0011

WATER QUALITY MEMORANDUM
Utah Coal Regulatory Program

#3198

May 12, 2009

TO: Internal File

THRU: Daron Haddock, Permit Supervisor

FROM: James D. Smith, Environmental Scientist III JS 05/13/09

RE: 2008 Second Quarter Water Monitoring, Canyon Fuel Company, LLC, Skyline Mine, C/007/0005, Task ID #3198

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 of the MRP, in particular pages 2-35 through 2-39aa, 2-44, and 2-45.

Sampling during the 2nd quarter can be done through July 15 when snow prevents access before June 1. At stream sampling sites NL-1 through NL-42, in the North Lease, 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.

Samples are analyzed for isotopes at several sites. Because determinations of isotopic concentrations can require several months, these values are often reported much later than those for field measurements and routine laboratory analyses. The Permittee has always been quite prompt at getting the data to the Division as soon as they receive them from the lab.

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

In-mine

The MRP requires 2nd quarter sampling of 6 sites classified as "in-mine, roof drippers" in the database, but in actuality mine discharge stations CS-12, CS-14, MD-1, and SRD-1 and french drain CS-13 are monitored as streams and ELD-1, the combined output of JC-1 and JC-3, is monitored as a well.

Springs

The MRP requires spring sampling at 25 springs during the 2nd quarter (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, WQ1-39, WQ3-6, WQ3-26, WQ3-41, WQ3-43, and WQ4-12). WQ1-1, added to the MRP in 2008, was not sampled during the 2nd quarter 2008.

The Permittee submitted data for the springs for the 2nd quarter 2008:

Streams

The MRP requires spring sampling at 36 stream-sites (CS-3, CS-4, CS-6, CS-7, CS-8, CS-9, CS-10, CS-11, CS-12, CS-13, CS-14, CS-16, CS-17, CS-18, CS-19, CS-20, CS-21, CS-22, CS-23, MD-1, SRD-1, F-9, F-10, UP&L-10, VC-6, VC-9, VC-10, VC-11, VC-12, WRDS-1, WRDS-2, WRDS-3, WRDS-4, EL-1, and EL-2).

The Permittee submitted data for all stream monitoring sites for the 2nd quarter 2008. April and May "no flow" data need to be entered into the pipeline for F-9 and F-10.

Wells

The MRP requires spring sampling at 18 wells (JC-1, JC-3, ELD-1, W79-10-1-B, 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, W99-28-1, W20-28-1, 91-26-1, W91-35-1, and 92-91-03).

The Permittee submitted data for all wells for the 2nd quarter 2008. Flow data for April and May at JC-1 need to be entered into the pipeline. The Permittee has had problems loading the isotope data for JC-1 into the pipeline

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 by PacifiCorp; JC-3 has not discharged since July of 2004.

The Permittee submitted all required samples for the UPDES sites. Outfalls -001 and -002 discharged during the 2nd quarter, all 13 weeks at -001 and 3 weeks at -002.

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

- Dissolved Fe and dissolved Mn were not reported for 92-91-03.
- Flow data for April and May at JC-1 need to be entered into the pipeline.
- The Permittee has had problems loading the isotope data for JC-1 into the pipeline.
- April and May "no flow" data for F-9 and F-10 need to be entered into the pipeline.

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

Listed below are parameters that fell outside two standard deviations from the mean.

Parameter	Site	Value	Standard Deviations from Mean	Mean
NO2+NO3 as N				
	CS-3	5.05 mg/L	3.69	0.89 mg/L
	CS-9	4.06 mg/L	2.45	1.51 mg/L

