#3326

WATER QUALITY MEMORANDUM
Utah Coal Regulatory Program

April 15, 2010

TO: Internal File

THRU: James D. Smith, Permit Supervisor JDS 20Apr10

FROM: Steve Christensen, Environmental Scientist SC

RE: 2009, 2nd Quarter Water Monitoring, Canyon Fuel Company (CFC), LLC, Dugout Mine, C/007/0039-WQ09-2, Task ID #3326

The Dugout Canyon 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 7-40 of the approved Mining and Reclamation Plan (MRP), water monitoring protocols and sampling requirements are provided for surface water, ground water, monitoring wells and Utah Pollutant Discharge Elimination System (UPDES) outfalls. Tables 7-4 and Table 7-5 list the individual monitoring sites and their sampling protocols for ground water and surface water respectively.

1. Was data submitted for all required sites?

Springs YES [X] NO [ ]

The approved MRP outlines the operational and post-mining monitoring of fourteen springs (200, 203, 227, 259 259A, 260, 321, 322, 324, SC-100, SC-116, SC-14, SC-65 and SP-200). The locations of these springs are depicted on Plate 7-1, Hydrologic Monitoring Stations. Groundwater discharge from the old Gilson coal seam workings is also monitored and identified as location MD-1.

Spring 200 had not reported a measurable flow since the 2nd quarter of 2001. Spring 227 has never reported a measurable flow. Spring 259 last reported a measurable flow in the 3rd quarter of 2001. Spring SC-100 has not reported a measurable flow since the 2nd quarter of 2008.

Last quarter (WQ 09-1), none of the 14 spring monitoring sites were accessible this quarter due to snow. This quarter, all but one of the spring monitoring sites were accessible (SC-100).

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

The approved MRP outlines the monitoring of thirteen stream sites (323, DC-1, DC-2, DC-3, DC-4, DC-5, FAN, PC-1A, PC-2, PC-3, RC-1, SS-1 and SS-2). The locations of these streams are depicted on Plate 7-1, Hydrologic Monitoring Stations.

Data was submitted for all spring monitoring sites with measurable flow. Three sites reported no observable flow (DC-3, RC-1, SS-1 and SS-2).

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

The approved MRP outlines the sampling of three monitoring wells (GW-10-2, GW-11-2 and GW-24-1). Table 7-4 and Section 731.200 of the MRP specify that the Permittee will obtain quarterly water level measurements from the wells. Due to the ages of the wells and deterioration of the casing materials, water quality data is not collected.

Monitoring well GW-24-1 became blocked during the winter of 2000 and was last sampled in September of 1998. The well was removed from monitoring after the 4th quarter of 2004. Monitoring well G-11-2 was last monitored in October 2007. Since that time, the Permittee has reported that the well has appeared to have "caved in". Monitoring well GW-10-2 is still functioning and actively monitored for water level.

Though not required by the approved MRP, three additional monitoring wells (DH-1, DH-2 and DH-3) are monitored at the waste rock disposal site. Water levels are monitored quarterly with additional water quality sampling obtained from DH-1 during low flow periods (i.e. 3rd or 4th quarter).

Data was submitted for all functioning monitoring wells (DH-1, DH-2, DH-3 and GW-10-2).

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

Operational monitoring is required monthly for six active UPDES outfalls (Permit No. UT0025593):

- **001**-Mine water discharge to Dugout Ck.,
- **002**-Sedimentation pond discharge to Dugout Ck. (disturbed area runoff),
- **003**-Storage water discharge to Dugout Ck. (30,000-gallon water tank discharge),
- **004**-Sedimentation pond (waste rock site) discharge to Grassy Trail Ck. Tributary,
- **005**-Pace Canyon fan portal breakout, mine water discharge to Pace Ck.

- **006**-Sediment trap culvert discharge to Pace Creek (disturbed area runoff from Pace Canyon Fan facility).

