j-C018

Canyon Fuel Company, LLC
Skyline Mines
HC 35 Box 380
Helper, Utah 84526
(435) 448-6463 Fax: (435) 448-2632

March 22, 2004

Gregg Galecki
Reclamation Hydrologist
Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Incoming
C/007/0005
Copy Aaron & Gregg

RE: Petersen Hydrologic Report Concerning Skyline Mine Hydrologic Monitoring Point CS-2, Canyon Fuel Company, LLC, Skyline Mine, C/007/005

Dear Mr. Galecki:

Please find enclosed with this letter a copy of the Petersen Hydrologic report concerning the removal of CS-2 from Skyline Mine's water monitoring program. I inadvertently did not attach it to the cover letter of the HCI Ground Water Model TA submittal made on March 19, 2004. The cover letter for that submittal indicates that Petersen's report is attached. If you have any questions, please call me at (435) 448-2669.

Sincerely,

Chris D. Hansen
Environmental Coordinator
Canyon Fuel Company, LLC

enclosures

PETERSEN HYDROLOGIC

18 March 2004

Mr. Chris Hansen
Environmental Coordinator
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, Utah 84526

Dear Chris,

At your request, I have investigated the discharge and water quality characteristics of Eccles Creek below the Skyline Mine. Specifically, the purpose of this investigation is to determine whether there are significant differences in the discharge rate and/or water quality characteristics at monitoring sites CS-2 and VC-6. These sites have both been monitored by Skyline Mine since 1982.

CS-2 is located at the mouth of the culvert that transports Eccles Creek beneath the Skyline site. VC-6 is located on Eccles Creek approximately 2,000 feet downstream of CS-2 near the confluence with the South Fork. There are no significant surface-water drainages that enter Eccles Creek between these two monitoring sites. Likewise, there are at present no indications of significant groundwater discharge into the stream in this reach.

For this investigation, discharge and water-quality data for CS-2 and VC-6 were downloaded from the Utah Division of Oil, Gas and Mining on-line water database. The discharge and water-quality parameters monitored at CS-2 and VC-6 are summarized in Table 1. A complete listing of selected water quality parameters is presented in Table 2. It should be noted that for both Tables 1 and 2, only data from monitoring events where both CS-2 and VC-6 were monitored on the same calendar day are included. This procedure was used to minimize the introduction of other potential sources of variability into the database resulting from factors such as climatic variability, variability in the daily snowmelt rate, large precipitation events, and mine-water pumping patterns at the Skyline Mine.

Eccles Creek at sites CS-2 and VC-6 is highly influenced by the presence or absence of mine discharge water. At some times, mine discharge water comprises most of the water in the creek, at other times it is absent. Mine water in the Skyline Mine is stored in sumps and ponds and can be pumped to Eccles Creek on an intermittent basis. Thus, because the chemical composition of mine discharge water is often different from that naturally present in Eccles Creek, both the discharge rate and water quality characteristics measured at CS-2 and VC-6 are influenced by whether the mine is pumping water to the creek at the time of the monitoring event. Whether the mine was

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discharging water at the time of individual historic monitoring events is not known. Therefore, in order to minimize the effect of this variability on the analysis of the discharge rate and water quality in the creek, it is most useful to evaluate the long-term average data.

Discharge hydrographs for CS-2 and VC-6 are shown in Figure 1. Selected major ion water quality parameter averages are plotted in Figure 2.

As shown in Figure 1, discharge at CS-2 and VC-6 are generally similar. Sometimes the discharge measured at CS-2 is somewhat greater than that at VC-6 and sometimes it is less. This minor variability is attributed in part to the inherent error in the streamflow measurement technique (current velocity meter and wading rod) and in part to the intermittent nature of the pumping of mine water to Eccles Creek. The minor increases in streamflow measured at VC-6 relative to CS-2 during the high-flow season in the extremely wet years of the early to mid-1980's (Figure 1) may be a result of snowmelt water entering the creek between CS-2 and VC-6. The long-term average discharge rate at CS-2 and VC-6, 1,982 and 1,895 gpm, respectively, indicates that on average the discharge at these two monitoring sites is very similar.