	CS-11	2.79 mg/L	2.03	0.45 mg/L
	CS-13	3.26 mg/L	3.26	0.45 mg/L
	VC-9	2.66 mg/L	2.45	0.58 mg/L
	WQ1-39	2.34 mg/L	2.72	0.78 mg/L
	WQ3-26	3.44 mg/L	2.59	1.42 mg/L
	WQ3-41	2.25 mg/L	2.09	0.27 mg/L
	WQ3-43	3.51 mg/L	3.13	0.97 mg/L
	WQ4-12	0.77 mg/L	2.04	0.27 mg/L
bicarbonate as CaCO3				
	CS-3	159 mg/L	2.52	21.33 mg/L
	CS-4	158 mg/L	2.28	222.5 mg/L
	CS-9	211 mg/L	2.24	238.42 mg/L
	CS-11	168 mg/L	2.43	241.58 mg/L
	CS-19	123 mg/L	2.48	206.67 mg/L
	CS-20	106 mg/L	2.63	170.92 mg/L
	F-10	161 mg/L	2.71	211 mg/L
	S13-7	60 mg/L	2.28	136.45 mg/L
	UPL-10	89 mg/L	2.20	135.85 mg/L
total alkalinity as CaCO3				
	CS-3	159 mg/L	2.38	219.05 mg/L
	CS-19	145 mg/L	2.20	209.82 mg/L
	F-10	161 mg/L	3.01	212.19 mg/L
	UPL-10	100 mg/L	2.43	146.46 mg/L
cation/anion balance				
	CS-6	4.1 %	2.14	1.35 %
	CS-3	5.7 %	2.43	1.95 %
	CS-11	3.7 %	2.36	1.35 %
	CS-13	4.7 %	2.1	1.5 %
	CS-21	5.8 %	3.08	1.58 %
	WQ3-26	12.9 %	2.85	3.26 %
	UPL-10	5.1 %	2.21	1.93 %
	S10-1	11.1 %	2.39	3.46 %
total cations				
	CS-19	3.6 meq/L	2.36	5.05 meq/L
	CS-20	3.3 meq/L	2.16	4.5 meq/L
	F-10	3.9 meq/L	2.04	4.79 meq/L
flow				
	CS-11	1238 gpm	3.33	186.96 gpm

	CS-16	1780 gpm	2.25	382.99 gpm
	CS-19	1760 gpm	3.04	342.84 gpm
	CS-20	2650 gpm	2.62	601.82 gpm
	CS-21	2080 gpm	3.91	281.65 gpm
	CS-23	4350 gpm	2.32	780.38 gpm
	F-9	705.7 gpm	4.23	118.86 gpm
	F-10	1075 gpm	4.41	187.43 gpm
	NL-10	484.7 gpm	2.74	103.55 gpm
	NL-13	605.9 gpm	2.87	111.59 gpm
	NL-14	395 gpm	2.73	89 gpm
	S22-5	48.4 gpm	2.06	15.43 gpm
	S23-4	8.2 gpm	2.18	2.22 gpm
	S26-13	11.95 gpm	4.57	1.88 gpm
	S35-8	64 gpm	2.27	14.61 gpm
	3-290	121 gpm	4.26	10.94 gpm
	WQ3-41	1230 gpm	4.24	66.99 gpm
	UT0023540-002 (4/14/08)	60 gpm	4.59	2.31 gpm
	WQ3-43	19.74 gpm	2.87	3.43 gpm
field specific conductivity				
	CS-17	170 µmhos/cm	2.01	272 µmhos/cm
	CS-19	315 µmhos/cm	2.05	437.8 µmhos/cm
	F-9	302 µmhos/cm	2.27	395.9 µmhos/cm
	F-10	290 µmhos/cm	2.43	386.4 µmhos/cm
	S26-13	241 µmhos/cm	2.07	386.6 µmhos/cm
	S34-12	0 µmhos/cm	5.53	419.0 µmhos/cm
	WQ3-26	1405 µmhos/cm	4.21	215.2 µmhos/cm
total hardness as CaCO3				
	CS-19	170 mg/L	2.53	233 mg/L
	CS-20	156 mg/L	2.42	215.7 mg/L
	CS-21	192 mg/L	2.29	243.2 mg/L
	F-10	190 mg/L	2.31	234.6 mg/L
TDS				
	CS-19	208 mg/L	2.28	264.5 mg/L
	UT0023540-002 (4/14/08)	687 mg/L	2.06	354.1 mg/L
sulfate				
	CS-21	14 mg/L	2.15	20.64 mg/L
DO				

