

# WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

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March 29, 2010

TO: Internal File

THRU: James D. Smith, Permit Supervisor *JDS 01/30/2010*

FROM: Steve Christensen, Environmental Scientist *SKC*

RE: 2009 Second Quarter Water Monitoring, West Ridge Resources, West Ridge Mine, Task ID #3327

The West Ridge Mine is currently operational in the Book Cliff Mountain range of Carbon County, UT. Water monitoring data is submitted quarterly to the Division EDI database. Beginning on page 7-34 of the approved Mining and Reclamation Plan (MRP), water monitoring protocols and sampling requirements are provided for surface water, ground water, monitoring wells and UPDES outfalls in Tables 7-1, 7-2, 7-3 and 7-4 respectively.

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

### ***Springs***

*The approved MRP outlines the monitoring of 10 springs. Four of the springs (SP-12, SP-13, SP-15 and SP-16) discharge from the lower slopes of West Ridge in Whitmore Canyon. Two springs (WR-1 and WR-2) discharge from the upper slope of West Ridge in Whitmore Canyon. One spring (SP-8) discharges in the upper drainage of C Canyon. Hanging Rock Spring (S-80) is located near the northwest corner of the permit area and discharges from the east slopes of Whitmore Canyon. Spring 101 monitors Little Spring at the bottom of West Ridge. Spring 102 is located within Spring Canyon.*

Data was submitted for all spring monitoring sites with measurable flow.

### ***Streams***

*The approved MRP outlines the monitoring of 12 stream sites. Grassy Trail Creek is the only perennial stream in the permit and adjacent areas. Operational sampling is required quarterly for six stream sites (ST-3, ST-8, ST-9, ST-10, ST-13 and ST-15). Four sites (ST-5, ST-6, ST-6A and ST-7) are equipped with automatic samplers that are required to be checked*

*following precipitations events. Sites ST-11 and ST-12 were added to the water-monitoring program based upon field inspections conducted in 2005. The field inspections were conducted as part of a proposed lease expansion by the Permittee. At the time of the inspections, the Bear Canyon drainage had exhibited measurable flow. As a precaution, sites ST-11 and ST-12 were established within that drainage. Since that time (summer of 2005) neither site has produced appreciable/measurable flow. However, the sites remain as part of the surface water monitoring program and are inspected quarterly.*

Data was submitted for all stream-monitoring sites with measurable flow.

**Wells**

*Operational sampling is required quarterly for one groundwater monitoring well (Site DH 86-2).*

Monitoring well DH 86-2 was sampled during this quarter and all required data submitted.

**UPDES**

Operational sampling is required monthly for two active UPDES sites (Permit # UT0025640). Site D001 is the mine sites primary sediment pond discharge to the ephemeral 'C' Canyon drainage. Site D002 is the mine-water discharge to the ephemeral 'C' Canyon drainage. Specific limitations and self-monitoring requirements as outlined in the UPDES permit are presented in the table below:

<b>Effluent Characteristics</b>	<b>Effluent Limitations</b>
Flow, MGD (million gallons per day)	1.0
Total Suspended Solids (TSS), ppm	70
Total Iron, ppm	1.3
Oil & Grease, ppm	10
Total Dissolved Solids (TDS), ppm	2,000
pH	9

The Permittee submitted all required samples per the terms of the UPDES discharge permit.

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

**Surface Water Monitoring Sites:** All required parameters were reported for sites with

measurable flow.

**Groundwater and Well Monitoring Sites:** All required parameters were reported for sites that measurable flow.

**UPDES:** Site D001 did not produce any discharge during this quarter. All required parameters were reported for Site D002.

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

**Surface Water Monitoring Sites-** The following irregularities were found in the reported surface water monitoring data:

**ST-5-** Flow values have been steadily rising at surface water monitoring site ST-5 (See Chart Below). Four of the last five quarters of monitoring have produced flow values outside of two standard deviations from the mean. Based upon field inspections and discussions with the Permittee, it's apparent that the majority (if not all) of the flow within this ephemeral drainage is coming from the mine-water discharge. The reported flow value for this quarter was 700 gallons per minute (gpm), down from 987.36 gpm the previous quarter.

As the flow is generated from the mine-water discharge, particular attention has been paid to the TSS and T-Fe values. As discussed in detail below, these two parameters have shown significant upward trends within the mine-water discharge. As site ST-5 is comprised of mine-water, there is a potential for the TSS and T-Fe levels to rise. However, no such increase has been detected. The reported TSS and T-Fe levels for this quarter are 22 ppm and 0.619 ppm respectively (well below the established UPDES standard of 70 ppm and 1.3 ppm respectively for TSS and T-Fe).

**ST-6-** As with site ST-5, the majority (if not all) of the flow within this drainage comes from the mine-water discharge. The previous two quarters had reported increased flow values outside of two standard deviations from the data set. The reported flow value for this quarter was back to within two standard deviations. Again, as with site ST-5, as the TSS and T-Fe levels in the mine-water have steadily increased, particular attention has been paid on potential downstream impacts as a result. Site ST-6 is located less than ½ mile from the outlet of UPDES outfall D002 (mine-water discharge point) and as result, there is a potential for the TSS and T-Fe levels to also rise. However, the TSS and T-Fe levels reported for site ST-6 are within two standard deviations of the data set.