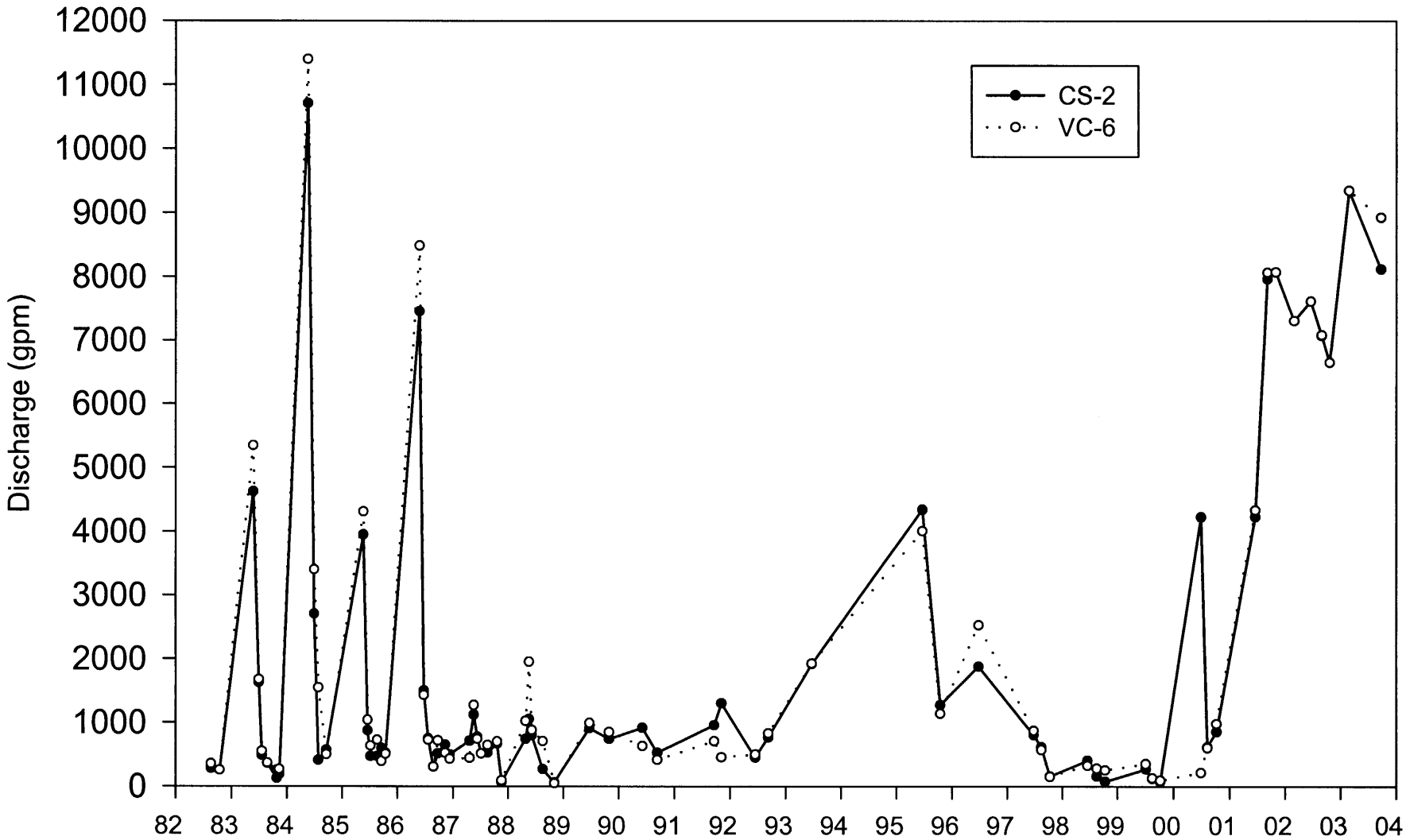
It is apparent in Figure 2 and Table 1 that the chemical composition of the creek water at CS-2 is also similar to that measured at VC-6. The average TDS concentration at CS-2 and VC-6 are essentially identical, with values of 502 and 497 mg/l, respectively. Likewise, the average concentrations of the other major ion constituents are similar (Table 1; Figure 2). The field water-quality parameters including temperature, pH, specific conductance, dissolved oxygen and turbidity are also similar at both monitoring sites. Concentrations of trace metals, nutrients, and other parameters are also similar at CS-2 and VC-6.

Based on the information presented in this letter report, it is my professional opinion that with the minor exceptions described above, the discharge rate and water quality monitored at CS-2 and VC-9 have historically been very similar.

We appreciate the opportunity to provide this information to you. Please feel free to contact me if you have any questions in this regard.