	VC-9	0 mg/L	4.47	8.38 mg/L
field water temperature				
	S34-12	0 °C	4.44	6.67 °C
field pH				
	S34-12	0 pH units	5.74	7.42 pH units
Cl				
	WQ3-43	5.0 mg/L	2.23	3.37 mg/L

The cation/anion balance at S10-1 and WQ3-26 is outside two standard deviations and well above the 5% attention value. Similar values were noted during the First Quarter 2008. It is not clear why these two sites have such high values, but the Permittee should be able to explain.

The 0 (zero) value for pH at S34-12 cannot be valid; likewise, 0 mg/L value for DO at VC-9 and 0 µmhos/cm at S34-12. These indicate the Permittee needs to check the field procedures and results more carefully. The 0 °C water temperature at S43-12 is possible but is problematic in light of the other questionable field parameters just mentioned.

Flow at a number of sites was above average. As this is the period of maximum snowmelt, these numbers are probably not cause for concern.

There were a number of sites with elevated field specific conductivity, but only two sites had elevated TDS, and CS-19 was the only site where both TDS and specific conductivity were elevated.

Ten sites had elevated NO2+NO3 as N: five stream sites and five springs. See the attached charts. There is no evident explanation for such a large number of sites with elevated N values. This parameter will be checked in successive quarters to determine if there is a trend or pattern.

Up until the First Quarter 2008, chloride values were increasing steadily at CS-3; however, the value has dropped to 29 mg/L, well below the average of 44 mg/L and comparable to the values that were being obtained when monitoring at this point began in 2000. See the attached chart.

Reliability Checks

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.) Several routine Reliability Checks found a number of values outside of the those espected.

- TDS/Conductivity
    - Out of 42 samples for which both field specific conductivity and TDS were

determined, 18 have TDS/Conductivity ratios within the typical range of 0.55 and 0.76.
    - Only two are low: S13-7 is slightly below 0.55, but the ratio at WQ3-26 is only 0.08, indicating a possible quality control problem.
    - Fifteen of the seventeen sites where this ratio is > 0.8 are UPDES discharge points, and no UPDES sites have a ratio < 0.8.
  - The Conductivity/Total Cations ratio should be close to 1.00.
    - For 25 of the 26 samples that had both parameters determined, this ratio ranges from 0.73 to 1.22,
    - The ratio at WQ3-26 was 12.77.
  - These two checks indicate that the field specific conductivity measurement at WQ3-26 is probably invalid.
  - In response to the comment in the First Quarter 2008 Water Quality Memo on calibrating the field specific conductivity meter, the Permittee stated that they routinely clean and calibrate the conductivity meter and verify that the field parameters are within site specific range.

- The Division calculated Reliability Checks that involve dissolved Ca, Mg, K, Na, Cl, and SO4. There were 26 samples that were analyzed for these five ions.
  - Ideally the Mg/(Ca + Mg) ratio is < 40%.
    - Of the 26, 25 have a ratio < 40%.
    - The 26th sample, CS-12, is right at 40%, the same as during the First Quarter 2008.
  - Ideally the Ca/(Ca + SO4) ratio is > 50%.
    - Of the 26 samples, 7 have a ratio < 50%.
    - Because Mg/(Ca + Mg) values are within the expected range, SO4 values may bear watching at these 7 sites.
  - The K/(K+ Na) ratio should be < 20%.
    - Half the sites are > 20 %.
    - The highest is 36 %, at WQ3-12.
  - The Na/(Na + Cl) ratio should be > 50%.
    - Only 10 of the 26 sites are > 50 %
    - The ratio is as low as 20 % (at CS-3).
    - The analyses for ions should be watched during the coming quarters for quality and consistency.

Reliability Checks not meeting the target value 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. An analysis and explanation of the inconsistencies by the Permittee would help to increase the Division's confidence in the procedures used for sample collection and analysis. 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.