Reported values for Dissolved Potassium (D-K) and Bicarbonate (Bcarb) last quarter (1<sup>st</sup> quarter 2009) were outside of two standard deviations. The reported values for these parameters for this quarter were well within two standard deviations from the mean. Monitoring of these parameters will continue.

**ST-10-** Several parameters were reported outside two standard deviations during the third quarter of 2008. TSS, TDS, Cat-An PC Diff, and T-Fe values were significantly higher. Based upon rainfall data, it appeared that the elevated levels were caused by a large rainfall event prior to sampling. However, no flow was reported at monitoring ST-10 during both the 4<sup>th</sup> quarter of 2008 and the 1<sup>st</sup> quarter of 2009. As such, it was unknown as to whether the rainfall event had caused the elevated samples.

Sampling data was obtained for this quarter and all required parameters (including TSS, TDS, Cat-Ani PC Diff and T-Fe) were within two standard deviations from the mean. It would appear that the rainfall event might have caused a flushing event the resulted in the elevated concentrations.

**Groundwater Monitoring Sites-** Several irregularities were found in the reported groundwater monitoring data:

**SP-101-** Sampling could not be completed during the 1<sup>st</sup> quarter of 2009 due to inaccessible conditions. The previous quarter (4<sup>th</sup> quarter 2008), the reported dissolved magnesium (D-Mg) value was 2.33 standard deviations from the mean with a reported value of 54.74 ppm. Upon review of the sampling data obtained during this quarter, it appears that D-Mg is beginning to exhibit an upward trend. In addition, several parameters were reported outside two standard deviations from the data set:

- Dissolved Magnesium (D-Mg) was out by 3.27 standard deviations with a mean value of 52.34 ppm and a reported value of 67.5 ppm.
- Cat-Ani PC Difference was out by 2.38 standard deviations with a mean value of 0.92 and a reported value of 7.27.
- T-Hardness was out by 2.85 standard deviations with a mean value of 359.85 pm and a reported value of 426.74 ppm.
- T-Cations was out by 2.46 standard deviations with a mean value of 8.73 meq/L and a reported value of 10.27 meq/L.

**SP-102-** This spring reported two values outside of two standard deviations from the mean:

- Total Alkalinity (T-Alk) was out by 2.37 standard deviations with a mean value of 310.33 ppm and a reported value of 296 ppm.
- Bicarbonate (Bcrb) was out by 2.48 standard deviations with a mean value of 306.33 and a reported value of 290 ppm.

Continued monitoring of spring SP-102 will be conducted in order to detect if any significant trends are developing.

**SP-12-** Sampling was not possible the previous quarter (1<sup>st</sup> quarter 2009) due to accessibility issues due to snow/mud. The fourth quarter of 2008 had reported a TDS value outside of two standard deviations from the mean. The sampling from this quarter again reported an elevated TDS value as well as other parameters:

- Dissolved Calcium (D-Ca) was out by 2.44 standard deviations with a mean value of 42.59 ppm and a reported value of 50.89 ppm.
- Dissolved Sodium (D-Na) was out by 3.29 standard deviations with a mean value of 37.43 ppm and a reported value of 48.64 ppm.
- Sulfate (SO<sub>4</sub>) was out by 2.10 standard deviations with a mean value of 99.33 ppm and a reported value of 151 ppm.
- Lab-Specific Conductance (L-Sp. Cond) was out by 2.69 standard deviations with a mean value of 808.65 umhos/cm and a reported value of 917 umhos/cm.
- TDS was out by 2.63 ppm with a mean value of 458.44 ppm and a reported value of 584 ppm.
- Bcrb was out by 2.10 standard deviations with a mean value of 337.44 ppm and a reported value of 349 ppm.
- Total Cations (T-Cats) was out by 2.33 standard deviations with a mean value of 8.86 meq/l with a reported value of 10.34 meq/l.

Based upon the data set, TDS has been steadily trending upward since monitoring began in 2000.

**SP-13-** Several reported parameters were reported outside two standard deviations from the data set during the 4<sup>th</sup> quarter of 2008 (D-Ca, D-Mg, D-Na, SO<sub>4</sub>, T-Alk, T-Hdns., TDS and T-Cats). Due to weather conditions, the site was inaccessible during the 1<sup>st</sup> quarter of 2009. The reported value for D-Na was out by 2.18 standard deviations with a mean value of 49.33 ppm and a reported value of 72.73 ppm. (See chart below).

**SP-8** reported several parameters that were out by more than two standard deviations from the data set:

- Cation-Anion PC Diff was out by 3.10 standard deviations with a mean value of 1.06 and a reported value of 6.15.

- D-Na was out by 2.83 standard deviations with a mean value of 181.57 ppm and a reported value of 233.3 ppm.
- TDS was out by 2.40 standard deviations with a mean value of 1,351.64 ppm and a reported value of 1,551 ppm.

