

# WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

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October 30, 2007

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TO: Internal File

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

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

RE: 2006 Fourth Quarter Water Monitoring, Canyon Fuel Company, Soldier Canyon Mine, C/007/0018-WQ-06-4, Task ID #2681

The Soldier Canyon Mine has been in temporary cessation since 1998.

Pertinent water monitoring requirement information is in the MRP in Section 7.31.2, summarized in tables 7.31-1 through 7.31-4. The tables and text explain what is currently required (under temporary cessation), and changes in the monitoring plan that will immediately take effect if the mine becomes active.

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

**Springs** –

*During temporary cessation, the Permittee is not required to monitor any springs at the Soldier Canyon Mine.*

**Streams** –

*During temporary cessation, the Permittee is required to sample G-5, and G-6 flow, and the laboratory parameters outlined in Table 7.31-4 each quarter.*

The Permittee monitored and reported the essential data for all streams as required during this quarter.

**Wells**–

*During temporary cessation, the Permittee is not required to sample any wells at the Soldier Canyon Mine.*

**UPDES**–

*There are three active UPDES sites at the Soldier Canyon Mine. They are all*

*under the permit #UT0023680, and include outfalls 001 (MW-01), 002, and 003 (MW-02). The Permittee is required to monitor each UPDES site monthly.*

The Permittee monitored and reported the essential data for all UPDES sites as required during this quarter. None of the UPDES sites recorded any flow during the period.

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

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

Parameters that fell outside of 2 standard deviations from the mean encountered at the respective sites were:

Site	Parameter	Value	Standard Deviations from Mean	Mean
G-6	Dissolved Sodium	112 mg/L	2.29	61.48 mg/L
G-6	Chloride	24 mg/L	2.75	11.89 mg/L
G-6	Total Alkalinity	434 mg/L	2.08	318.83 mg/L
G-6	Carbonate (as CaCO <sub>3</sub> )	46 mg/L	2.02	26.33 mg/L

The salinity at G-6, which is affected by several parameters (Cl, Na, Mg, SO<sub>4</sub>, Ca, K, HCO<sub>3</sub>, etc.), has always been at the high end of "fresh" (<500 mg/L NaCl equivalent) and at times crosses into the "brackish" category (500-30000 mg/L NaCl equivalent). The average salinity has been approximately 415 mg/L NaCl equivalent with 21% of all samples >500 mg/L, 55% >400 mg/L, and 92% >300 mg/L. There is no real upward trend in salinity ( $R^2 = 0.0482$ ) and a weak negative correlation to flow ( $R^2 = 0.22$ ). Similarly high, fluctuating salinity values were recorded at G-1 (2 miles upstream) from 1987 to 1999. Samples taken at G-7 in the 1970's ranged from 385 to 635 mg/L NaCl equivalent.

Chloride (24 mg/L) has no real trend at G-6 ( $R^2 = 0.0012$ ) nor correlation to flow ( $R^2 = 0.03$ ). This is the highest concentration of chloride ever recorded at this site, but a level of 24 mg/L is well below any water quality limits.

The value for sodium (112 mg/L) is the largest ever recorded at G-6, but there is no real upward trend ( $R^2 = 0.0434$ ). There is a weak negative correlation to water level. There is no water quality standard for sodium, but it does affect salinity as described above.

The alkalinity at G-6 has no real trend ( $R^2 = 0.0755$ ), with a weak negative correlation to flow ( $R^2 = 0.29$ ). Carbonate has a weak upward trend ( $R^2 = 0.3149$ ) and no correlation to flow. Alkalinity is a measure of buffering capacity, or the ability of a water-source to absorb acid

without a change in pH. Very high levels of alkalinity can cause soil problems and leave white scale on spray-irrigated plants. Average alkalinity values recorded from 1987-1999 at G-1, 2 miles upstream, were higher than the average of recorded values at G-6 (379 mg/L vs. 319 mg/L).

