

TOTAL AMD LOADS AND CASSELMAN RIVER

TOTAL AMD LOADS AND CASSELMAN RIVER

Description

The Casselman River was sampled upstream of Coal Run at the bridge in Boynton (Station 6) since August 1967. This is above the first source of mine drainage from SMC coming from Coal Run. There are 157 observations (see "data file"), but only 10 flows were recorded, all in 1982, precluding calculation of AMD loads except for that year.

The sampling station (No. 7) on the Casselman downstream of SMC is located at the Broadway Bridge in Meyersdale. This is below the last significant source of mine drainage from SMC coming from Shaw Mines Run. Starting in July 1967 there are 161 observations (see "data file") but only 10 flows recorded, all in 1982.

DATE	SHAW MINES COMPLEX		PH	ACIDITY	ACID LOAD	ALKALINITY	STATION 6		FERROUS SULFATE	REISER & EARL HYDROGEOLOGISTS		GAL DEVICE
	AL	MIN					TOTAL IRON	TOTAL IRON LOAD		IRON	LOAD	
8/25/67	-1.00	-1.00	6.40	8.	-1.00	-1.00	5.00	-1.00	47.	-1.00	-1.00	-1.00
9/1/67	-1.00	-1.00	6.60	28.	-1.00	-1.00	1.20	-1.00	41.	-1.00	-1.00	-1.00
9/8/67	-1.00	-1.00	6.80	12.	-1.00	-1.00	0.40	-1.00	82.	-1.00	-1.00	-1.00
9/15/67	-1.00	-1.00	6.20	10.	-1.00	-1.00	0.80	-1.00	75.	-1.00	-1.00	-1.00
9/22/67	-1.00	-1.00	6.60	4.	-1.00	-1.00	6.00	-1.00	76.	-1.00	-1.00	-1.00
9/29/67	-1.00	-1.00	6.70	16.	-1.00	-1.00	1.00	-1.00	60.	-1.00	-1.00	-1.00
10/6/67	-1.00	-1.00	7.00	12.	-1.00	-1.00	0.80	-1.00	60.	-1.00	-1.00	-1.00
10/13/67	-1.00	-1.00	7.00	10.	-1.00	-1.00	0.40	-1.00	61.	-1.00	-1.00	-1.00
10/20/67	-1.00	-1.00	6.30	6.	-1.00	-1.00	7.00	-1.00	40.	-1.00	-1.00	-1.00
10/27/67	-1.00	-1.00	6.90	8.	-1.00	-1.00	1.20	-1.00	42.	-1.00	-1.00	-1.00
11/3/67	-1.00	-1.00	6.50	10.	-1.00	-1.00	0.80	-1.00	40.	-1.00	-1.00	-1.00
11/10/67	-1.00	-1.00	6.50	4.	-1.00	-1.00	0.40	-1.00	43.	-1.00	-1.00	-1.00
12/1/67	-1.00	-1.00	6.70	8.	-1.00	-1.00	0.40	-1.00	34.	-1.00	-1.00	-1.00
12/8/67	-1.00	-1.00	6.30	2.	-1.00	-1.00	5.00	-1.00	27.	-1.00	-1.00	-1.00
12/15/67	-1.00	-1.00	6.20	4.	-1.00	-1.00	1.20	-1.00	36.	-1.00	-1.00	-1.00
1/5/68	-1.00	-1.00	6.30	2.	-1.00	-1.00	32.00	-1.00	37.	-1.00	-1.00	-1.00