UPDES

The UPDES permit in effect during the 2nd quarter (dated Nov. 23, 2004) allows for a DML for TDS of 1,310 mg/l and a 30-day average of 500 mg/l. There is no tons/day DML unless

the 30-day average exceeds 500 mg/l; then a 7.1 tons/day limit is imposed. For the 2nd quarter of 2008, the discharge at UPDES Permit discharge points UT0023540-001 (13 weeks) and -002 (3 weeks) did not exceed the DML for TDS; however, the 30-day average remained well above 500 mg/l and the tons/day load during the 2nd quarter averaged over 10 tons/day (as calculated from the TDS and flow data in the database).

Because of such ongoing exceedences, Canyon Fuel Company participates in the Salinity Offset Plan that was approved by DWQ on January 5, 2005 (retroactive to September 2004). 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.

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?

- Flow data for April and May at JC-1 need to be entered into the pipeline.
- The Permittee needs to resolve the problems with loading the isotope data for JC-1 into the pipeline.
- April and May "no flow" data for F-9 and F-10 need to be entered into the pipeline.

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

Some data that have been submitted still need to be entered into the database (see item 5 above). Dissolved Fe and Mn were not measured at 92-92-03, so values for these parameters cannot be submitted.

7. Follow-up from last quarter, if necessary.

In an e-mail dated 4/17/08, Austin Belcher addressed several items that were noted in the First Quarter 2008 water monitoring:

> 1) UPDES-001 dated 3/14/2008; the Total Iron was not required because it was sampled the week before and after; Total Iron is 2 X month. The field data, water temperature and conductivity are not required to be reported [for UPDES sites].
>
> 2) The other Total Irons that are indicated as missing on the following dates 1/8/08, 1/24/08, 2/13/08, 2/26/08, and 3/27/08 are not required because in each case Total Iron was analyzed the week before and after.

3) We routinely clean and calibrate the conductivity meter and verify that the field parameters are within site specific range.

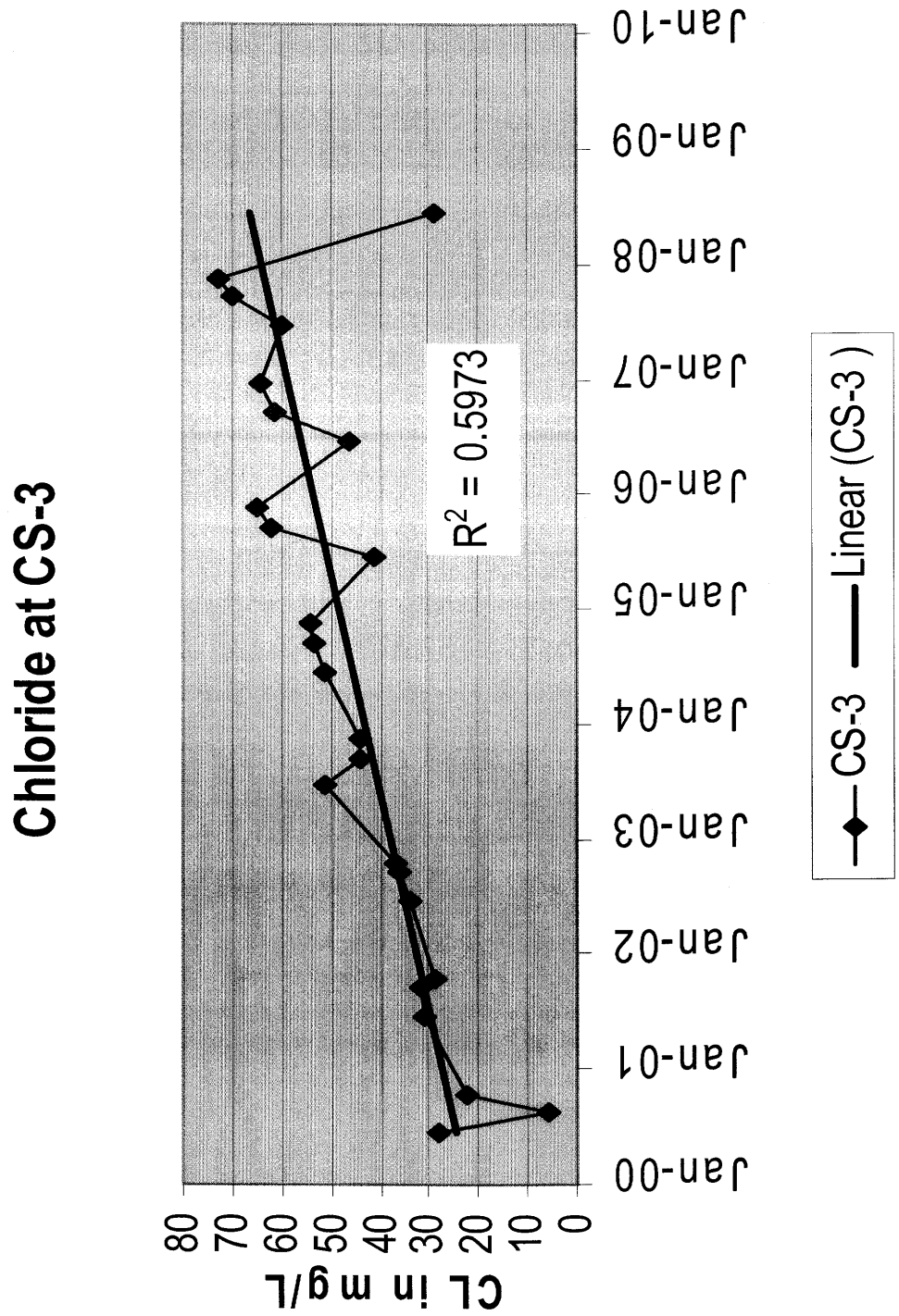
4) Site CS-1 was removed as a monitoring site during the 2005 water monitoring reduction. On table 2.3.7-3 CS-1 should have been removed from Eccles Canyon and under Huntington Canyon it should be CS-10 not CS-1.