Since

- G-6 is above the mine yard,
  - no activity or discharge takes place at the portals, and
  - similar high readings were recorded in the past at sites well above the mine,
- the fluctuation of these constituents must be attributed to upstream processes or activities.

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

Site	Reliability Check	Value Should Be...	Value is...
G-5	Conductivity/Cations	> 90 & < 110	77
G-5	Mg/(Ca + Mg)	< 40 %	63%
G-5	Ca/ (Ca + SO <sub>4</sub> )	> 50 %	49%
G-6	Conductivity/Cations	> 90 & < 110	79
G-6	Mg/(Ca + Mg)	< 40 %	62%

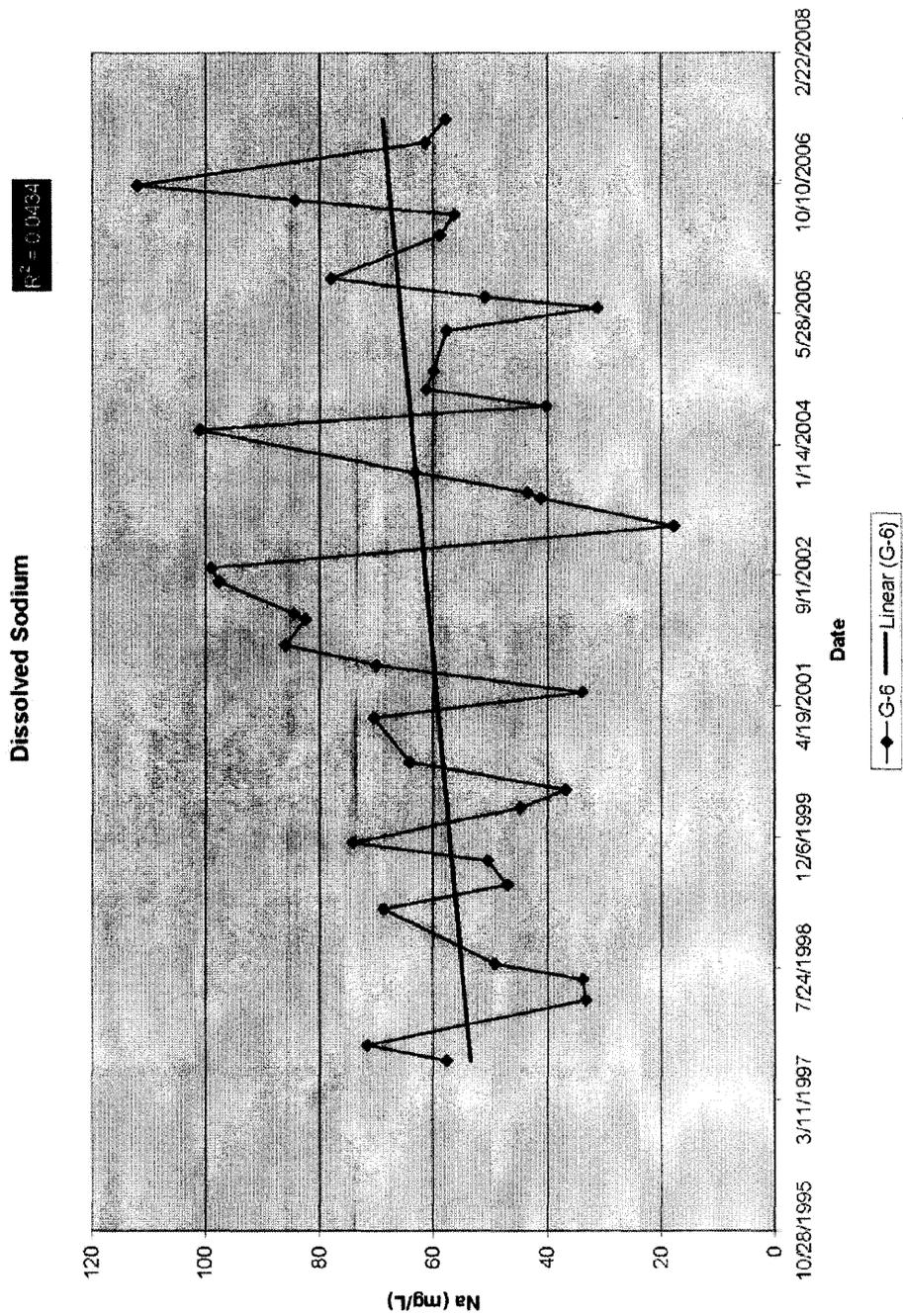
The Permittee should work with the lab to make sure that samples pass all quality checks so that the reliability of the samples does not come into question. These inconsistencies do not necessarily mean that a sample is wrong, but it does indicate that something is unusual. An analysis and explanation 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.**