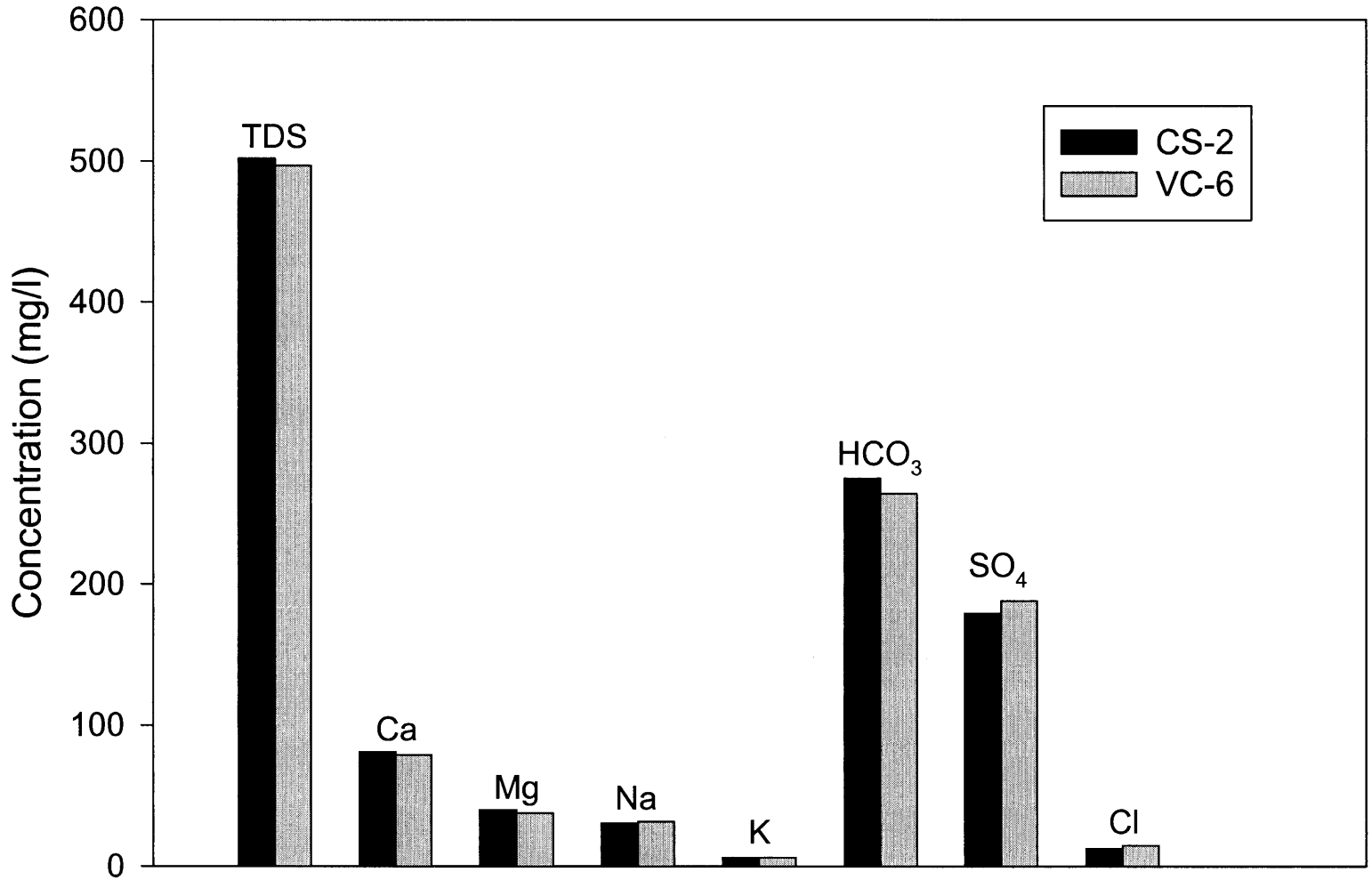
Sincerely,

Erik C. Petersen, P.G.
Principal Hydrogeologist
Utah PG No. 5373615-2250



Note: Only those discharge data for which monitoring occurred at CS-2 and VC-6 on the same calendar day.

Figure 1 Discharge hydrograph for CS-2 and VC-6, 1982-2003.



Note: The averages graphed above are the average of stream samples collected at CS-2 and VC-6 on the same calendar day.

Figure 2 Comparison of average major ion composition of CS-2 and VC-6 discharge in Eccles Creek, 1982-2003.

Table 1 Comparison of discharge and selected water-quality parameters in Eccles Creek monitored by Skyline Mine at CS-2 and VC-6, 1982-2003.

Notes: Includes only discharge and water quality analyses for which data exist at CS-2 and VC-6 on the same calendar day.

Average values for several trace constituents not calculated because of many analytical results below the laboratory detection limit

	Average		Maximum		Minimum	
	CS-2	VC-6	CS-2	VC-6	CS-2	VC-6
Discharge						
Discharge (gpm)	1982	1895	9350	9350	58	45
Field water-quality parameters						
Temperature (°C)	10.0	10.4	16.3	16.0	3.0	1.0
pH	7.8	8.1	8.6	8.7	6.7	7.4
Specific conductance (µS)	748	753	1650	1590	245	261
Dissolved Oxygen (mg/l)	7.6	7.9	10.6	11.9	3.9	5.8
Turbidity (ntu)	16.9	19.3	48	53	1.3	2.0
Major ions						
TDS (mg/l)	502	497	1246	1214	172	210
Ca^{2+} (mg/l)	81	79	127	129	51	51
Mg^{2+} (mg/l)	40.1	37.8	102	101	11.3	7.2
Na^{+} (mg/l)	30.7	31.7	138	129	3.8	4.8
K^{+} (mg/l)	6.2	6.2	15	14.3	1.0	1.0
HCO_3^{-} (mg/l)	275	264	480	485	148	178
SO_4^{2-} (mg/l)	179	188	647	632	<0.3	<0.3
Cl^{-} (mg/l)	12.8	15.0	85	92	2.0	2.5
Trace metals						
Fe (t) (mg/l)	0.79	1.00	11.0	16.1	<0.1	0.05
Fe (d) (mg/l)	---	---	0.12	0.36	<0.05	<0.05
Mn (t) (mg/l)	---	---	0.48	0.48	<0.05	<0.05
Mn (d) (mg/l)	---	---	0.16	0.16	<0.05	<0.05
Nutrients						
NH_3 (mg/l)	---	---	1.01	0.88	<0.01	<0.01
NO_3^{-} (mg/l)	---	---	2.8	2.3	<0.02	<0.02
NO_2^{2-} (mg/l)	---	---	0.13	0.10	<0.02	<0.02
O-PO_4 (mg/l)	---	---	0.06	0.05	<0.05	<0.05
Other parameters						
Oil and grease (mg/l)	---	---	4	2.8	<2	<2
Total suspended solids (mg/l)	43	85	924	1950	<5	<5

Table 2 Discharge and selected water-quality parameters for CS-2 and VC-6, 1982-2003.