Specific effluent limitations and self-monitoring requirements as outlined in the UPDES permit are presented below:

Effluent Characteristics	Effluent Limitations
TDS, tons/day	1.0
Total Suspended Solids (TSS), ppm	70
Total Iron, ppm	1.1
Oil & Grease, ppm	10
Total Dissolved Solids (TDS), ppm	2,400
pH	9

3,000 parts per million (ppm) is the water quality standard for total dissolved solids (as established by the Department of Water Quality) for both Pace Creek and Dugout Creek.

Three outfalls reported flows this quarter. Site 001 produced an average flow for the quarter of 156 gallons per minute (gpm). Site 002 produced an average flow of 5.15 gpm. Site 005 produced an average flow of 69 gpm for the quarter.

2. Were all required parameters reported for each site?

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

For accessible springs that produced a measurable flow, the required data was submitted.

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

For accessible streams that produced a measurable flow, the required data was submitted.

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

For all accessible/functioning monitoring wells, the required parameters were submitted.

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

The required parameters were reported.

3. Were irregularities found in the data?

Springs YES [X] NO [ ]

Several springs reported concentrations outside of two standard deviations from the mean:

- 321- reported elevated levels of dissolved sodium (D-Na), dissolved magnesium (D-Mg), sulfate (SO4), total alkalinity (T-Alk.), total dissolved solids (TDS) and total cations (T-Cats).

- SC-116 reported elevated concentrations of dissolved calcium (D-Ca), SO4, TDS and T-Cats.

- SC-65 reported elevated concentrations of D-Ca, T-Alk and bicarbonate (Bcarb).

Streams YES [X] NO [ ]

DC-1 had reported elevated D-Na concentrations the previous two quarters (WQ08-4 and WQ09-1). The reported D-Na concentration for this quarter was back to within two standard deviations of the mean. The D-Na concentrations at this surface water monitoring point have historically been erratic (See Chart Below). Based upon the data set, it appears that the D-Na concentrations tend to spike during the spring and early summer, presumably as a result of snowmelt.

DC-2 had reported a D-Na concentration beyond two standard deviations from the mean during the previous quarter (WQ09-1). The D-Na concentration has decreased to within two standard deviations of the mean this quarter.

During the 4th quarter of 2008, elevated levels of dissolved calcium (D-Ca) were reported for site PC-1A. Due to accessibility issues, the site could not be sampled during the 1st quarter of 2009. The reported concentration for D-Ca for this quarter was within two standard deviations of the mean. However, dissolved potassium (D-K) was reported outside of two standard deviations. Continued monitoring of PC-1A will be conducted in an attempt to identify the erratic parameter fluctuations.

Site PC-2 had reported elevated dissolved magnesium (D-Mg) levels during the 4th quarter of 2008. However, the site could not be accessed due to snow cover the 1st quarter of 2009. Sampling values reported this quarter identified several parameters that were outside of two standard deviations of the mean: field conductivity, D-Ca, D-Mg, Cl, SO4, total alkalinity, total dissolved solids (TDS), bicarbonate, total cations and total anions. (See Chart Below).

Monitoring site DC-3 reported elevated levels of dissolved potassium (D-K) during the 4th quarter of 2008. However, no observable flow was reported for the last two quarters.

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

Elevated levels of D-Ca and Cl were reported during the 4th quarter of 2008 (WQ 08-4) at monitoring well DH-1. However, as water quality data is only obtained at this well during the latter quarters of the year, it's unclear at this time what caused the elevated concentrations.

Monitoring well GW-10-2 reported a depth to water that was outside of two standard deviations (747.58') during the fourth quarter of 2008 (WQ 08-4). The well was inaccessible due to snow conditions the first quarter of 2009. The reported depth to water for this quarter was within two standard deviations of the mean. (See Chart Below).

Water levels reported for wells DH-1, DH-2 and DH-3 were all within two standard deviations of the mean.