**SP-16-** TDS was out by 2.49 standard deviations during the 4<sup>th</sup> quarter of 2008. Due to weather conditions, the site was inaccessible during the 1<sup>st</sup> quarter of 2009. All required parameters were reported within two standard deviations from the data set mean, including TDS, for this quarter.

**WR-1-** Field pH was out by 2.86 standard deviations during the 4<sup>th</sup> quarter of 2008. Due to weather conditions, the site was inaccessible during the 1<sup>st</sup> quarter of 2009. The field pH value that was reported this quarter is back to within two standard deviations of the data set mean. The 4<sup>th</sup> quarter 2008 value may have been caused by instrumentation/calibration error in the field.

**Monitoring Well DH 86-2** reported 3 values outside two standard deviations during the 2<sup>nd</sup> quarter of 2009.

- Dissolved-Calcium (D-Ca) was out by 2.2 standard deviations with a mean value of 88.3 ppm and a reported value of 144.8 ppm.
- Chloride (Cl) was out by 2.49 standard deviations with a mean value of 90.01 ppm and a reported value of 339 ppm.
- Total Cations (T-Cat) was out by 2.14 standard deviations with a mean value of 26.12 ppm and a reported value of 40.79 ppm.

**WR-2** had reported an elevated concentration of D-Na beyond two STD during the 2<sup>nd</sup> quarter of 2008 (33.77 ppm). The spring did not produce a measurable flow during the 3<sup>rd</sup> and 4<sup>th</sup> quarters of 2008. The site was inaccessible during the 1<sup>st</sup> quarter of 2009 due to weather conditions. No observable flow was reported for this quarter. As such, it's uncertain as to what may have caused the elevated D-Na concentrations at this monitoring point. Continued monitoring of the site will be conducted.

**UPDES Sites- (UPDES Permit #UT0025640)**

- **Site D001-** UPDES outfall D001 (primary sediment pond at mine site) did not discharge this quarter.
- **Site D002-** UPDES Outfall 002 has exhibited fluctuating levels of TSS and T-Fe historically (See Charts below).

During the 1<sup>st</sup> quarter of 2008, a TSS value of 103 ppm was reported for D002, which

exceeded the 70 ppm standard established in the Permittee's UPDES Discharge Permit (# UT0025640). However; for the next 3 consecutive quarters (2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> quarters of 2008), the TSS levels were within the 70 ppm compliance level.

In the 1<sup>st</sup> quarter of 2009, the mine-water discharge at site D002 produced a TSS value outside of two standard deviations from the mean. However, that value (53 ppm) was within the 70-ppm compliance level.

Of 4 sampling events within the 2<sup>nd</sup> quarter of 2009, one TSS value was reported above the 70-ppm compliance levels (82 ppm). The reported value was out by 3.74 standard deviations with a mean value of 18.95 ppm for the entire data set.

T-Fe at outfall D002 has exhibited similar erratic trends (See Chart Below). T-Fe levels were particularly high during most of 2007 with a maximum reported value of 2.682 ppm. For 2008, T-Fe levels essentially stayed within the compliance level of 1.3 ppm as outlined in the UPDES Discharge Permit.

However, during the 1<sup>st</sup> quarter of 2009, the standard for T-Fe (1.3 ppm) was exceeded three times out of six sampling events (1.423 ppm, 1.478 ppm and 1.824 ppm).

The Permittee notified the Division in January of 2009 to report that coal fines had been accumulating within the C Canyon drainage as a result of the mine-water discharge. On January 1<sup>st</sup>, 2009, Division Inspector Steve Demczak issued a Notice of Violation (#10033) for "additional contributions of sediment to stream flow outside the permit area".

Additionally, on February 10<sup>th</sup>, 2009 (WQ09-1), the Division of Water Quality (DWQ) issued a violation for not meeting compliance levels for TSS and T-Fe at outfall D002 (mine-water discharge point).

Based on six sampling events for the 2<sup>nd</sup> quarter of 2009, reported T-Fe levels exceeded the 1.3 ppm standard four times (1.629 ppm, 2.07 ppm, 1.32 ppm and 1.934 ppm).

On March 30<sup>th</sup>, 2009, the Permittee submitted a 'Mitigation and Abatement Plan' that outlined the methods to remove the coal fine material from the 'C' Canyon Drainage as well as address the underground conditions and water management within the mine works (Task ID #3257). The Division reviewed the proposed amendment and found deficiencies that needed to be addressed. The amendment was returned deficient. On June 8<sup>th</sup>, 2009, the Permittee re-submitted the proposed amendment for technical review. The Division is currently reviewing the proposed amendment.

**4. On what date does the MRP require a five-year re-sampling of baseline water data.**

On page 7-35 of the approved MRP, the Permittee commits to collecting baseline samples *“from each spring in the monitoring program during the low flow (fall) sampling and from each stream monitoring sites during low flow every five years beginning with the first mid-term review.”*

The Division initiated the last mid-term review on November 9<sup>th</sup>, 2006. As such, baseline sampling of ground and surface water sites will be required during the 3<sup>rd</sup> quarter of 2011.