1/12/68	-1.00	-1.00	6.60	4.	-1.00	-1.00	0.40	-1.00	32.	-1.00	-1.00	-1.00
1/26/68	-1.00	-1.00	5.40	2.	-1.00	-1.00	0.0	-1.00	29.	-1.00	-1.00	-1.00
2/9/68	-1.00	-1.00	6.40	4.	-1.00	-1.00	0.80	-1.00	44.	-1.00	-1.00	-1.00
2/16/68	-1.00	-1.00	6.40	6.	-1.00	-1.00	0.60	-1.00	29.	-1.00	-1.00	-1.00
3/1/68	-1.00	-1.00	6.90	2.	-1.00	-1.00	1.20	-1.00	34.	-1.00	-1.00	-1.00
3/15/68	-1.00	-1.00	5.80	8.	-1.00	-1.00	3.00	-1.00	40.	-1.00	-1.00	-1.00
3/22/68	-1.00	-1.00	6.10	12.	-1.00	-1.00	1.00	-1.00	30.	-1.00	-1.00	-1.00
3/29/68	-1.00	-1.00	6.60	2.	-1.00	-1.00	1.00	-1.00	22.	-1.00	-1.00	-1.00
4/12/68	-1.00	-1.00	6.50	4.	-1.00	-1.00	0.60	-1.00	27.	-1.00	-1.00	-1.00
4/19/68	-1.00	-1.00	6.50	4.	-1.00	-1.00	0.0	-1.00	15.	-1.00	-1.00	-1.00
4/26/68	-1.00	-1.00	6.50	4.	-1.00	-1.00	0.0	-1.00	32.	-1.00	-1.00	-1.00
5/3/68	-1.00	-1.00	6.60	4.	-1.00	-1.00	0.80	-1.00	31.	-1.00	-1.00	-1.00
5/10/68	-1.00	-1.00	6.90	82.	-1.00	-1.00	0.0	-1.00	30.	-1.00	-1.00	-1.00
5/17/68	-1.00	-1.00	6.80	4.	-1.00	-1.00	0.40	-1.00	30.	-1.00	-1.00	-1.00
5/24/68	-1.00	-1.00	6.20	400.	-1.00	-1.00	0.60	-1.00	27.	-1.00	-1.00	-1.00
5/31/68	-1.00	-1.00	6.20	4.	-1.00	-1.00	50.00	-1.00	765.	-1.00	-1.00	-1.00
6/7/68	-1.00	-1.00	4.70	4.	-1.00	-1.00	1.20	-1.00	23.	-1.00	-1.00	-1.00
6/14/68	-1.00	-1.00	4.80	10.	-1.00	-1.00	2.00	-1.00	36.	-1.00	-1.00	-1.00
6/21/68	-1.00	-1.00	4.80	20.	-1.00	-1.00	1.80	-1.00	57.	-1.00	-1.00	-1.00
6/28/68	-1.00	-1.00	5.60	4.	-1.00	-1.00	0.80	-1.00	39.	-1.00	-1.00	-1.00
7/9/68	-1.00	-1.00	6.60	4.	-1.00	-1.00	1.20	-1.00	48.	-1.00	-1.00	-1.00
7/16/68	-1.00	-1.00	3.40	14.	-1.00	-1.00	3.40	-1.00	70.	-1.00	-1.00	-1.00
7/23/68	-1.00	-1.00	6.30	8.	-1.00	-1.00	2.50	-1.00	60.	-1.00	-1.00	-1.00
7/30/68	-1.00	-1.00	6.20	8.	-1.00	-1.00	0.70	-1.00	48.	-1.00	-1.00	-1.00
8/6/68	-1.00	-1.00	6.30	-1.	-1.00	-1.00	0.50	-1.00	28.	-1.00	-1.00	-1.00
9/4/68	-1.00	-1.00	6.80	-1.	-1.00	-1.00	2.00	-1.00	40.	-1.00	-1.00	-1.00
9/20/68	-1.00	-1.00	6.50	-1.	-1.00	-1.00	0.70	-1.00	59.	-1.00	-1.00	-1.00
9/27/68	-1.00	-1.00	6.80	-1.	-1.00	-1.00	0.40	-1.00	45.	-1.00	-1.00	-1.00
