 110	89
S17-2	Conductivity/Cations	>90 & < 110	88
S17-2	Na/(Na + Cl)	> 50%	44%
WQ3-6	Conductivity/Cations	>90 & < 110	74
WQ3-26	Conductivity/Cations	>90 & < 110	119
WQ3-26	K/(Na + K)	< 20%	25%
WQ3-41	Conductivity/Cations	>90 & < 110	87
WQ3-43	Conductivity/Cations	>90 & < 110	85
WQ4-12	Conductivity/Cations	>90 & < 110	76
WQ4-12	K/(Na + K)	< 20%	24%
92-91-03	TDS/Conductivity	>0.55 & <0.75	0.77
92-91-03	Conductivity/Cations	>90 & < 110	82
UT0023540-001 Jul 13	TDS/Conductivity	>0.55 & <0.75	0.79
UT0023540-001 Sep 21	TDS/Conductivity	>0.55 & <0.75	0.87

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. A geological influence is most likely here, since most samples have the same inconsistencies, and they recur each quarter.

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. 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>.

For the third quarter of 2007, the Permittee has not exceeded the daily max of 1310 mg/L for TDS. However, at Outfall 001 the 30-day average has remained 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.

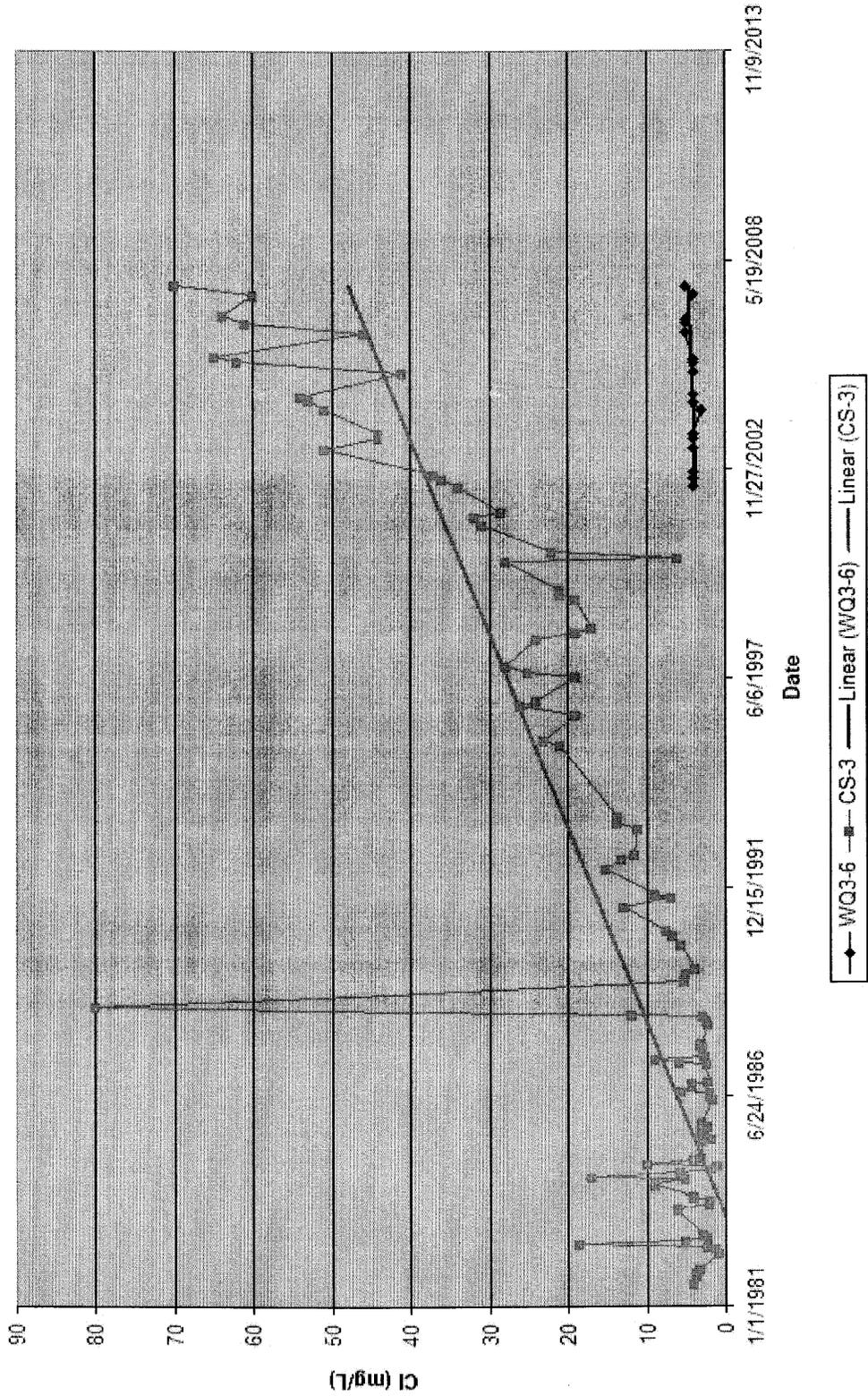
There is no commitment in the MRP to resample for baseline parameters. However, they are required to monitor 8 stream sites (CS-1, CS-7, CS-8, CS-10, CS-16, CS-17, CS-18, and VC-10) and 13 springs (S13-2, S14-4, S15-3, S22-5, S22-11, S23-4, S24-12, S26-13, S34-12, S35-8, S36-12, 2-413, and 3-290) for all operational parameters at high and low flow (where accessible) once every five years (2010, 2015, etc.), and whenever abrupt changes in flow occur.

