#3431
OK

WATER QUALITY MEMORANDUM
Utah Coal Regulatory Program

April 20, 2010

TO: Internal File

THRU: James D. Smith, Permit Supervisor JDS 04May 10

FROM: Steve Christensen, Environmental Scientist SJC

RE: 2009 4th Quarter Water Monitoring, Canyon Fuel Company (CFC), LLC, Dugout Mine, C/007/0039-WQ09-4, Task ID #3431

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.

Of the 14 spring monitoring sites, all but five produced a measurable flow. Data was submitted for the 9 sites that reported a discharge.

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 stream-monitoring sites with measurable flow. Four sites (DC-3, RC-1, SS-1 and SS-2) reported no observable flow for this quarter.

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.

UPDES outfalls 003 and 005 produced a discharge this 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 [ ]**

321 had 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) during the 2nd quarter of this year (WQ09-2). The reported values for all required parameters were within two standard deviations of the mean for the second consecutive quarter.

SC-116 The previous two quarters (WQ09-2 and WQ09-3), SO4, TDS and T-Cats were reported outside of two standard deviations. Additionally, dissolved calcium (D-Ca) was

reported outside of two standard deviations the previous quarter (WQ09-3). This quarter, all required parameters were reported within two standard deviations of the mean. (See Chart Below)

Streams YES [X] NO [ ]

DC-1 reported a D-Na concentration within two standard deviations of the data set for the second consecutive quarter. Historically, this site has produced erratic D-Na trends typified by spikes in the late spring/early summer. (See Chart Below)

Monitoring site DC-2 reported several parameters outside of two standard deviations: dissolved potassium (D-K), D-Na, chloride (Cl) and TDS. Continued monitoring will be conducted in order to determine if a trend is developing.

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

The FAN surface water-monitoring site below the Pace Canyon Fan portals reported an elevated D-Na value the previous quarter (WQ09-3). D-Na, Cl, SO4, total alkalinity and total cations were reported outside of two standard deviations for this quarter. Continued monitoring will be conducted in order to ascertain if a trend is emerging. (See Chart Below)

During the 2nd quarter of 2009 (WQ09-2), a D-K value outside of two standard deviations for monitoring site PC-1A. For the second consecutive quarter, all required parameters have been reported within two standard deviations of the mean (including D-K). It's unclear as to what caused the spike, however; continued monitoring of this parameter will be conducted.

During the previous two quarters (WQ09-2 and WQ09-3), site PC-2 has reported several parameters outside of two standard deviations (D-Ca, D-Mg, total alkalinity, bicarbonate, field conductivity, Cl, total cations, total anions, SO4 and TDS). This quarter, Cl, total alkalinity and bicarbonate were again reported outside of two standard deviations. (See Chart Below)

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. Continued monitoring will be conducted as additional water quality data is obtained. Water levels at well DH-1 remained within two standard deviations of the mean.

For the second consecutive quarter, monitoring well GW-10-2 reported a depth to water outside of two standard deviations from the mean. Continued monitoring of water levels in well GW-10-2 will be conducted to ascertain if a downward trend is emerging. (See Chart Below)

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

UPDES YES [ ] NO [X]

UPDES outfalls 003 and 005 produced flows during this quarter.

Based upon six measurements, Sites 003 and 005 averaged flows of 99 gallons per minute (gpm) and 146 gpm respectively.

Site 003's required parameters were all within the compliance levels established by the Permittee's UPDES discharge permit. In addition, all reported values were within two standard deviations of the mean.

Site 005 reported three TDS values that were outside of two standard deviations from the mean of 1,061.42 ppm. Two of the reported TDS values were below the average (840 ppm and 890 ppm) with one value reported higher than the average (1,300 ppm). The TDS effluent limitation outlined in the Permittee's UPDES discharge permit is 2,400 ppm. All 5 reported TDS values for this quarter were well below the 2,400-ppm compliance level.