Note: Includes only discharge and water quality analyses for which data exist at CS-2 and VC-6 on the same calendar day.

								Major ions								Trace metals				Nutrients				Other parameters				
			Flow	Temp	pH	Cond.	TDS	Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	HCO_3^-	CO_3^{2-}	SO_4^{2-}	Cl^-	Fe (d)	Fe (t)	Mn (t)	Mn (d)	NH_3	NO_3^-	NO_2^{2-}	O-PO_4	D.O.	TSS	O&G	Alkalinity	Turbidity
	DATE	TIME	gpm	°C		µS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	NTU
CS-2	8/19/1982	1400	278	11	8.1	371	318					314		<3.	24.7			0.09		0.31	0.59			9.3	36	0.8	257	
CS-2	10/14/1982	1100	251	3	7.7	430	235					291		30	7.9			0.25							119	0.8		
CS-2	5/25/1983	1045	4623	4	7.7	324	198					193		21	4			0.315							924			
CS-2	6/30/1983	1130	1625	6	8.1	353	228					220		18	2			0.082		<0.1					13	1.4		
CS-2	7/20/1983	940	485	11	7.6	364	300					295		36	8			0.19							8			
CS-2	8/25/1983	1030	359	10	7.6	565	318					329		37	4			0.385		<0.01	<0.02			3.9	31	<0.2	270	
CS-2	10/26/1983	1510	124	6	7.5	542	320					310		37	8			0.16		<0.01					30	<0.2		
CS-2	11/11/1983	1100	189	4	7.7	479	320					320		34	8			0.22							29			
CS-2	5/17/1984	1040	10710	6	7.3	315	440	80	48	3.1	3.2	122		286	3.6			0.001							1828			
CS-2	6/28/1984	1630	2701	14	7.7	396	295	72	24	3.8	1.6	256		68	3.3			0.09		0.1					9	0.6		
CS-2	7/27/1984	850	408	9	7.5	475	490	88	11.3	4.1	1.37	284		34	3.3			0.21							13			
CS-2	9/18/1984	820	568	10	7.7	499	344	80	30	6.3	3.45	366		29	11			0.14							53			
CS-2	5/22/1985	1310	3949	4	7.1	319	240	62.4	12.2	8	1.2	181		65	2.9			0.12							149			
CS-2	20-Jun-85	1345	871	12	7.6	547	288	68.8	15.6	6	2.2	251		32	4.8			0.08		<0.01					22	<0.1		
CS-2	09-Jul-85	1330	467	15	7.8	623	284	68.8	18.2	9.5	3.4	266		48	5.4			0.12							26			
CS-2	22-Aug-85	815	467	11	7.7	322	348	74.4	24.7	19.5	4.2	249		100	5.3			0.06		0.05	0.85				26	<0.1	204	
CS-2	19-Sep-85	1100	597	8	7.8	508	358	80.4	20.9	6.4	2.74	255		89	6.4			0.12							12			
CS-2	16-Oct-85	1120	521	6	7.3	577	356					310		78	8.1			0.1		<0.01					14	0.2		
CS-2	28-May-86	1030	7450	5	7.5	245	172					148		29	2.1			0.1							142			
CS-2	25-Jun-86	1030	1495	9	7.7	468	260					215		65	3.2			0.08		0.13					27	0.6		
CS-2	23-Jul-86	840	745	10	7.6	611	370					234		128	7.7			0.09							40			
CS-2	26-Aug-86	1100	301	10	7.4	603	348					271		85	7.5			0.14		0.18	0.33			7.2	15	0.8	222	
CS-2	25-Sep-86	1410	512	6	7.5	590	364					217		126	7.7			0.32							74			
CS-2	11-Nov-86	1300	646	4	8	640	445					227		177	9.3			0.14							11.6			
CS-2	11-Dec-86	830	494	4	8	631	470					244		191	5.1			0.14							7			
CS-2	22-Apr-87	1040	709	6	7.6	630	426					249		142	11.8			0.14							23			
CS-2	20-May-87	1110	1118	8	8	558	356					199		122	16.5			0.09							29			
CS-2	11-Jun-87	1030	772	12	7.8	729	522					224		208	6.1			0.09		<0.03					3	0.6		
CS-2	08-Jul-87	1400	512	13	8.1	630	378					237		128	4.7			0.09		0.09	0.62	0.13			24			
CS-2	19-Aug-87	1130	525	9	8	897	706					273		331	8.6			0.09		0.04	0.81			7.8	8	0.3	224	
CS-2	21-Oct-87	1100	664	8	8.2	813	365					293		89	3.7			<0.01		<0.03					1	0.2		
CS-2	19-Nov-87	930	63	5	7.2	823	545					338		183	13			0.48							12			
CS-2	26-Apr-88	1350	741	6	7.4	992	835					237		438	37.1			0.28							387			
CS-2	18-May-88	910	1050	6.5	7.2	685	560					204		277	15.4			0.09							57			
CS-2	06-Jun-88	1430	794	12.5	7.1	780	445					227		172	6.9			0.08		0.07					12	0.6		
CS-2	16-Aug-88	1530	265	14	7.2	850	560					261		227	12			0.19		0.2	0.51			6.8	10	1.2	214	
CS-2	02-Nov-88	1240	58	7	7.3	759	510					279		112	85			0.36		0.18	2.8	<0.02			4	0.2		
CS-2	23-Jun-89	850	907	10	7.5	986	559					257		238	13.3			0.09		0.1	1.23			8.8	7	0.4		
CS-2	31-Oct-89	1020	741	7	8		635	84.6	46.8	55.6	9.19	240		300	14.9			0.06		0.05	1.51			8.8	22	0.9		
CS-2	06-Jun-90	1340	911	14	7.1	673	558	79.4	27.6	25.4	4.82	226		189	15.5			0.07		0.05	0.6			8.6	17	1.3		
CS-2	12-Sep-90	1140	525	12.5	7.8	1248	764	127	70.2	26.4	10.3	256		432	14.8			0.09	0.01	0.55	1.89			6.6	11	0.2	210	
CS-2	17-Sep-91	1300	956	13.7	7.78	1620	1246	114	102	99.1	14.3	348		633	14	0.01	0.01	0.19	0.16	0.71	2.4			8.8	20	1.3	285	
CS-2	05-Nov-91	1140	1297	8.6	7.5	1650	1184	113	86.2	138	15	373		647	26			0.17		1.01	<5.			8.4	29	<0.2		
CS-2	15-Jun-92	1300	449	12	8	1520	1068					369	3.1	548	34			0.16		0.46	2.5			10.6	22	<0.5		
CS-2	09-Sep-92	1100	763	13	7.8	1500	1010					343	1.6	456	10.6	0.36	0.36	0.11	0.11	0.51	0.66			7	23	1.7	284	
CS-2	22-Jun-93	1515	1907	14.2	8.08	1281	822					354	2.5	349	13.6			0.05		<0.05	0.66			7.6	71	0.8		
CS-2	20-Jun-95	1415	4335	11.9	7.88	840	510					230	20	130	17			<0.1		0.5			0.06	7.15	35	<5.	225	
CS-2	16-Oct-95	1330	1270	13.45	7.95	1550	1060					480		301	14			<0.1		<0.5			0.05	6.06	30	<5.		
CS-2	25-Jun-96	1030	1871	12.1	8.45	1208	745	90	55	89	8			278	19			<0.1		<0.5			<0.01	6.03	28	<4.		