10/11/68	-1.00	-1.00	7.10	-1.	-1.00	-1.00	0.30	-1.00	90.	-1.00	-1.00	-1.00
10/25/68	-1.00	-1.00	6.30	-1.	-1.00	-1.00	0.50	-1.00	120.	-1.00	-1.00	-1.00
11/8/68	-1.00	-1.00	6.40	-1.	-1.00	-1.00	0.40	-1.00	240.	-1.00	-1.00	-1.00
11/21/68	-1.00	-1.00	5.90	-1.	-1.00	-1.00	6.00	-1.00	120.	-1.00	-1.00	-1.00
12/5/68	-1.00	-1.00	6.10	-1.	-1.00	-1.00	3.10	-1.00	56.	-1.00	-1.00	-1.00
12/18/68	-1.00	-1.00	2.50	-1.	-1.00	-1.00	1.54	-1.00	112.	-1.00	-1.00	-1.00
1/3/69	-1.00	-1.00	5.00	-1.	-1.00	-1.00	125.00	-1.00	3200.	-1.00	-1.00	-1.00
1/16/69	-1.00	-1.00	5.40	8.	-1.00	-1.00	0.40	-1.00	54.	-1.00	-1.00	-1.00
1/31/69	-1.00	-1.00	5.30	-1.	-1.00	-1.00	2.10	-1.00	90.	-1.00	-1.00	-1.00
2/13/69	-1.00	-1.00	5.50	4.	-1.00	-1.00	3.00	-1.00	36.	-1.00	-1.00	-1.00
					-1.00	-1.00	0.30	-1.00	140.	-1.00	-1.00	-1.00

DATE	SUAW MINES COMPLEX		PH	ACIDITY	ACID LOAD		ALKALINITY	STATION 6		FERRUSSULFATE IRON	MEISER & EARL HYDROGEOLOGISTS		GAL DEVICE
	AL	MIN			IRON	TOTAL		LOAD	SULFATE		MILLION GAL/DAY		
2/28/69	-1.00	-1.00	6.10	-1.	-1.00	4.00	1.00	-1.00	-1.00	-1.00	140.	-1.00	-1.00
3/13/69	-1.00	-1.00	5.80	0.	-1.00	0.0	0.30	-1.00	-1.00	-1.00	34.	-1.00	-1.00
3/28/69	-1.00	-1.00	5.70	2.	-1.00	-1.00	1.20	-1.00	-1.00	-1.00	44.	-1.00	-1.00
4/10/69	-1.00	-1.00	5.10	4.	-1.00	-1.00	8.00	-1.00	-1.00	-1.00	500.	-1.00	-1.00
4/25/69	-1.00	-1.00	5.20	0.	-1.00	0.0	0.60	-1.00	-1.00	-1.00	60.	-1.00	-1.00
5/ 8/69	-1.00	-1.00	5.60	-1.	-1.00	4.00	0.40	-1.00	-1.00	-1.00	85.	-1.00	-1.00
5/23/69	-1.00	-1.00	5.70	0.	-1.00	0.0	1.70	-1.00	-1.00	-1.00	80.	-1.00	-1.00
6/ 5/69	-1.00	-1.00	6.10	-1.	-1.00	8.00	2.10	-1.00	-1.00	-1.00	70.	-1.00	-1.00
6/20/69	-1.00	-1.00	5.90	18.	-1.00	-1.00	2.00	-1.00	-1.00	-1.00	70.	-1.00	-1.00
7/ 3/69	-1.00	-1.00	6.70	-1.	-1.00	18.00	1.10	-1.00	-1.00	-1.00	70.	-1.00	-1.00
7/18/69	-1.00	-1.00	5.40	-1.	-1.00	4.00	0.50	-1.00	-1.00	-1.00	70.	-1.00	-1.00
8/ 1/69	-1.00	-1.00	5.50	-1.	-1.00	4.00	1.70	-1.00	-1.00	-1.00	52.	-1.00	-1.00
8/15/69	-1.00	-1.00	5.50	-1.	-1.00	10.00	0.60	-1.00	-1.00	-1.00	70.	-1.00	-1.00
8/28/69	-1.00	-1.00	5.90	-1.	-1.00	10.00	0.65	-1.00	-1.00	-1.00	90.	-1.00	-1.00