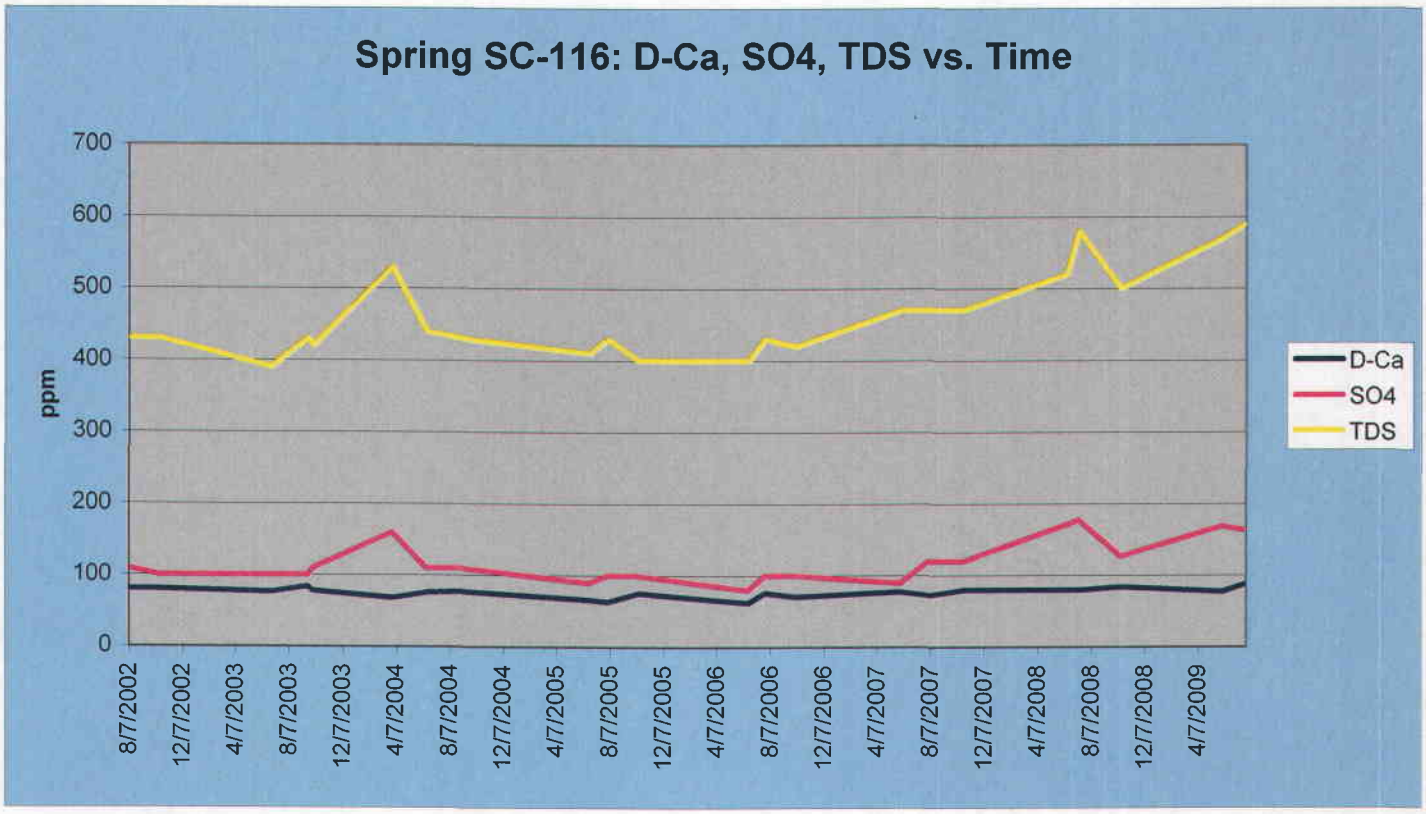
4. On what date does the MRP require a five-year resampling of baseline water data.

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 as well as ground-water levels and flow trends.

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.