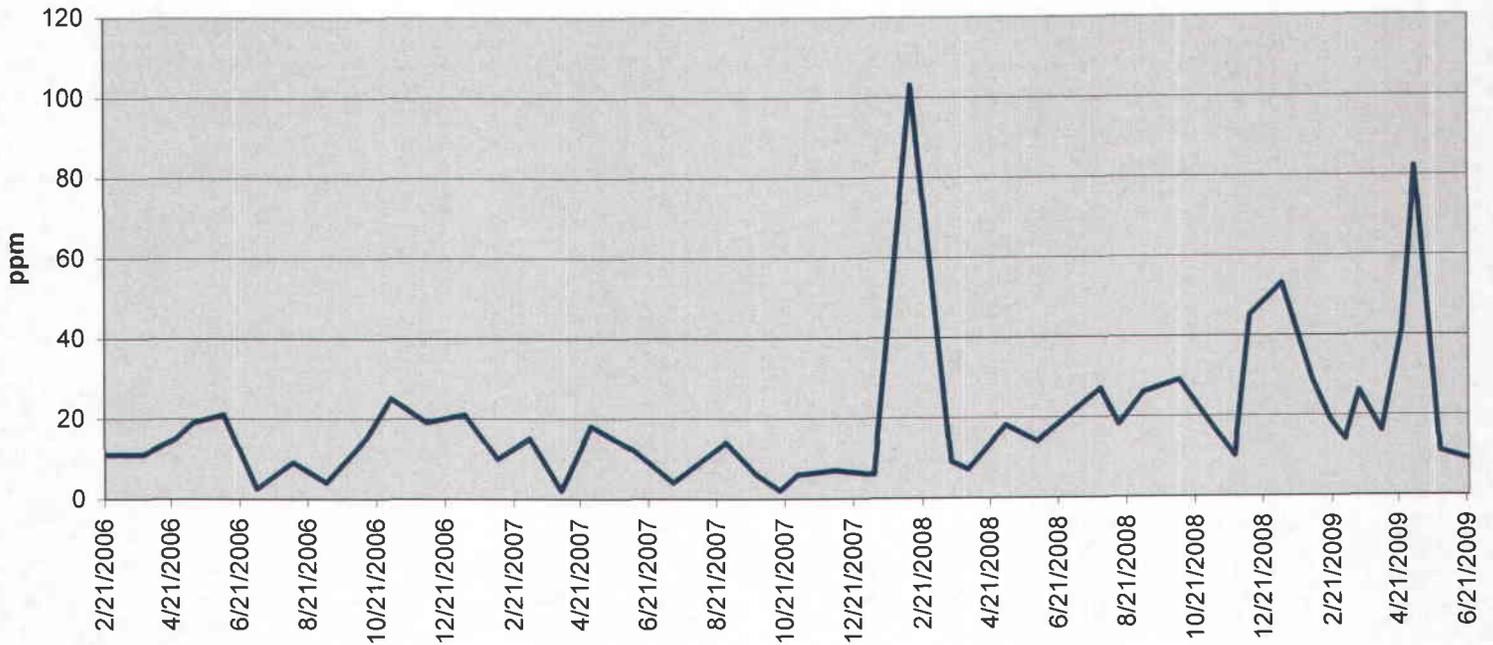
**5. Based on your review, what further actions, if any, do you recommend?**

Continue to monitor the data irregularities cited above for any trends. Work with the Permittee in developing a mitigation/clean-up plan for the coal fine accumulations within the C Canyon drainage.