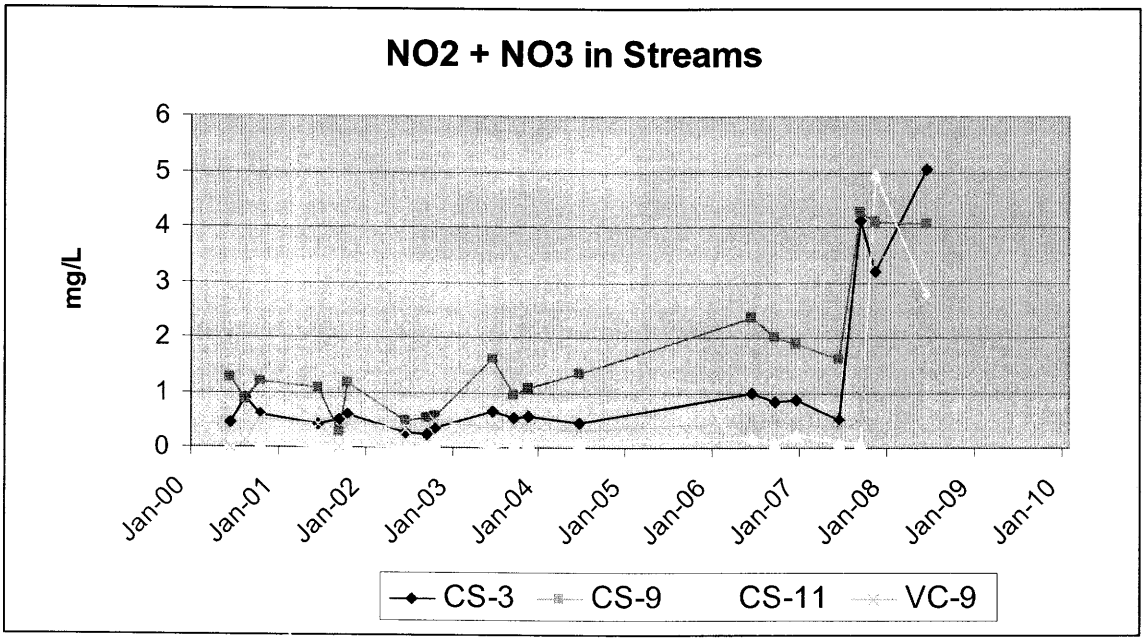
5) MC-1 through MC-6 sampling was concluded after reporting the information in 2005. See section 2.3 page 2-35 to 2-35a of the MRP.