Spring SC-116: D-Ca, SO4, TDS vs. Time
ppm
700
600
500
400
300
200
100
0
8/7/2002
12/7/2002
4/7/2003
8/7/2003
12/7/2003
4/7/2004
8/7/2004
12/7/2004
4/7/2005
8/7/2005
12/7/2005
4/7/2006
8/7/2006
12/7/2006
4/7/2007
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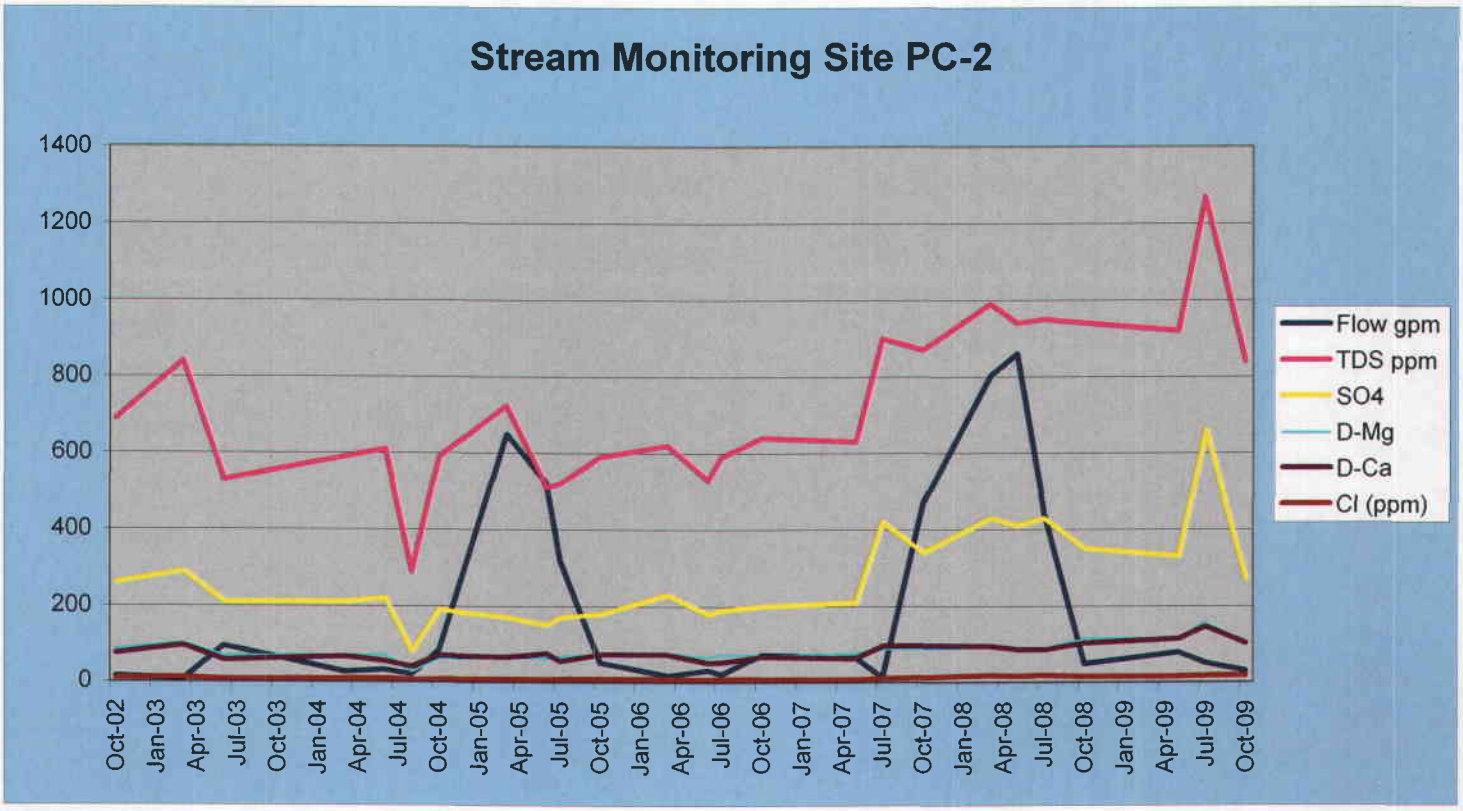
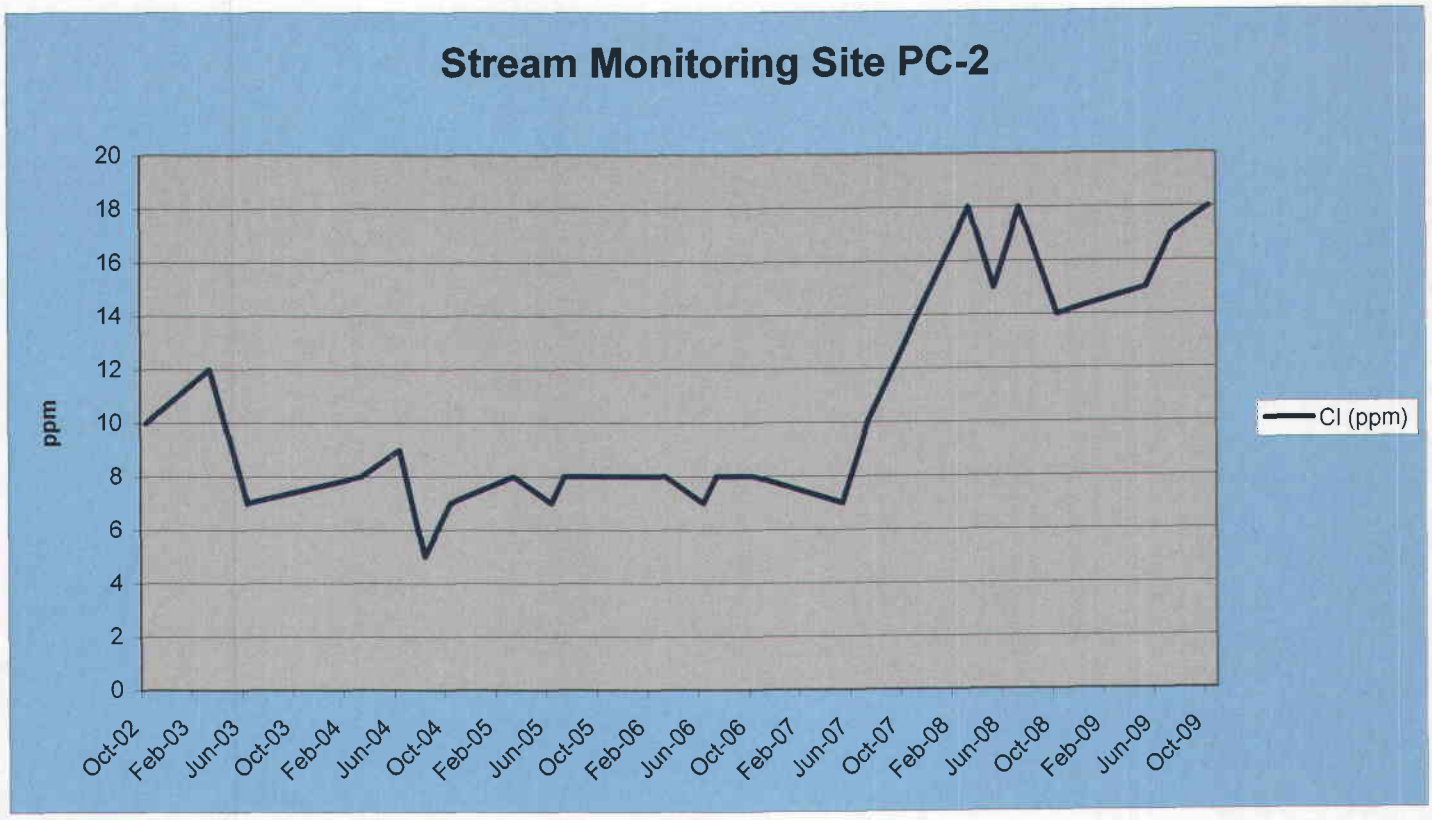