								Major ions								Trace metals				Nutrients					Other parameters			
			Flow	Temp	pH	Cond.	TDS	Ca^{2+}	Mg^{2+}	Na^{+}	K^{+}	HCO_3^-	CO_3^{2-}	SO_4^{2-}	Cl^-	Fe (d)	Fe (t)	Mn (t)	Mn (d)	NH_3	NO_3^-	NO_2^{2-}	O-PO_4	D.O.	TSS	O&G	Alkalinity	Turbidity
	DATE	TIME	gpm	°C		µS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	NTU
CS-2	24-Jun-97	1040	803	7.67	8.09	556	290	78	15	10	1	246			23			<0.1		<0.5			0.03	8.71	<5.	<2.		
CS-2	13-Aug-97	1600	615	14.42	6.72	1134	740	99	59	43	8	305	<5.	299	22	<0.1	<0.1	<0.1	<0.1	<0.5			0.05	8.09	7	<2.	250	17.2
CS-2	09-Oct-97	1800	157	6.21	8.25	7.85	450	92	22	34	2	316			55			0.2		<0.5			0.03	7.12	6	<2.		11.8
CS-2	16-Jun-98	1230	404	10.67	8.37	520	276	70	13	10	<1.	262			22			<0.1		<0.5			0.01	8.57	13	<2.		1.13
CS-2	17-Aug-98	820	157	14.56	7.83	1178	439	109	73	34	9	312	<5.	370	11	<0.1	<0.1	<0.1	<0.1	<0.5				8.14	23	<2.	255	34.2
CS-2	11-Oct-98	1400	75	12.11	8.02	1204	881	106	72	41	10	337			19			<0.1		<0.5			<0.05	8.86	23	<2.		37
CS-2	05-Jul-99	830	269	12.56	7.83	1085	741	105	55	33	7	301			23	0.2	0.2	<0.1		<0.5			<0.05	8.38	<5.	<2.		
CS-2	16-Aug-99	945	121	11.99	7.9	1189	823	108	63	37	8	307	<5.	350	23	<0.1	<0.1	<0.1	<0.1	<0.5			<0.05	8.38	<5.	<2.	252	10
CS-2	07-Oct-99	1145	76	7.04	8.07	1300	923	107	70	43	9	320			18			<0.1		<0.5			<0.1	8.17	14	<2.		23
CS-2	28-Jun-00	1030	4223	12	7.98	703	367	63	30	22	5	272	<5.	107	19	<0.1	<0.1	<0.1	<0.1	<0.5			<0.05	5.71	27	<2.	223	39
CS-2	09-Aug-00	1000	616	14	8.06	698	413	60	33	21	6	237	<5.	125	8	<0.1	<0.1	<0.1	<0.1	<0.5			<0.05	5.92	12	<2.	195	24
CS-2	08-Oct-00	1230	852	13	7.73	827	518	73	42	20	8	265	<5.	192	5			<0.1		<0.5			<0.05	6.72	29	<2.	218	42
CS-2	20-Jun-01	1615	4223	13.9	8.28	749	467	73	43	25	8	284		171	7			<0.1		<0.5			<0.05	7.18	5	<2.		19
CS-2	06-Sep-01	1250	7962	13.9	8.21	522	333	55	27	15	5	264	<5.	49	6.4	<0.1	<0.1	<0.05	<0.05	0.1			<0.05	7.46	27	<2.	217	48
CS-2	30-Oct-01	1045	8072	13.1	8.12	678	457	69	39	22	8	285		151	3.9			0.07		<0.1			<0.05	7.77	11	<2.		25
CS-2	28-Feb-02	1300	7300	8	7.7	403	328	57	30	17	5	259		94.5	4.1			<0.05		<0.1	0.33		<0.05	8	30	<2.		2
CS-2	18-Jun-02	1325	7614	14.9	7.75	576	281	51	26	16	5	246	<5.	70	4			<0.05		<0.1			<0.05	7.98	<5.	4	202	11
CS-2	28-Aug-02	1035	7069	16.3	7.87	582	322	53	28	15	5	257	<5.	74	4	<0.1	<0.1	<0.05	<0.05	0.1			<0.05	7.11	<5.	<2.	212	9
CS-2	21-Oct-02	1040	6647	12.1	8.3	858	600	76	43	56	7	304	<5.	253	3			<0.05		<0.1			<0.05	7.76	<5.	<2.	249	8
CS-2	26-Feb-03	1215	9350	12.6	8.64	696	486	66.4	39.5	34.1	6.44	279	<5.	163	11			0.036		<0.1		<0.03	<0.05	7.2	6	<2.	235	2
CS-2	24-Sep-03	1315	8120	10.6	8.16	704	459	69.6	36.9	28.9	6.39	292	<5.	146	4	<0.005	<0.005	0.021	0.018	<0.1			<0.05	6.07	<5.	<2.	239	10.8