9/12/69	-1.00	-1.00	5.90	-1.	-1.00	14.00	0.50	-1.00	-1.00	-1.00	90.	-1.00	-1.00
9/25/69	-1.00	-1.00	5.80	-1.	-1.00	10.00	6.00	-1.00	-1.00	-1.00	88.	-1.00	-1.00
10/ 9/69	-1.00	-1.00	5.50	-1.	-1.00	14.00	0.65	-1.00	-1.00	-1.00	105.	-1.00	-1.00
10/23/69	-1.00	-1.00	5.50	-1.	-1.00	10.00	1.15	-1.00	-1.00	-1.00	92.	-1.00	-1.00
11/10/69	-1.00	-1.00	5.50	0.	-1.00	0.0	0.77	-1.00	-1.00	-1.00	56.	-1.00	-1.00
11/20/69	-1.00	-1.00	5.80	0.	-1.00	0.0	0.80	-1.00	-1.00	-1.00	52.	-1.00	-1.00
12/ 5/69	-1.00	-1.00	5.80	0.	-1.00	0.0	0.40	-1.00	-1.00	-1.00	56.	-1.00	-1.00
12/19/69	-1.00	-1.00	5.50	-1.	-1.00	10.00	0.30	-1.00	-1.00	-1.00	58.	-1.00	-1.00
4/ 6/70	-1.00	-1.00	4.90	4.	-1.00	-1.00	4.00	-1.00	-1.00	-1.00	42.	-1.00	-1.00
4/17/70	-1.00	-1.00	5.00	0.	-1.00	0.0	4.00	-1.00	-1.00	-1.00	52.	-1.00	-1.00
5/22/70	-1.00	-1.00	5.70	0.	-1.00	0.0	77.00	-1.00	-1.00	-1.00	42.	-1.00	-1.00
7/31/70	-1.00	-1.00	6.00	8.	-1.00	-1.00	77.00	-1.00	-1.00	-1.00	72.	-1.00	-1.00
8/28/70	-1.00	-1.00	6.70	14.	-1.00	-1.00	2.75	-1.00	-1.00	-1.00	58.	-1.00	-1.00
9/25/70	-1.00	-1.00	6.00	8.	-1.00	-1.00	3.50	-1.00	-1.00	-1.00	105.	-1.00	-1.00
10/ 9/70	-1.00	-1.00	6.30	10.	-1.00	-1.00	1.70	-1.00	-1.00	-1.00	120.	-1.00	-1.00
10/30/70	-1.00	-1.00	6.10	10.	-1.00	-1.00	2.56	-1.00	-1.00	-1.00	28.	-1.00	-1.00
11/12/70	-1.00	-1.00	6.40	2.	-1.00	-1.00	0.60	-1.00	-1.00	-1.00	38.	-1.00	-1.00
11/27/70	-1.00	-1.00	6.30	0.	-1.00	-1.00	2.66	-1.00	-1.00	-1.00	32.	-1.00	-1.00
12/15/70	-1.00	-1.00	5.90	10.	-1.00	-1.00	0.45	-1.00	-1.00	-1.00	24.	-1.00	-1.00
1/ 8/71	-1.00	-1.00	5.30	0.	-1.00	-1.00	1.90	-1.00	-1.00	-1.00	20.	-1.00	-1.00
1/22/71	-1.00	-1.00	5.70	10.	-1.00	-1.00	3.00	-1.00	-1.00	-1.00	44.	-1.00	-1.00
3/17/71	-1.00	-1.00	5.70	2.	-1.00	-1.00	55.00	-1.00	-1.00	-1.00	28.	-1.00	-1.00
3/ 3/72	-1.00	-1.00	7.60	3.	-1.00	14.00	0.29	-1.00	-1.00	-1.00	20.	-1.00	-1.00
4/11/72	-1.00	-1.00	6.20	8.	-1.00	8.00	0.32	-1.00	-1.00	-1.00	24.	-1.00	-1.00
5/26/72	-1.00	-1.00	7.40	1.	-1.00	12.00	0.21	-1.00	-1.00	-1.00	30.	-1.00	-1.00
6/30/72	-1.00	-1.00	6.50	9.	-1.00	9.00	3.30	-1.00	-1.00	-1.00	36.	-1.00	-1.00