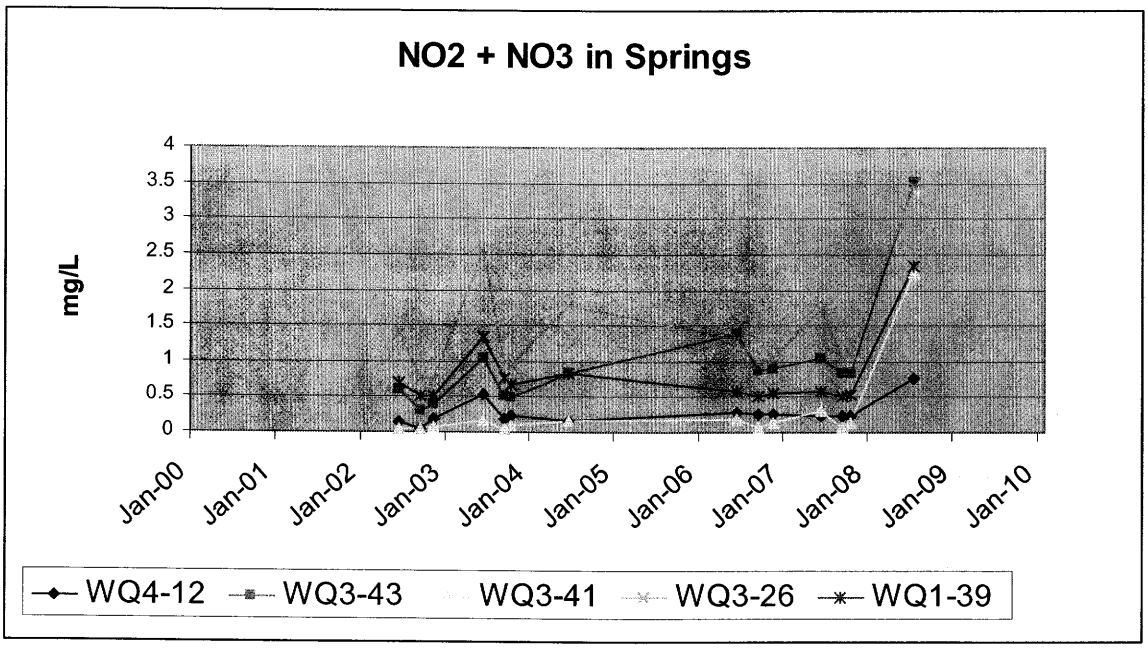
8. Did the Mine Operator submit all the missing and/or irregular data (datum)?

Austin Belcher provided additional data for MD-1, S26-3, S35-8, and JC-1 in an e-mail dated 5/7/2008. He also indicated that additional data had been entered into the pipeline for 2-413, 8-253, S15-3, S24-1, WQ1-1, EL-1, and EL-2.

Some data that have been submitted still need to be entered into the pipeline and database (see item 5 above). Dissolved Fe and Mn were not measured at 92-92-03, so values for these parameters cannot be submitted.


Chloride at CS-3
CL in mg/L
80
70
60
50
40
30
20
10
0
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
R^2 = 0.5973
CS-3
Linear (CS-3)


NO2 + NO3 in Streams
mg/L
6
5
4
3
2
1
0
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
CS-3
CS-9
CS-11
VC-9


NO2 + NO3 in Springs
mg/L
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
WQ4-12
WQ3-43
WQ3-41
WQ3-26
WQ1-39