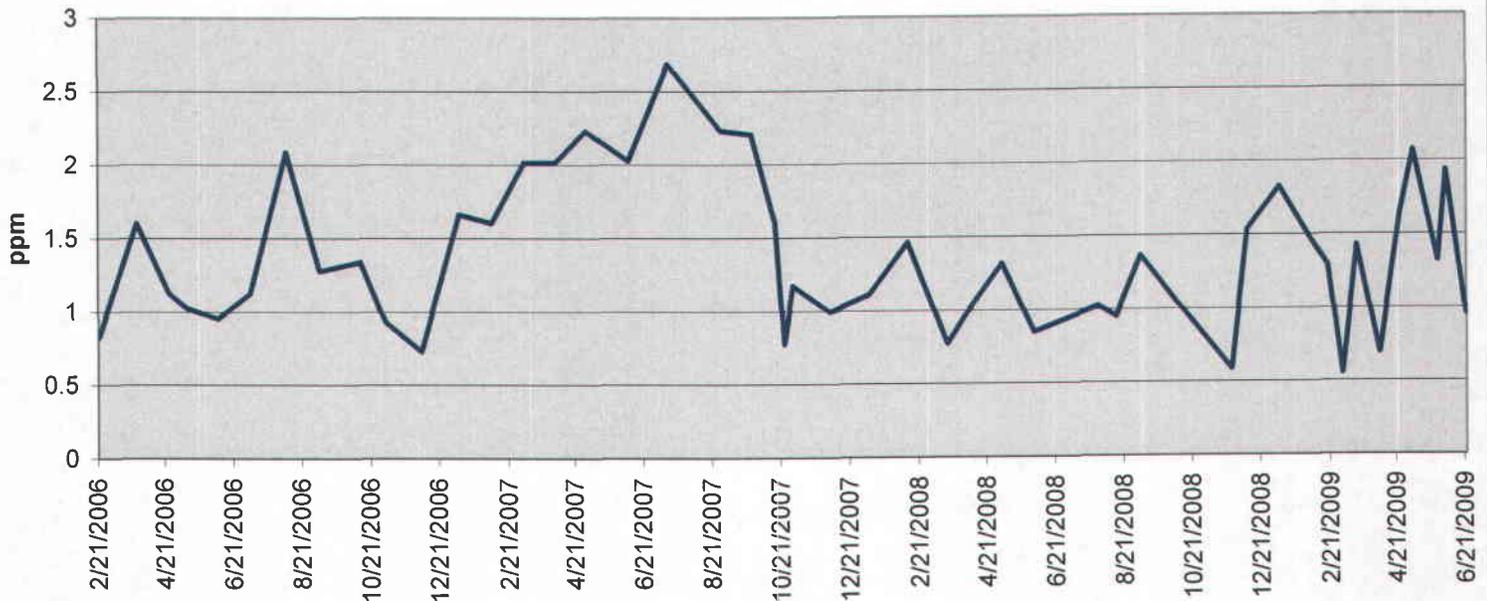
**6. Does the Mine Operator need to submit more information to fulfill this quarter's monitoring requirements?** YES  NO

**7. Follow-up from last quarter, if necessary. Did the Mine operator submit or provide an explanation for missing and/or irregular data?** YES  NO