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

UPDES outfalls 001, 002 and 005 produced flows during this quarter.

Site 001 averaged a flow of 156 gallons per minute (gpm). Of seven sampling events, two total iron (T-Fe) concentrations were reported outside of the compliance level established in the Permittee's UPDES permit (1.1 ppm). (See Chart Below)

Site 002 averaged a flow of 5.15 gpm. All reported water quality parameters were within two standard deviations of the mean as well as within UPDES compliance levels.

Site 005 averaged a flow of 69 gpm. All reported water quality parameters were within two standard deviations of the mean as well as within UPDES compliance levels.

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

The resampling of baseline data will next be performed in July 2014. In addition, one water sample will be collected at each spring sampling point during low flow period every fifth year, during the year, preceding re-permitting. These samples will be obtained for the analysis of baseline parameters (See Table 7-4).

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

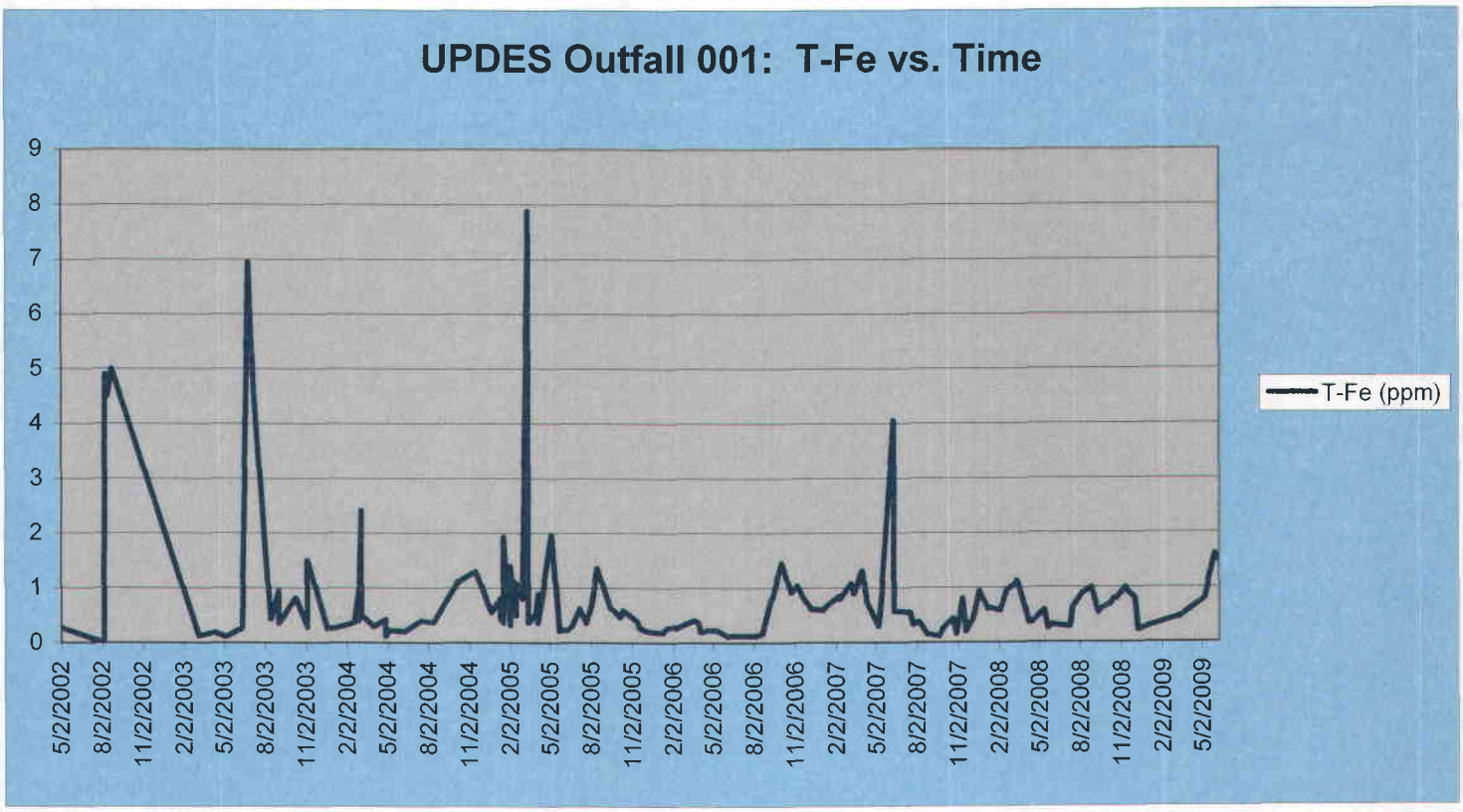
Continued monitoring of elevated concentrations.