VC-6	19-Aug-82	1545	350	12	8.4	370	258					289		<3.	18.7			0.075		0.38	0.48			11.9	75	1	236.8	
VC-6	14-Oct-82	1145	251	4	8.5	460	300					307		30	8.1			0.417							407	2.8		
VC-6	25-May-83	1200	5341	7	7.7	311	216					178		21	4			0.475							1950			
VC-6	30-Jun-83	845	1670	6	7.9	359	232					225		12	8			0.07		<0.1					26	<0.2		
VC-6	20-Jul-83	1000	548	10	8	471	290					303		36	6			0.17							2			
VC-6	25-Aug-83	1100	364	11	7.9	341	280					305		25	6			0.275		0.15	<0.02			6	149	<0.2	25	
VC-6	26-Oct-83	1530	251	6	7.9	542	335					281		65	10			0.18		<0.01					36	<0.2		
VC-6	11-Nov-83	830	265	3	7.4	476	320					298		34	8			0.18							33			
VC-6	17-May-84	1100	11400	8	7.3	328	620	160	36	3.3	2.9	201		319	37.5			1.05							1868			
VC-6	28-Jun-84	1645	3400	13	7.9	410	256	76	7.2	20	1.7	288		30	3.3			0.1		0.16					4	0.8		
VC-6	27-Jul-84	910	1542	11	7.7	483	270	77.6	14.6	4.8	1.49	297		20	4.9			0.18							17			
VC-6	18-Sep-84	900	498	10	7.8	504	346	82	25.2	6.7	3.05	305		64	10			0.21							112			
VC-6	22-May-85	1330	4308	9	7.6	311	250	63.9	12.8	9	1.5	182		73	3.4			0.12							245			
VC-6	20-Jun-85	1410	1037	14	7.8	522	286	66	16.3	13	5.8	246		50	5.3			0.02		<0.01					19	0.2		
VC-6	09-Jul-85	1350	633	16	8	630	288	68	18.7	11	2.4	261		53	6.2			0.04							19			
VC-6	22-Aug-85	840	723	13	7.9	554	344	68	24.5	26	5.2	242		99	5.8			0.08		0.15	0.89				39	<0.1	198	
VC-6	19-Sep-85	1130	390	8	8.1	563	394	80.8	22.3	7.3	2.66	254		91	7.4			0.1							23			
VC-6	16-Oct-85	1140	503	6	8	556	342					310		97	6.7			0.09		<0.01					17	1.8		
VC-6	28-May-86	1245	8482	6	7.8	261	210					150		138	2.5			0.12							284			
VC-6	25-Jun-86	1050	1423	10	7.8	472	296					217		65	3.9			0.08		0.48					17	<0.1		
VC-6	23-Jul-86	900	723	11	7.8	564	390					222		153	5.6			0.11							76			
VC-6	26-Aug-86	1130	305	15	7.6	630	368					232		124	5.4			0.07		0.11	0.24			7.4	6	0.6	190	
VC-6	25-Sep-86	1440	714	6	7.7	592	360					217		132	<1.			0.29							115			
VC-6	11-Nov-86	1330	521	4	8.2	633	440					229		179	11.3			0.17							11.6			
VC-6	11-Dec-86	900	426	1	8.2	626	470					244		192	5.7			0.16							4			
VC-6	22-Apr-87	1320	440	8	8	583	400					229		128	14.8			0.37							681			
VC-6	20-May-87	1140	1266	7	8.3	567	382					201		131	15.3			0.01							54			
VC-6	11-Jun-87	1100	741	14	8.2	710	514					221		200	7.3			0.09		<0.03					5	1.2		
VC-6	08-Jul-87	1400	507	16	8.3	630	420					234		151	6.1			0.09		0.09	0.68	0.1			18			
VC-6	19-Aug-87	1200	642	13	8.3	875	656					249		319	8.6			0.1		0.09	0.74			5.8	6	<0.1	204	
VC-6	21-Oct-87	1130	696	9	8.4	804	594					244		270	7.6			0.09		0.06					22	0.4		