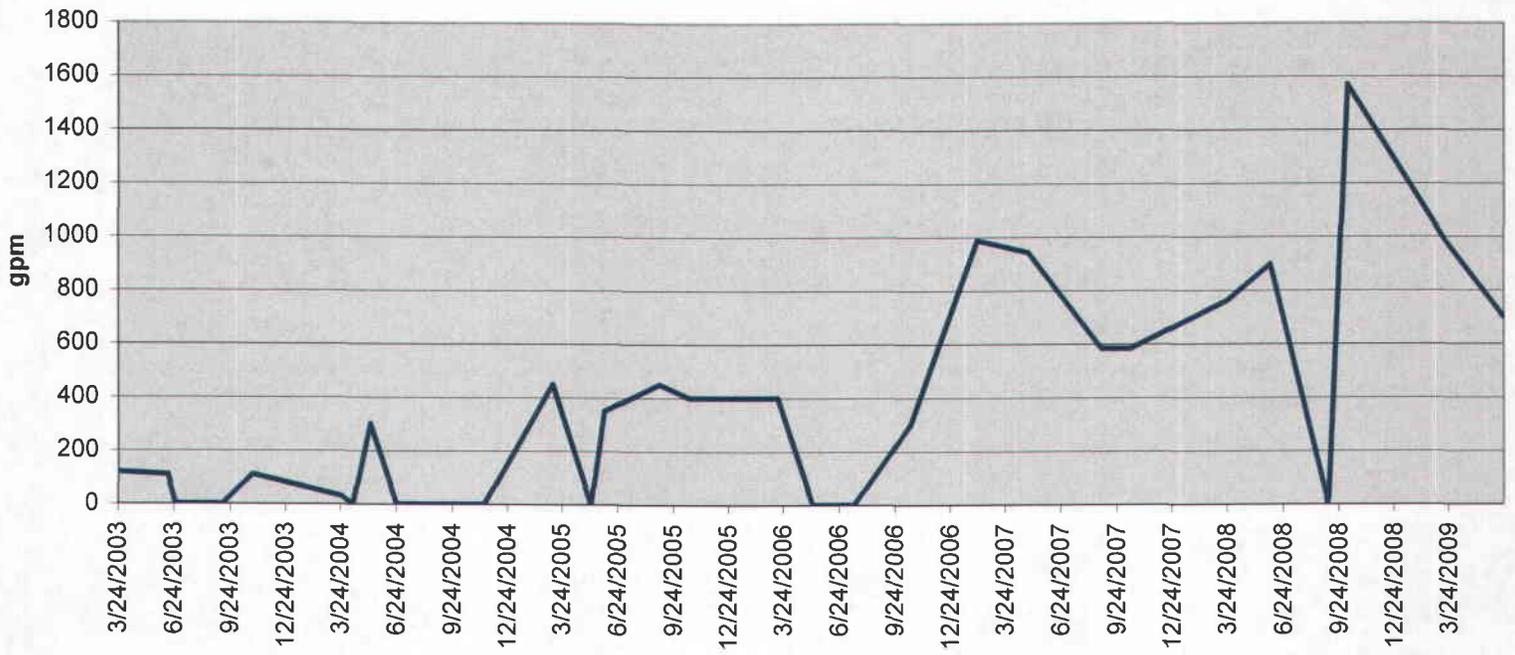
### UPDES Outfall D002: TSS vs. Time



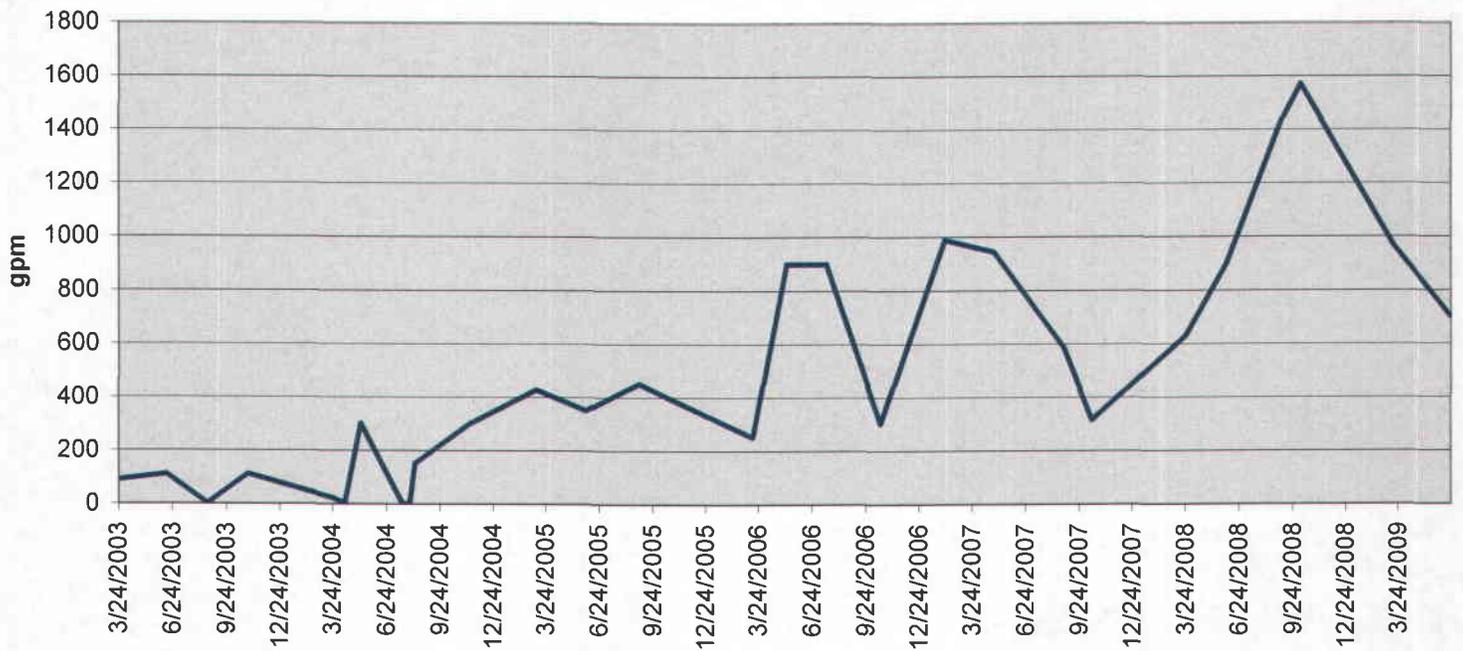
### UPDES Outfall D002: Total Iron (T-Fe) vs. Time