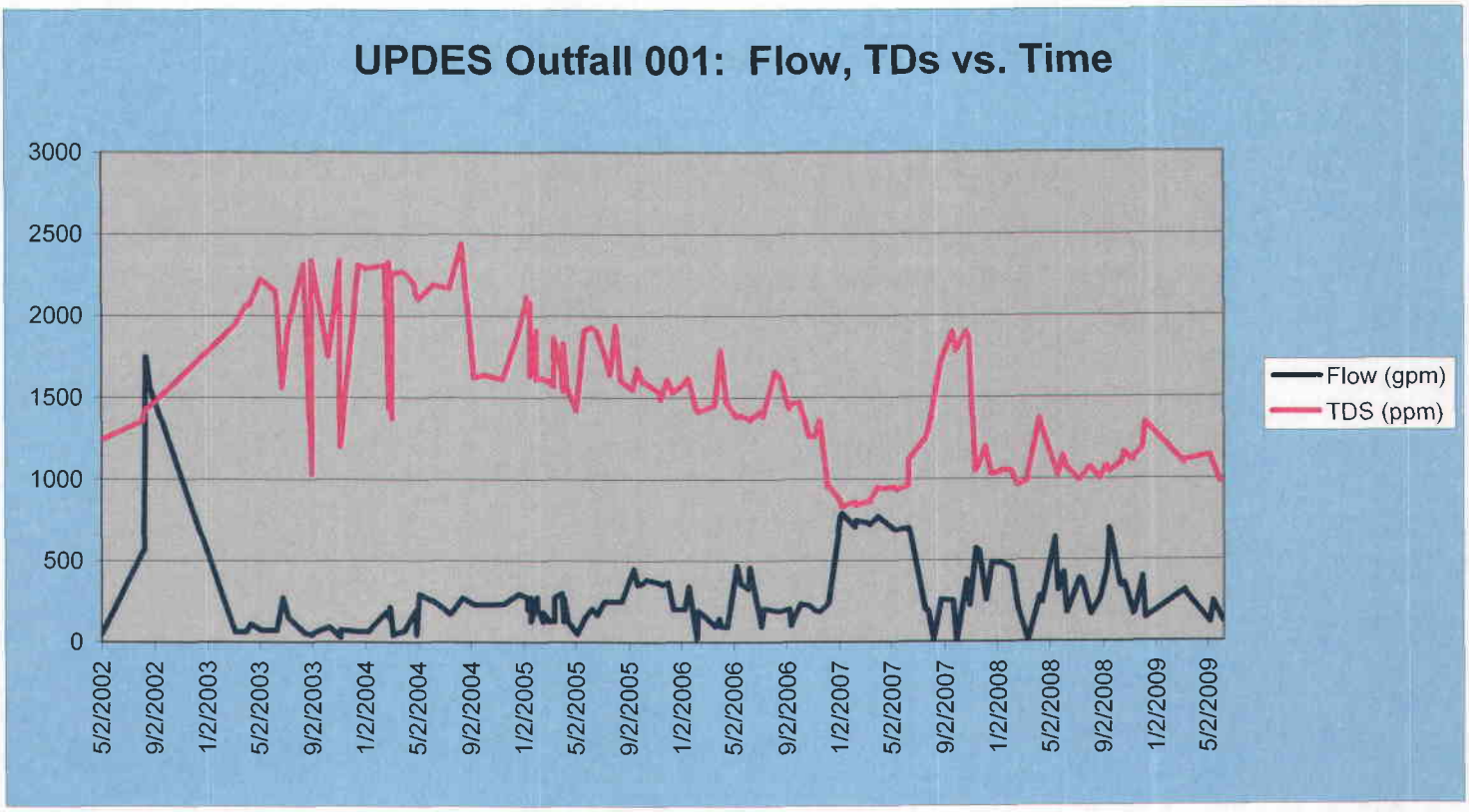
During the next mid-term review, the water-monitoring program in the approved MRP