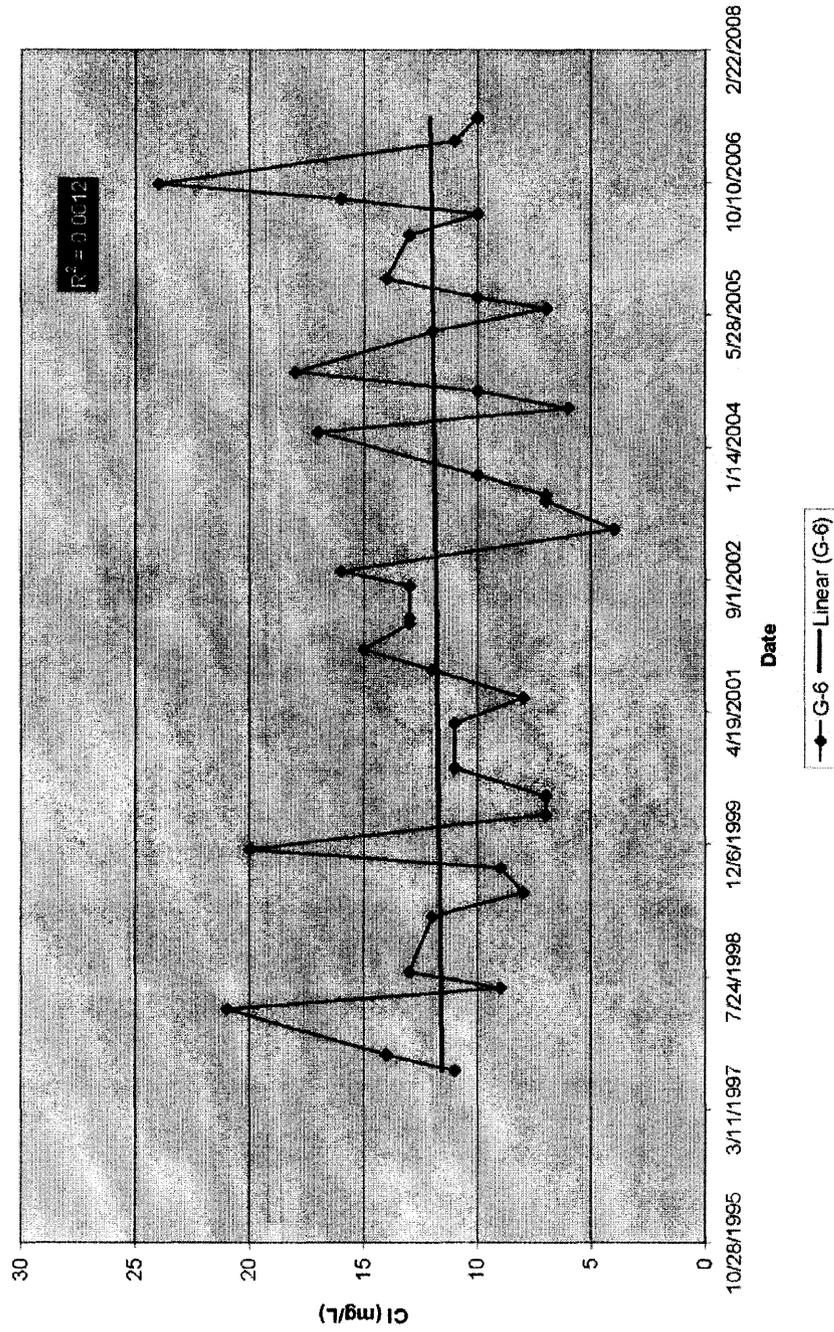
The MRP does not contain a commitment for re-sampling of baseline water data.