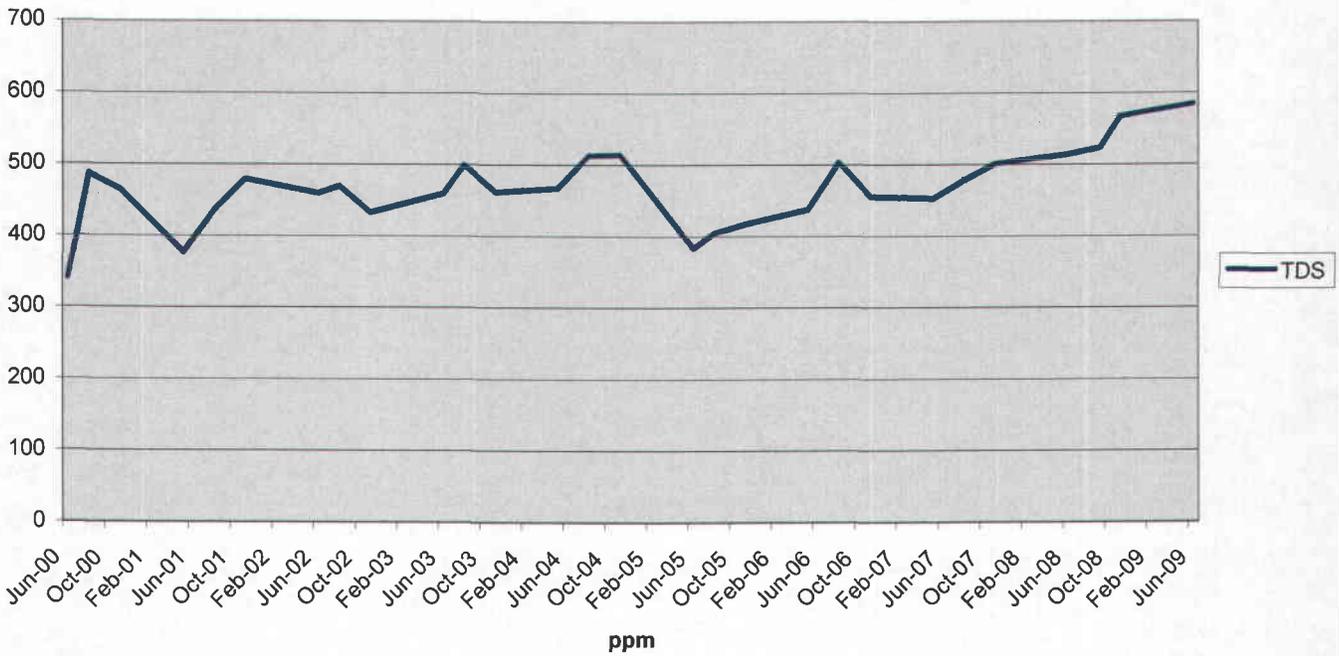
### ST-5: Flow Values



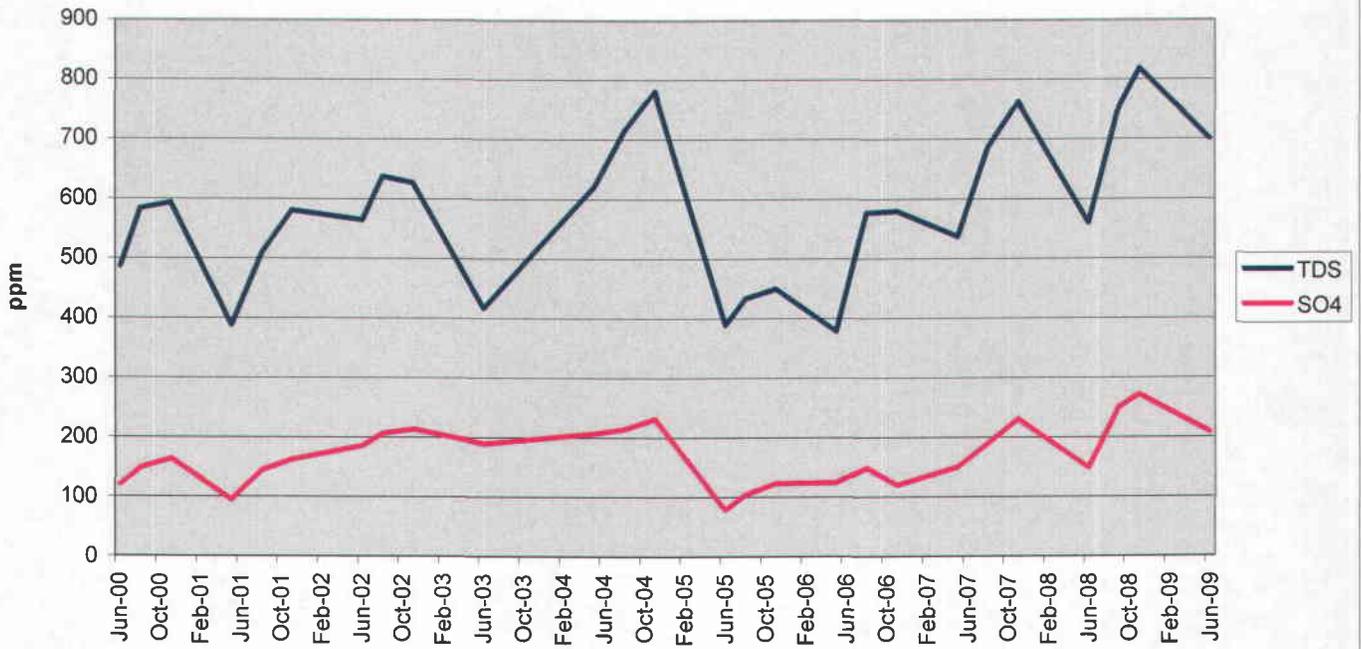
### ST-6: Flow Values



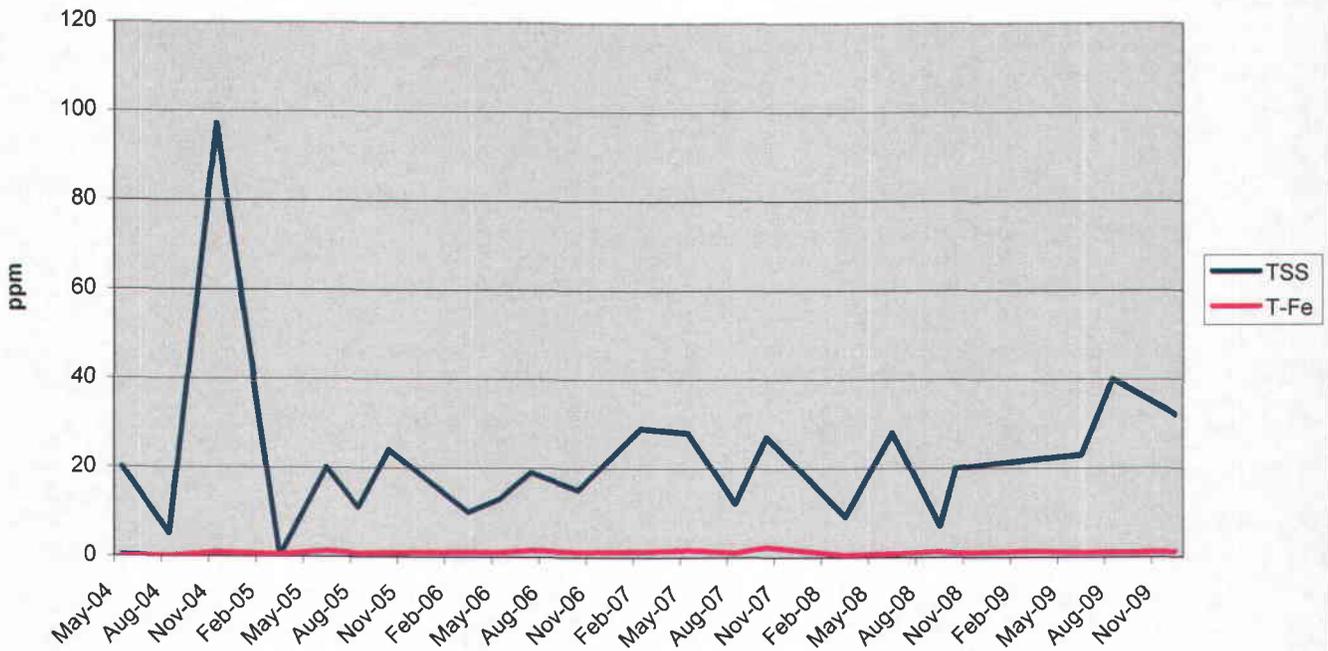