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

No further actions are necessary at this time.

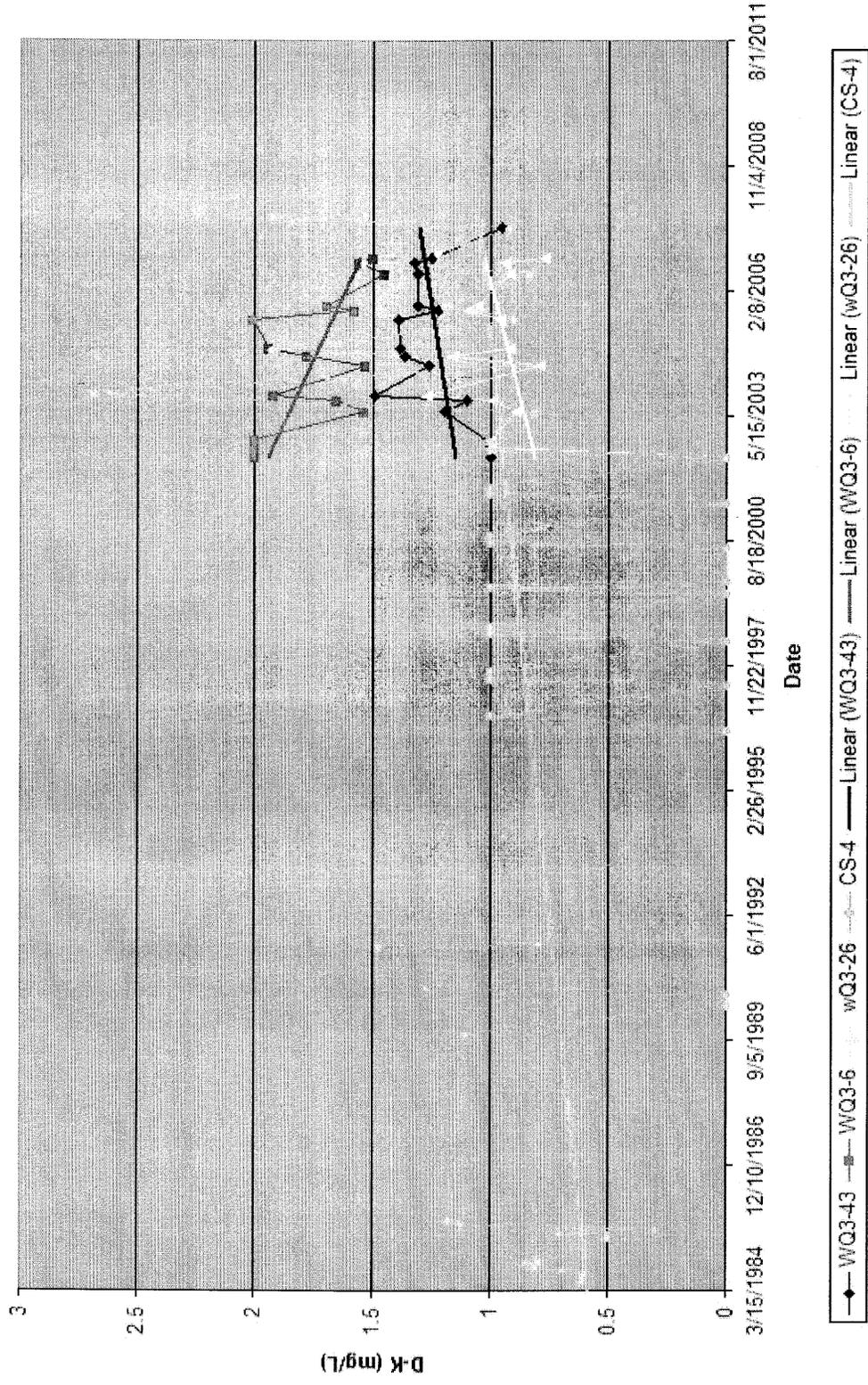
Chloride

$R^2 = 0.332$



Dissolved Potassium

$R^2 = 0.0908$ $R^2 = 0.0796$
 $R^2 = 0.0793$ $R^2 = 0.0648$



Legend:
 WQ3-43 (solid line with diamond markers)
 WQ3-26 (dashed line with square markers)
 CS-4 (solid line with circle markers)
 WQ3-6 (dotted line with triangle markers)
 Linear (WQ3-43)
 Linear (WQ3-26)
 Linear (WQ3-6)
 Linear (CS-4)