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

No further actions are required at this time.

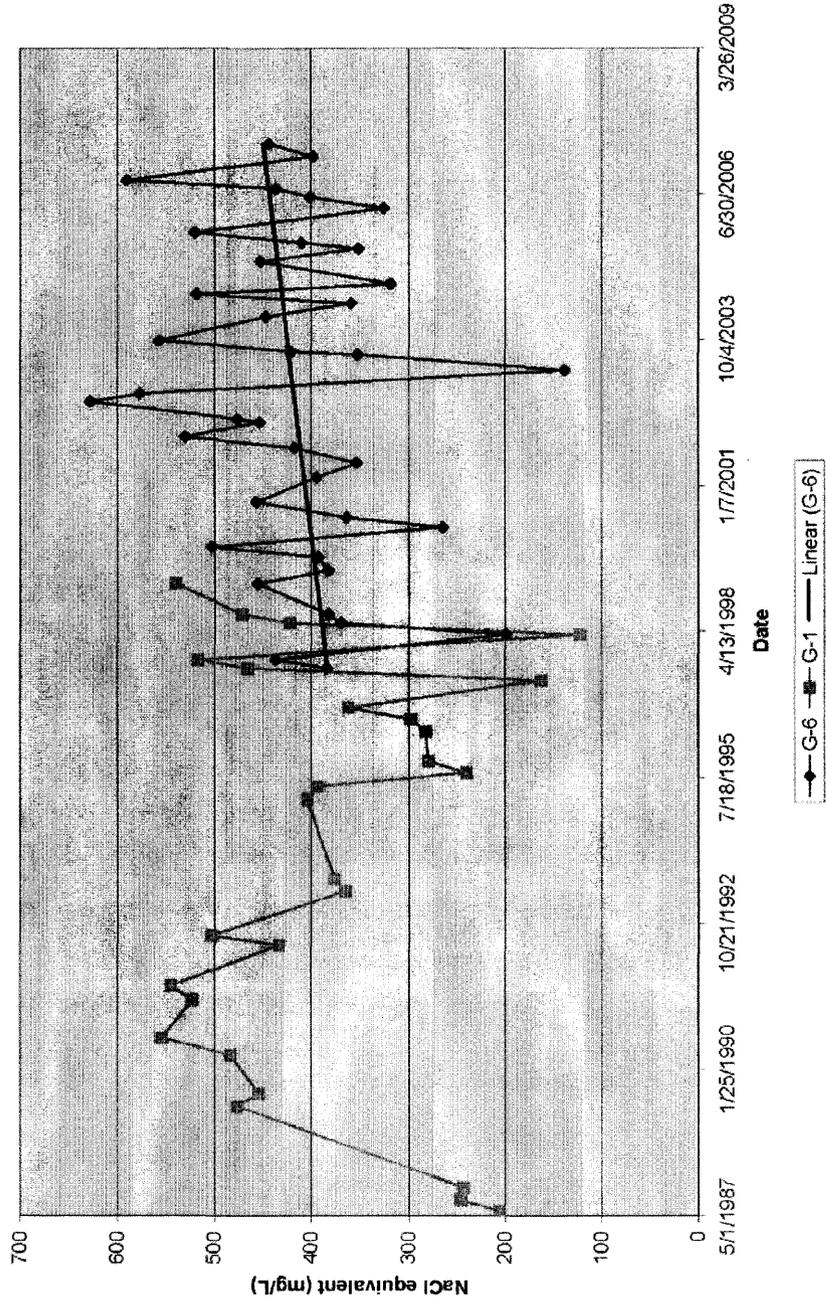


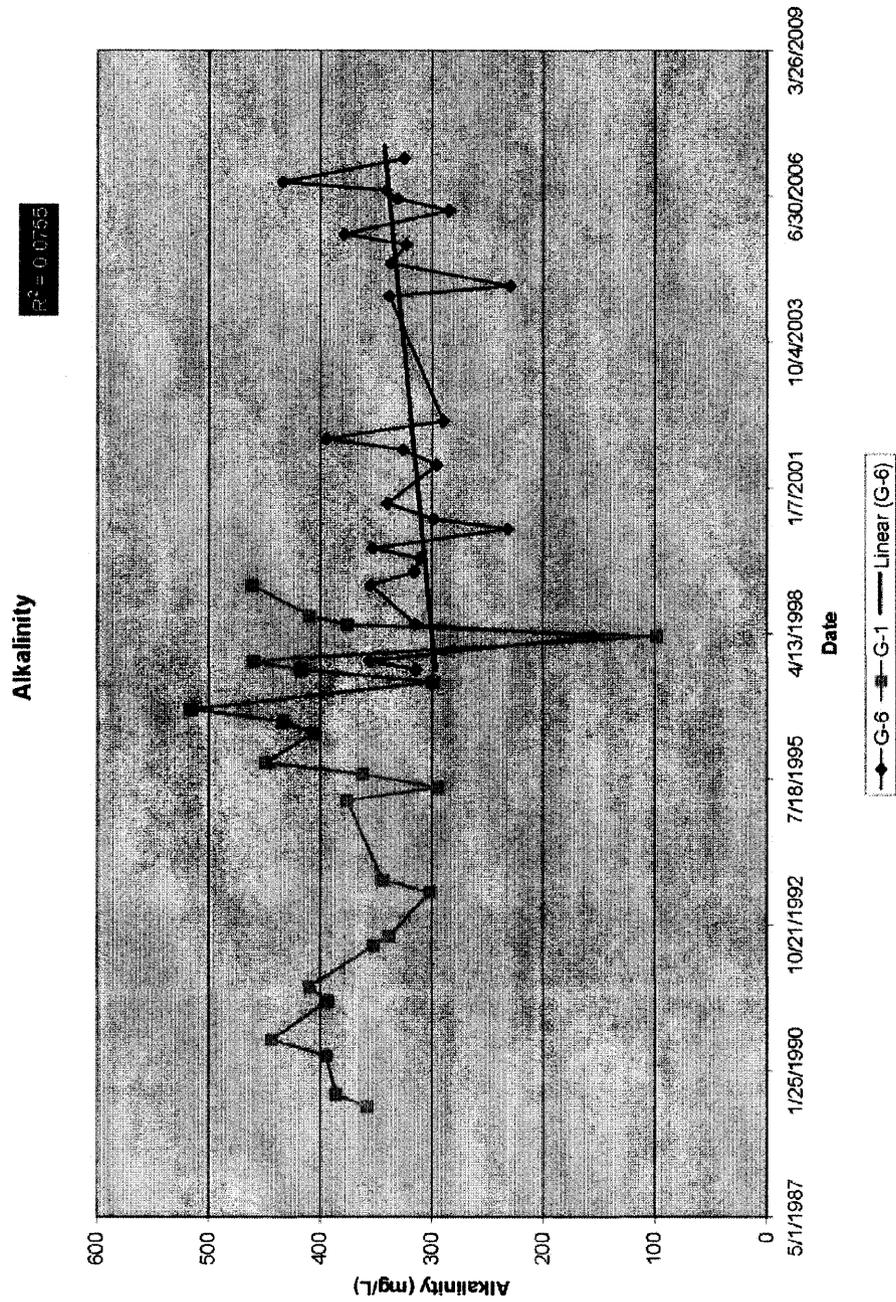
Chloride



$R^2 = 0.0366$

Salinity





Carbonate