### Spring SP-12: TDS vs. Time



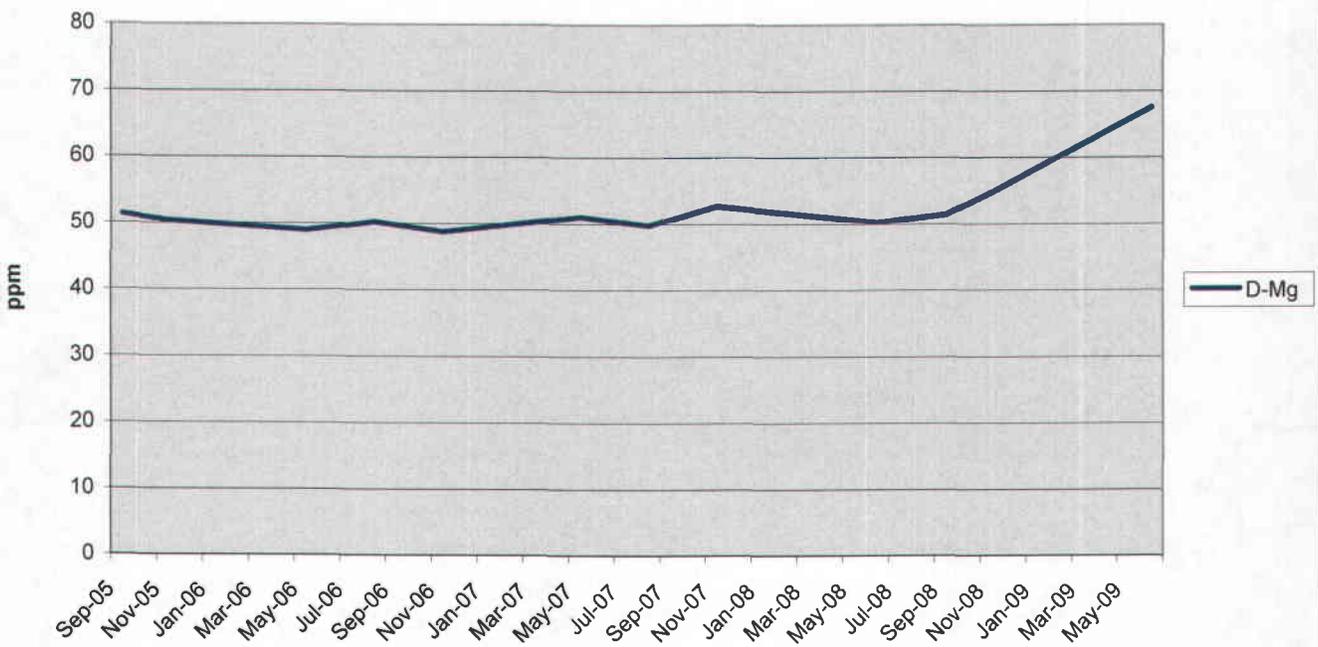
### Spring SP-13: TDS, SO4 vs. Time



### ST-6: TSS, T-Fe vs. Time



### Spring SP-101: D-Mg vs. Time



# Well DH 86-2