								Major ions								Trace metals				Nutrients					Other parameters			
	DATE	TIME	Flow gpm	Temp °C	pH	Cond. µS	TDS mg/l	Ca^{2+} mg/l	Mg^{2+} mg/l	Na^{+} mg/l	K^{+} mg/l	HCO_3^- mg/l	CO_3^{2-} mg/l	SO_4^{2-} mg/l	Cl^- mg/l	Fe (d) mg/l	Fe (t) mg/l	Mn (t) mg/l	Mn (d) mg/l	NH_3 mg/l	NO_3^- mg/l	NO_2^{2-} mg/l	O-PO_4 mg/l	D.O. mg/l	TSS mg/l	O&G mg/l	Alkalinity mg/l	Turbidity NTU
VC-6	19-Nov-87	1000	90	5	7.7	849	560					337		195	16.4			0.35							8			
VC-6	26-Apr-88	1430	1019	6	7.7	989	821					220		429	45.2			0.28							367			
VC-6	18-May-88	1000	1948	6	7.5	673	410					193		145	23.2			0.12							75			
VC-6	06-Jun-88	1330	875	13	8	772	465					229		176	10.2			0.08		0.05					16	0.4		
VC-6	16-Aug-88	810	705	12	7.6	891	625					261		285	9.3			0.11		0.11	0.75			8.4	17	<0.1	214	
VC-6	02-Nov-88	1330	45	7	7.7	792	550					272		144	80			0.16		0.1	1.3	<0.02			2	0.3		
VC-6	23-Jun-89	830	987	10	7.7	978	575					243		264	11.2			0.07		0.07	1.21			8.2	8	0.7		
VC-6	31-Oct-89	1050	844	6	7.9	990	645	82.9	45.5	56.2	9.11	238		305	14.8			0.06		<0.03	1.54			7.8	25	0.8		
VC-6	06-Jun-90	1300	628	13	7.6	639	538	80	24.8	26.9	4.39	222		178	18			0.04		0.42	0.56			7.7	12	<0.1		
VC-6	12-Sep-90	950	413	14.1	8	1215	820	129	52.4	30.6	9.19	237		421	16.2			0.08	0.08	0.28	1.67			7.5	24	0.9	194	
VC-6	17-Sep-91	1330	705	11.55	8.13	1590	1214	112	101	101	14	334		632	13	<0.01	<0.01	0.17	0.16	0.73	2.3			11.5	44	0.5	274	
VC-6	05-Nov-91	1240	453	7.32	7.6	1530	1102	99.1	80.5	129	14.3	345		551	44			0.16		0.88	<5.			8.6	30	<0.2		
VC-6	15-Jun-92	1330	494	12.5	8.23	1490	1036					329	3	480	21			0.12		0.32	1.4			11.9	31	1.3		
VC-6	09-Sep-92	1120	826	13.5	8.05	1440	1020					340	3.1	463	11.5	0.12	0.12	0.1	0.09	0.5	0.69			8	28	1.3	284	
VC-6	22-Jun-93	1545	1921	14.02	8.26	1276	784					330	2.2	348	15.5			0.06		<0.05	0.66			7.6	88	<0.5		
VC-6	20-Jun-95	1450	4003	11.6	8.09	818	510					220	25	160	21			<0.1		0.5			0.04	7.23	35	<5.	225	
VC-6	16-Oct-95	1350	1135	2.9	8.25	1530	1040					485		476	16			<0.1		<0.5			0.05	6.5	60	<5.		
VC-6	25-Jun-96	1110	2522	15.9	8.73	1168	774	89	54	87	9	332		308	20			<0.1		<0.5			<0.01	6.59	36	<4.		
VC-6	24-Jun-97	1130	871	10.12	8.45	571	290	81	16	13	1	245			25			<0.1		<0.5			0.03	9.24	7	<2.		
VC-6	13-Aug-97	1630	570	15.48	8.32	1125	700	100	57	43	8	303	<5.	282	16	<0.1	<0.1	<0.1	<0.1	<0.5			0.05	8.19	38	<2.	248	24.4