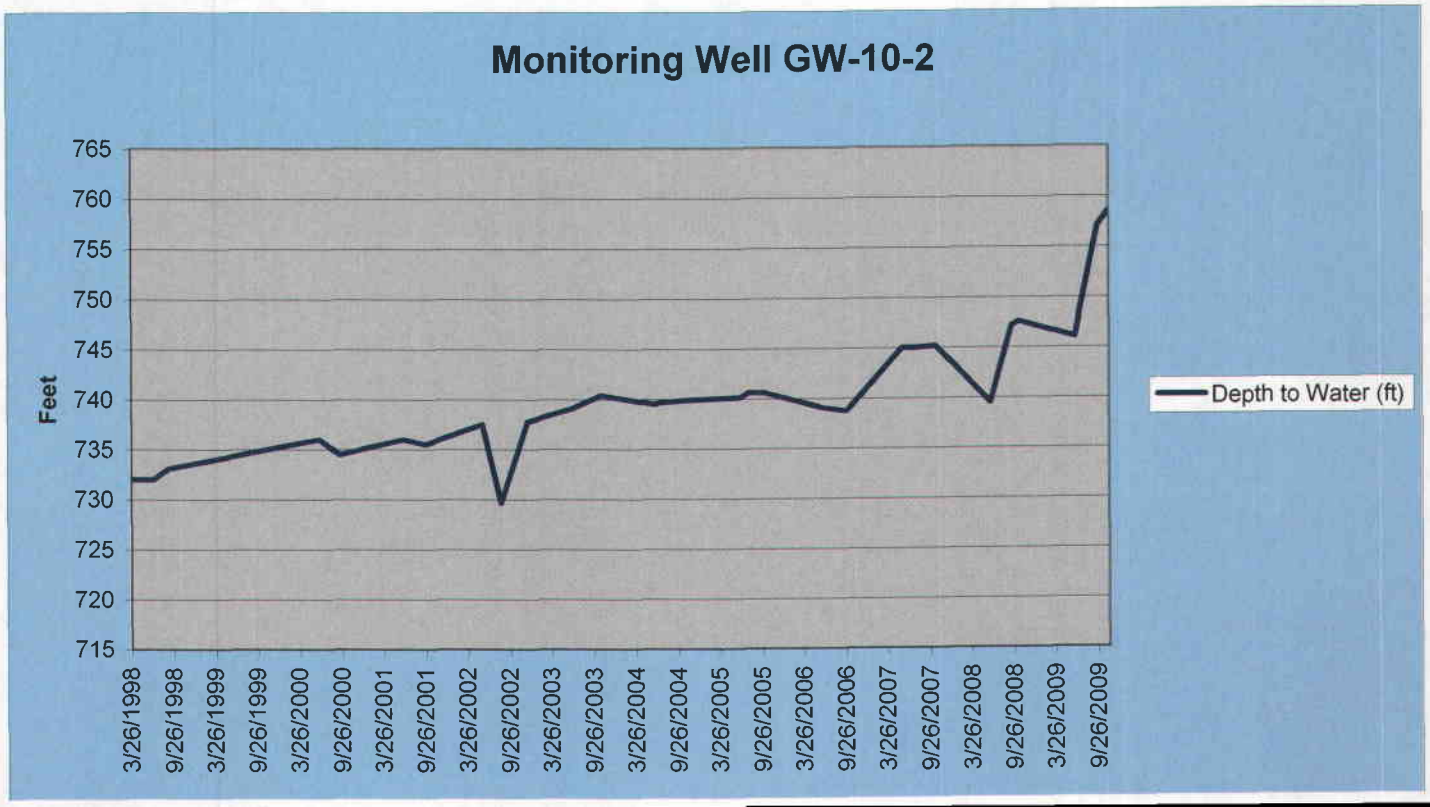
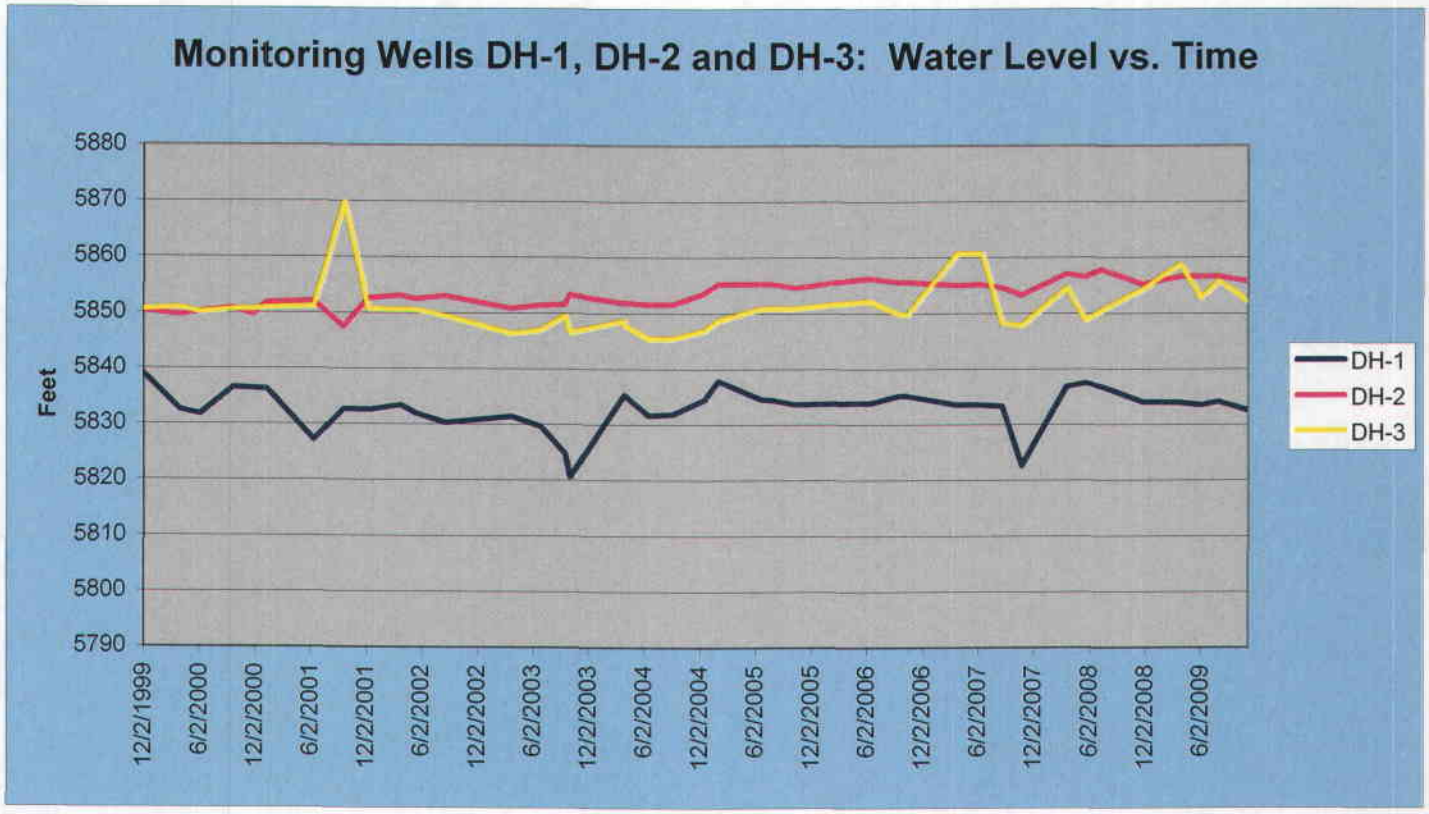
12/7/2008
4/7/2009
D-Ca
SO4
TDS