should be revised. Ground water monitoring wells GW-24-1 and G-11-2 have become impacted to the degree that obtaining measurements/samples is not possible. The MRP and Division EDI database should be revised to reflect the current condition on the ground. The approved MRP should also be revised to reflect the active monitoring of wells DH-1, DH-2 and DH-3.

6. Does the Mine Operator need to submit more information to fulfill this quarter's monitoring requirements? **[ ] Yes [X] No**

7. Follow-up from last quarter, if necessary. Did the Mine Operator submit all the missing and/or irregular data (datum)? **[ ] Yes [X] No**


UPDES Outfall 001: T-Fe vs. Time
9
8
7
6
5
4
3
2
1
0
5/2/2002
8/2/2002
11/2/2002
2/2/2003
5/2/2003
8/2/2003
11/2/2003
2/2/2004
5/2/2004
8/2/2004
11/2/2004
2/2/2005
5/2/2005
8/2/2005
11/2/2005
2/2/2006
5/2/2006
8/2/2006
11/2/2006
2/2/2007
5/2/2007
8/2/2007
11/2/2007
2/2/2008
5/2/2008
8/2/2008
11/2/2008
2/2/2009
5/2/2009
T-Fe (ppm)


UPDES Outfall 001: Flow, TDs vs. Time
3000
2500
2000
1500
1000
500
0
5/2/2002
9/2/2002
1/2/2003
5/2/2003
9/2/2003
1/2/2004
5/2/2004
9/2/2004
1/2/2005
5/2/2005
9/2/2005
1/2/2006
5/2/2006
9/2/2006
1/2/2007
5/2/2007
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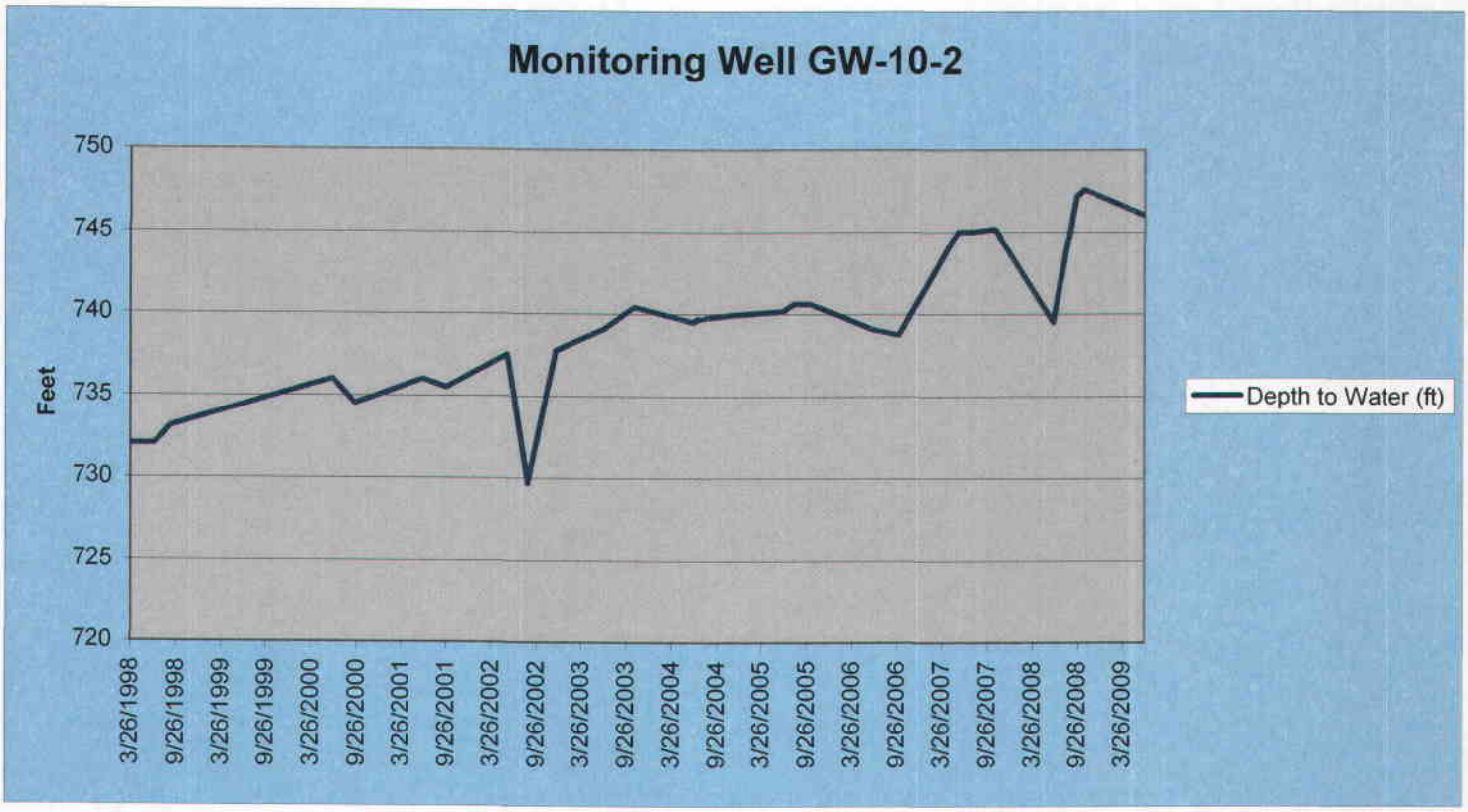
9/2/2008
1/2/2009
5/2/2009
Flow (gpm)
TDS (ppm)