7/28/72	-1.00	-1.00	6.80	6.	-1.00	13.00	0.39	-1.00	-1.00	-1.00	30.	-1.00	-1.00
8/31/72	-1.00	-1.00	7.60	9.	-1.00	81.00	0.65	-1.00	-1.00	-1.00	35.	-1.00	-1.00
9/20/72	-1.00	-1.00	5.70	0.	-1.00	30.00	0.44	-1.00	-1.00	-1.00	1.	-1.00	-1.00
11/30/72	-1.00	-1.00	6.30	5.	-1.00	17.00	0.59	-1.00	-1.00	-1.00	20.	-1.00	-1.00
1/22/73	-1.00	-1.00	6.60	5.	-1.00	0.0	0.59	-1.00	-1.00	-1.00	21.	-1.00	-1.00
2/28/73	-1.00	-1.00	6.40	0.	-1.00	6.00	2.10	-1.00	-1.00	-1.00	48.	-1.00	-1.00
3/29/73	-1.00	-1.00	6.40	10.	-1.00	0.0	0.30	-1.00	-1.00	-1.00	70.	-1.00	-1.00
5/ 1/73	-1.00	-1.00	5.60	0.	-1.00	4.00	0.20	-1.00	-1.00	-1.00	19.	-1.00	-1.00
10/15/74	-1.00	-1.00	6.00	14.	-1.00	190.00	1.00	-1.00	-1.00	-1.00	24.	-1.00	-1.00
10/31/74	-1.00	-1.00	6.30	4.	-1.00	48.00	0.10	-1.00	-1.00	-1.00	175.	-1.00	-1.00
11/14/74	-1.00	-1.00	6.20	2.	-1.00	30.00	0.20	-1.00	-1.00	-1.00	125.	-1.00	-1.00
11/26/74	-1.00	-1.00	5.30	6.	-1.00	18.00	0.0	-1.00	-1.00	-1.00	300.	-1.00	-1.00
12/11/74	-1.00	-1.00	6.50	6.	-1.00	14.00	0.0	-1.00	-1.00	-1.00	175.	-1.00	-1.00
1/17/75	-1.00	-1.00	6.30	6.	-1.00	10.00	0.0	-1.00	-1.00	-1.00	375.	-1.00	-1.00
2/ 7/75	-1.00	-1.00	6.10	6.	-1.00	8.00	0.0	-1.00	-1.00	-1.00	325.	-1.00	-1.00

DATE	SHAW MINES COMPLEX		STATION 6		MEISER & EARL HYDROGEOLOGISTS		GAL DEVISE
	AL	MN	TOTAL IRON	TOTAL IRON LOAD	FERROUS SULFATE IRON	SULFATE LOAD	
2/25/75	-1.00	-1.00	0.0	-1.00	0.0	250.	-1.00
3/18/75	-1.00	-1.00	0.0	-1.00	0.0	350.	-1.00
3/31/75	-1.00	-1.00	0.0	-1.00	0.0	250.	-1.00
4/18/75	-1.00	-1.00	0.20	-1.00	0.0	300.	-1.00
6/24/75	-1.00	-1.00	0.64	-1.00	-1.00	20.	-1.00
11/23/75	-1.00	-1.00	0.30	-1.00	0.0	110.	-1.00
2/9/76	-1.00	-1.00	0.20	-1.00	0.0	600.	-1.00
4/12/76	-1.00	-1.00	0.40	-1.00	0.25	83.	-1.00
6/25/76	-1.00	-1.00	0.70	-1.00	0.50	35.	-1.00
9/24/76	-1.00	-1.00	0.60	-1.00	0.20	55.	-1.00
11/19/76	-1.00	-1.00	0.50	-1.00	0.15	48.	-1.00
4/13/77	-1.00	-1.00	1.80	-1.00	1.25	40.	-1.00
5/5/78	-1.00	-1.00	1.00	-1.00	0.80	52.	-1.00
8/16/78	-1.00	-1.00	1.10	-1.00	1.00	66.	-1.00
9/14/78	-1.00	-1.00	-1.00	-1.00	-1.00	49.	-1.00