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
Cl (ppm)


Stream Monitoring Site PC-2
ppm
20
18
16
14
12
10
8
6
4
2
0
Oct-02
Feb-03
Jun-03
Oct-03
Feb-04
Jun-04
Oct-04
Feb-05
Jun-05
Oct-05
Feb-06
Jun-06
Oct-06
Feb-07
Jun-07
Oct-07
Feb-08
Jun-08
Oct-08
Feb-09
Jun-09
Oct-09
Cl (ppm)


Monitoring Well GW-10-2
Feet
765
760
755
750
745
740
735
730
725
720
715
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
3/26/2006
9/26/2006
3/26/2007
9/26/2007
3/26/2008
9/26/2008
3/26/2009
9/26/2009
Depth to Water (ft)


Monitoring Wells DH-1, DH-2 and DH-3: Water Level vs. Time
Feet
5880
5870
5860
5850
5840
5830
5820
5810
5800
5790
12/2/1999
6/2/2000
12/2/2000
6/2/2001
12/2/2001
6/2/2002
12/2/2002
6/2/2003
12/2/2003
6/2/2004
12/2/2004
6/2/2005
12/2/2005
6/2/2006
12/2/2006
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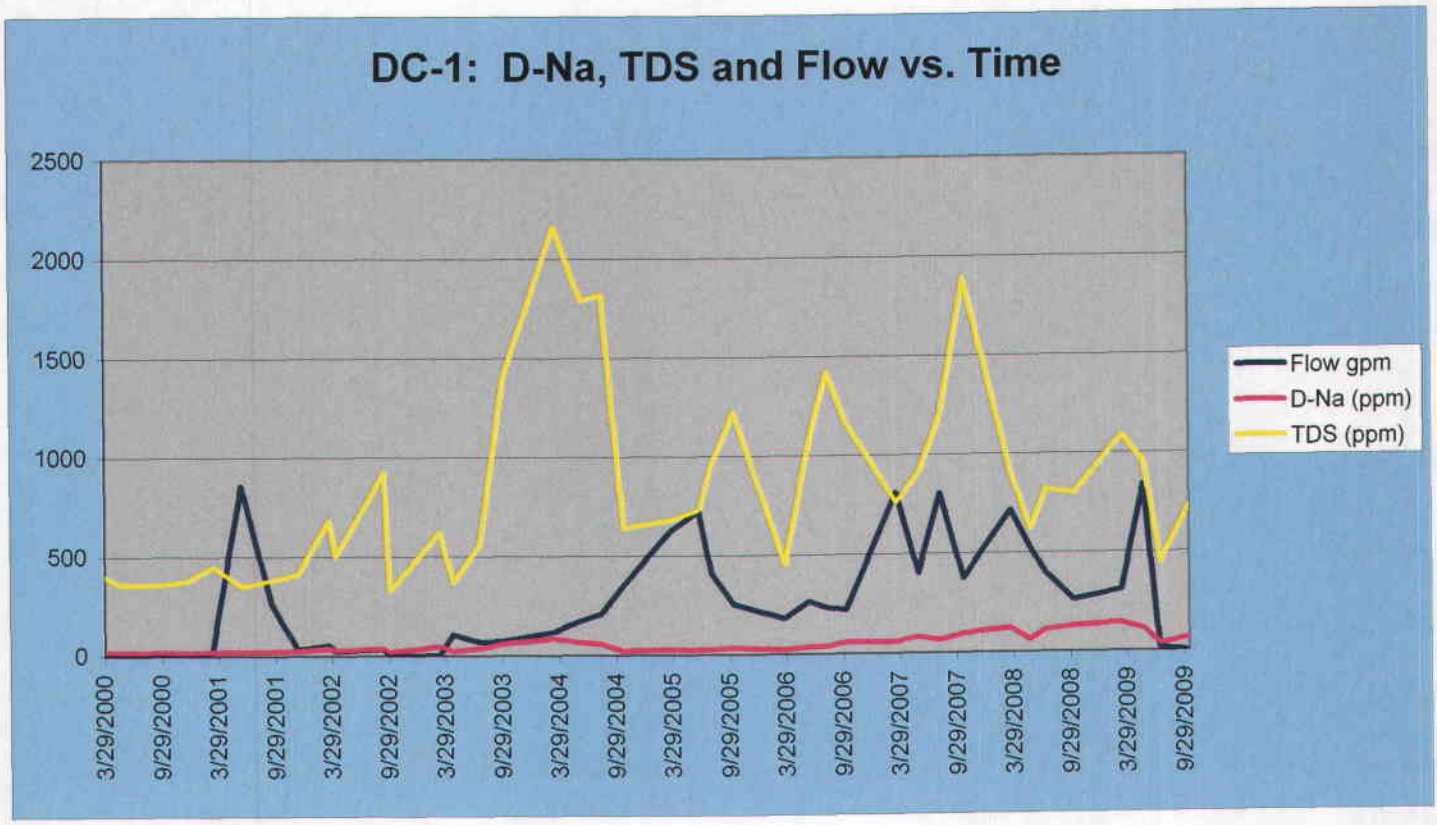
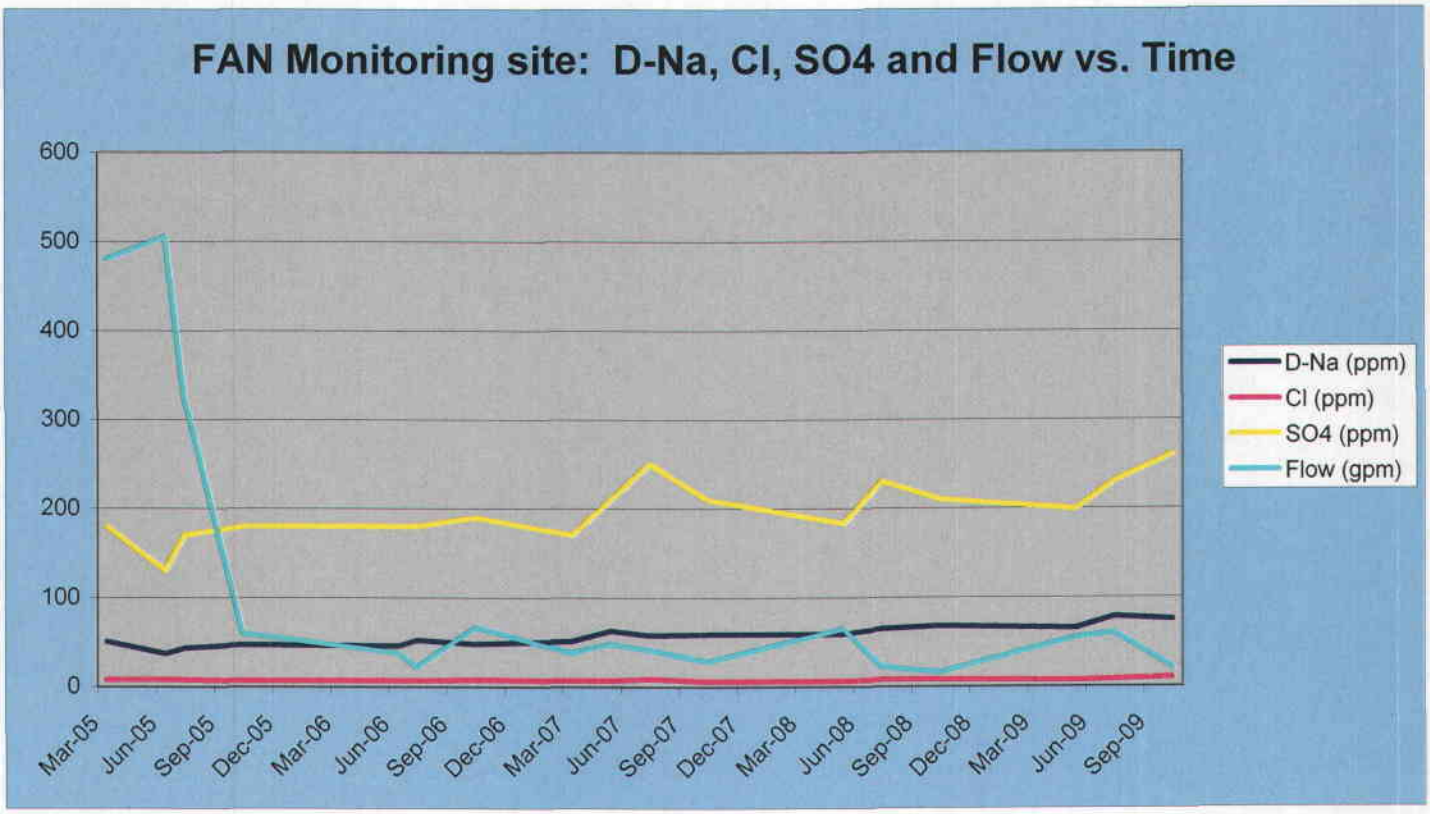
6/2/2008
12/2/2008
6/2/2009
DH-1
DH-2
DH-3


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
9/29/2009
Flow gpm
D-Na (ppm)
TDS (ppm)


FAN Monitoring site: D-Na, Cl, SO4 and Flow vs. Time
600
500
400
300
200
100
0
Mar-05
Jun-05
Sep-05
Dec-05
Mar-06
Jun-06
Sep-06
Dec-06
Mar-07
Jun-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
D-Na (ppm)
Cl (ppm)
SO4 (ppm)
Flow (gpm)