VC-6	09-Oct-97	1715	153	5.06	8.5	806	430	88	23	37	2	295			59			0.2		<0.5			0.03	7.97	14	<2.		9.51
VC-6	16-Jun-98	1315	323	10.69	8.49	531	274	70	14	11	<1.	253			25			<0.1		<0.5			0.02	8.52	12	<2.		12
VC-6	17-Aug-98	1000	278	14.6	8.03	1164	751	108	71	36	8	298	<5.	393	14	<0.1	<0.1	<0.1	<0.1	<0.5				8.22	63	<2.	245	51.2
VC-6	11-Oct-98	1500	251	11.24	8.25	1188	877	108	77	43	10	320			21			<0.1		<0.5			<0.05	9.07	23	<2.		25.6
VC-6	05-Jul-99	900	350	13.11	8.1	1073	706	102	52	34	6	281			28			<0.1		<0.5			<0.05	8.4	6	<2.		4.12
VC-6	16-Aug-99	1015	130	13.91	8.2	811	797	105	59	37	8	290	<5.	344	28	<0.1	<0.1	<0.1	<0.1	<0.5			<0.05	7.93	30	<2.	237	13
VC-6	07-Oct-99	1215	92	7.24	8.4	1298																		8.36				10
VC-6	28-Jun-00	1100	214	10.7	8.27	703	389	62	30	23	5	260	<5.	108	21	<0.1	<0.1	<0.1	<0.1	<0.5			<0.05	6.01	19	<2.	213	30
VC-6	09-Aug-00	1115	601	14	8.35	697	400	59	32	21	6	225	<5.	111	92	<0.1	<0.1	<0.1	<0.1	<0.5			<0.05	6.61	20	<2.	185	23
VC-6	08-Oct-00	1300	978	12	7.98	838	515	74	42	21	8	263	<5.	193	6			<0.1		<0.5			<0.05	6.56	41	<2.	215	47
VC-6	20-Jun-01	1645	4326	14.3	8.46	796	532	74	45	28	9	285		229	8			<0.1		<0.5			<0.05		<5.	<2.	285	15
VC-6	06-Sep-01	1300	8064	13.9	8.47	596	356	59	31	17	6	285	<5.	109	5.3	<0.1	<0.1	<0.05	<0.05	0.2			<0.05	6.8	50	<2.	240	53
VC-6	30-Oct-01	1100	8072	13.2	8.39	669	439	70	39	22	8	279		148	4.3			0.07		<0.1	0.48		<0.05	7.68	26	<2.		22
VC-6	28-Feb-02	1310	7300	9	8.25	430	322	56	31	18	5	248		95.6	5			<0.05		0.1	0.34		<0.05	7.5	41	2		2.5
VC-6	18-Jun-02	1355	7614	15.4	7.84	571	264	51	26	16	5	235	<5.	69	4			<0.05		<0.1			<0.05	8.27	5	<2.	193	9
VC-6	28-Aug-02	1120	7078	14.8	8.21	555	298	51	25	14	5	239		66	4	<0.1	<0.1	<0.05	<0.05	0.1	0.34		<0.05	7.21	<5.		198	11
VC-6	21-Oct-02	1115	6647	13.8	8.72	833	563	79	43	57	8	299	<5.	257	4			<0.05		<0.1			<0.05	7.19	<5.	<2.	245	9
VC-6	26-Feb-03	1230	9350	11.5	8.71	665	463	61.9	36.4	33.1	6.08	271	5	157	11			0.041		<0.1		<0.03	<0.05	7.5	7	<2.	230	2
VC-6	24-Sep-03	1415	8930	12.2	8.49	631	400	66.3	35.9	25.9	6.05	270	<5.	129	3	<0.005	<0.005	0.03	0.015	<0.1			<0.05	8	10	<2.	221	11.9

Note: The following typographic errors were identified in the EDI. The correct numbers are presented in these tables

28 May 86, HCO3 at VC-6 changed from 15 to 150 mg/l

09 Oct 97, Specific conductance at CS-2 chagned from 8.25 to 825 µS

17 May 84, Discharge at CS-2 changed from 107.1 to 10710 gpm