Monitoring Well GW-10-2
Feet
750
745
740
735
730
725
720
3/26/1998
9/26/1998
3/26/1999
9/26/1999
3/26/2000
9/26/2000
3/26/2001
9/26/2001
3/26/2002
9/26/2002
3/26/2003
9/26/2003
3/26/2004
9/26/2004
3/26/2005
9/26/2005
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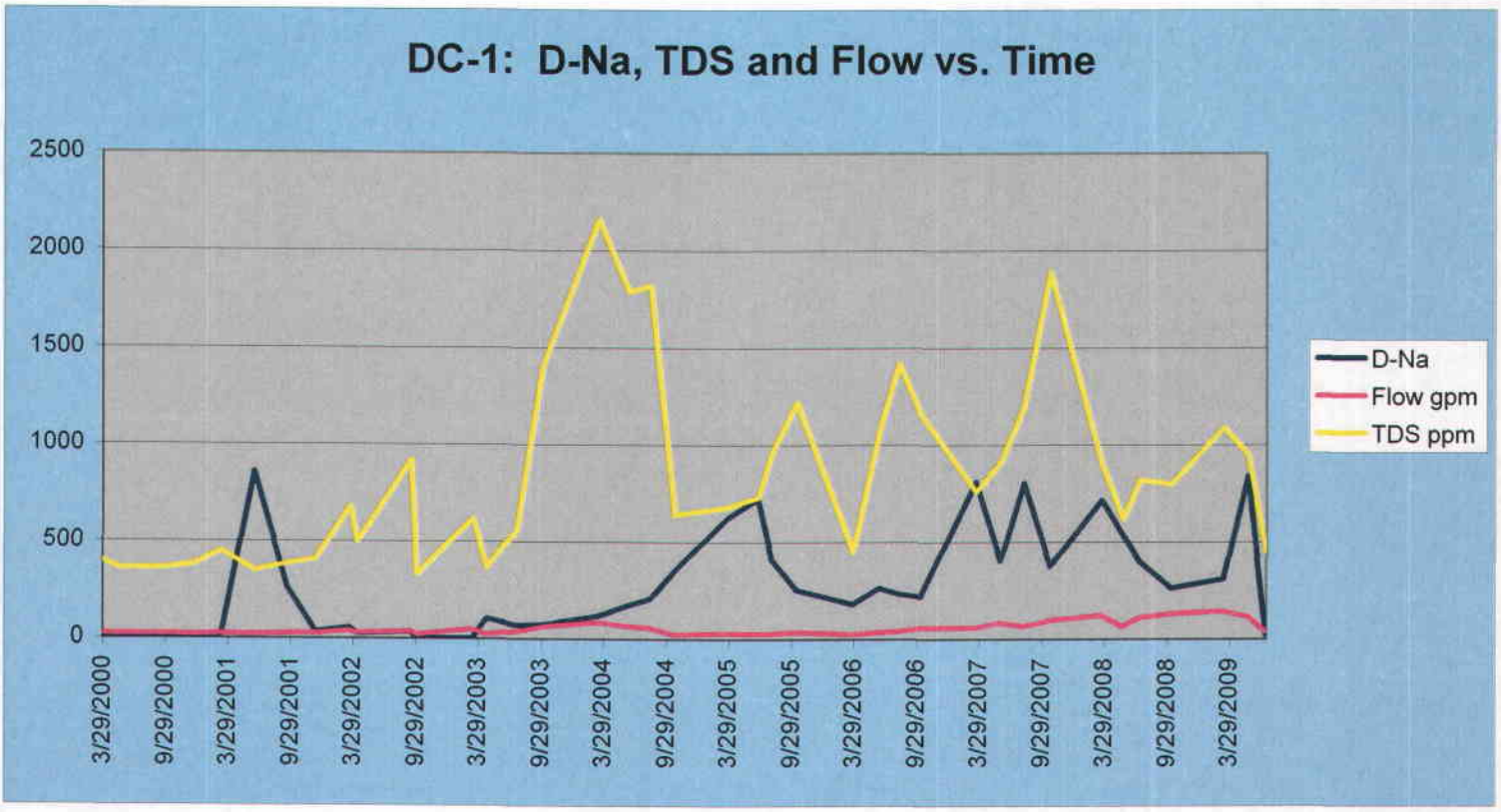
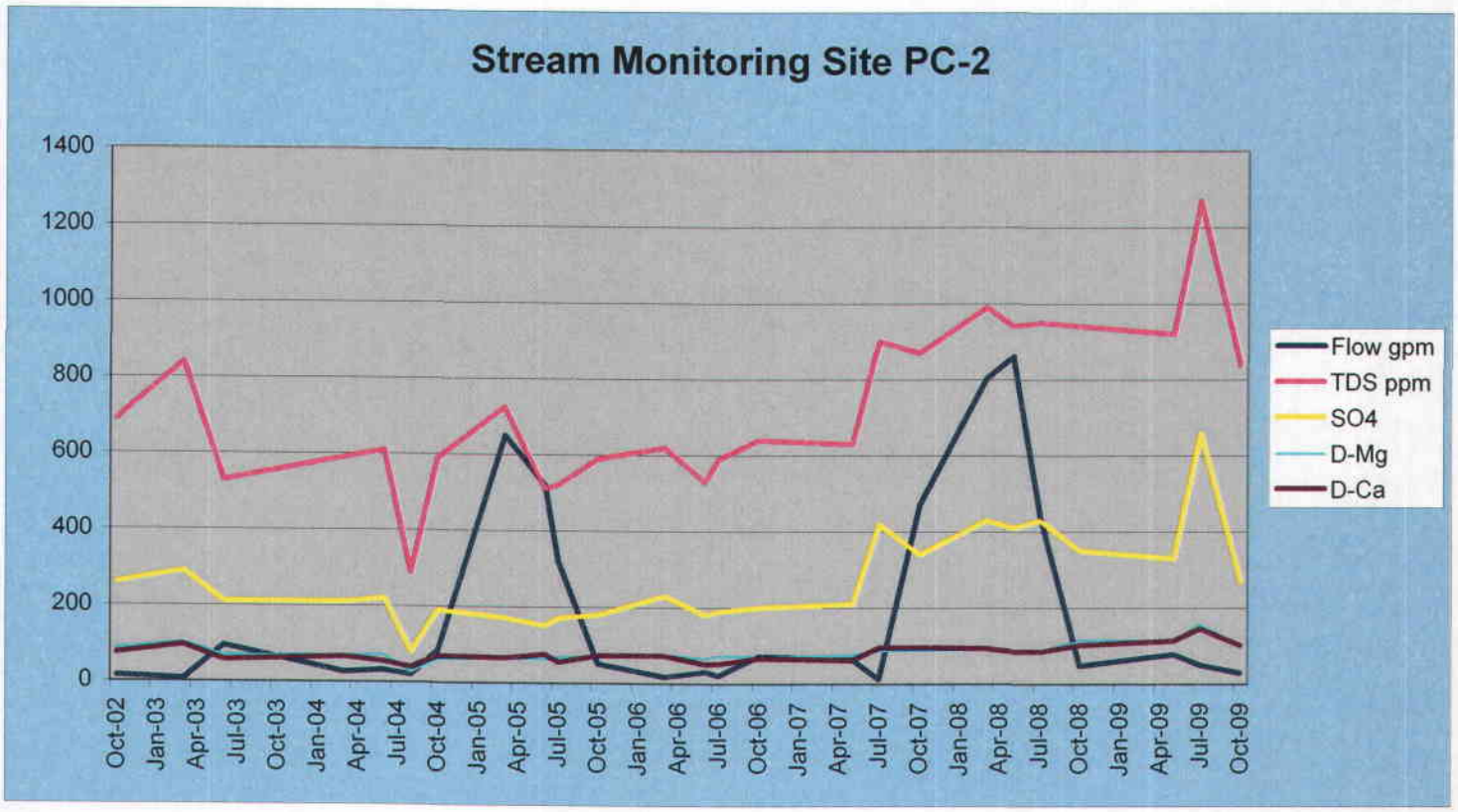
3/26/2007
9/26/2007
3/26/2008
9/26/2008
3/26/2009
Depth to Water (ft)


DC-1: D-Na, TDS and Flow vs. Time
2500
2000
1500
1000
500
0
3/29/2000
9/29/2000
3/29/2001
9/29/2001
3/29/2002
9/29/2002
3/29/2003
9/29/2003
3/29/2004
9/29/2004
3/29/2005
9/29/2005
3/29/2006
9/29/2006
3/29/2007
9/29/2007
3/29/2008
9/29/2008
3/29/2009
D-Na
Flow gpm
TDS ppm


Stream Monitoring Site PC-2
1400
1200
1000
800
600
400
200
0
Oct-02
Jan-03
Apr-03
Jul-03
Oct-03
Jan-04
Apr-04
Jul-04
Oct-04
Jan-05
Apr-05
Jul-05
Oct-05
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Flow gpm
TDS ppm
SO4
D-Mg
D-Ca