3/23/79	-1.00	-1.00	0.90	-1.00	0.40	58.	-1.00
4/20/79	-1.00	-1.00	0.60	-1.00	0.50	53.	-1.00
5/25/79	-1.00	-1.00	1.00	-1.00	0.70	91.	-1.00
2/27/80	-1.00	-1.00	0.30	-1.00	0.20	33.	-1.00
3/27/80	-1.00	-1.00	0.50	-1.00	0.20	39.	-1.00
4/28/80	-1.00	-1.00	0.70	-1.00	0.30	52.	-1.00
6/18/80	-1.00	-1.00	0.50	-1.00	0.30	45.	-1.00
6/25/80	-1.00	-1.00	0.90	-1.00	0.30	67.	-1.00
7/16/80	-1.00	-1.00	0.60	-1.00	0.30	64.	-1.00
8/5/80	-1.00	-1.00	0.0	-1.00	0.0	60.	-1.00
9/11/80	-1.00	-1.00	0.50	-1.00	0.30	108.	-1.00
9/18/80	-1.00	-1.00	0.30	-1.00	0.10	61.	-1.00
10/7/80	-1.00	-1.00	0.40	-1.00	0.10	101.	-1.00
12/3/80	-1.00	-1.00	0.80	-1.00	0.20	48.	-1.00
5/29/81	-1.00	-1.00	0.50	-1.00	0.20	41.	-1.00
8/20/81	-1.00	-1.00	0.40	-1.00	0.30	42.	-1.00
11/13/81	-1.00	-1.00	0.60	-1.00	0.30	40.	-1.00
2/16/82	-1.00	-1.00	0.60	-1.00	0.40	32.	-1.00
3/30/82	-1.00	-1.00	0.20	-1.00	0.20	29.	-1.00
4/20/82	-1.00	-1.00	0.10	-1.00	0.10	24.	-1.00
5/19/82	-1.00	-1.00	0.20	-1.00	0.10	37.	-1.00
6/16/82	-1.00	-1.00	0.20	-1.00	0.0	56.	-1.00
7/20/82	-1.00	-1.00	0.40	-1.00	0.20	21.	-1.00
8/25/82	-1.00	-1.00	0.10	-1.00	0.10	47.	-1.00
9/13/82	-1.00	-1.00	0.10	-1.00	0.0	63.	-1.00
10/12/82	-1.00	-1.00	0.0	-1.00	0.0	20336.39	-1.00
11/16/82	-1.00	-1.00	0.20	-1.00	0.0	74.	-1.00
12/14/82	-1.00	-1.00	0.20	-1.00	0.10	92.	-1.00
1/20/83	-1.00	-1.00	0.10	-1.00	0.0	80.	-1.00
2/4/83	-1.00	-1.00	0.30	-1.00	0.0	40.	-1.00
3/4/83	-1.00	-1.00	0.30	-1.00	0.10	37.	-1.00
			0.10	-1.00	0.10	41.	-1.00
			0.10	-1.00	0.0	42.	-1.00
			249.84	-1.00	0.40	32.	-1.00
			87.60	-1.00	0.20	29980.79	-1.00
			48.00	-1.00	0.10	32411.99	-1.00
			532.80	-1.00	0.0	13440.00	-1.00
			21.07	-1.00	0.20	27971.99	-1.00
			32.28	-1.00	0.10	9903.84	-1.00
			0.0	-1.00	0.0	20336.39	-1.00
			0.0	-1.00	0.0	38.74	-1.00
			15.12	-1.00	0.0	25.29	-1.00
			23.52	-1.00	0.0	38.74	-1.00
			32.04	-1.00	0.10	9.22	-1.00
			-1.00	-1.00	0.0	6400.00	-1.00
			16.00	-1.00	0.0	6300.00	-1.00
			16.00	-1.00	0.0	9.07	-1.00
			9.00	-1.00	0.10	14.11	-1.00
				-1.00	0.0	38.45	-1.00
				-1.00	0.10	26700.00	-1.00
				-1.00	0.10	-1.00	-1.00
				-1.00	0.0	-1.00	-1.00

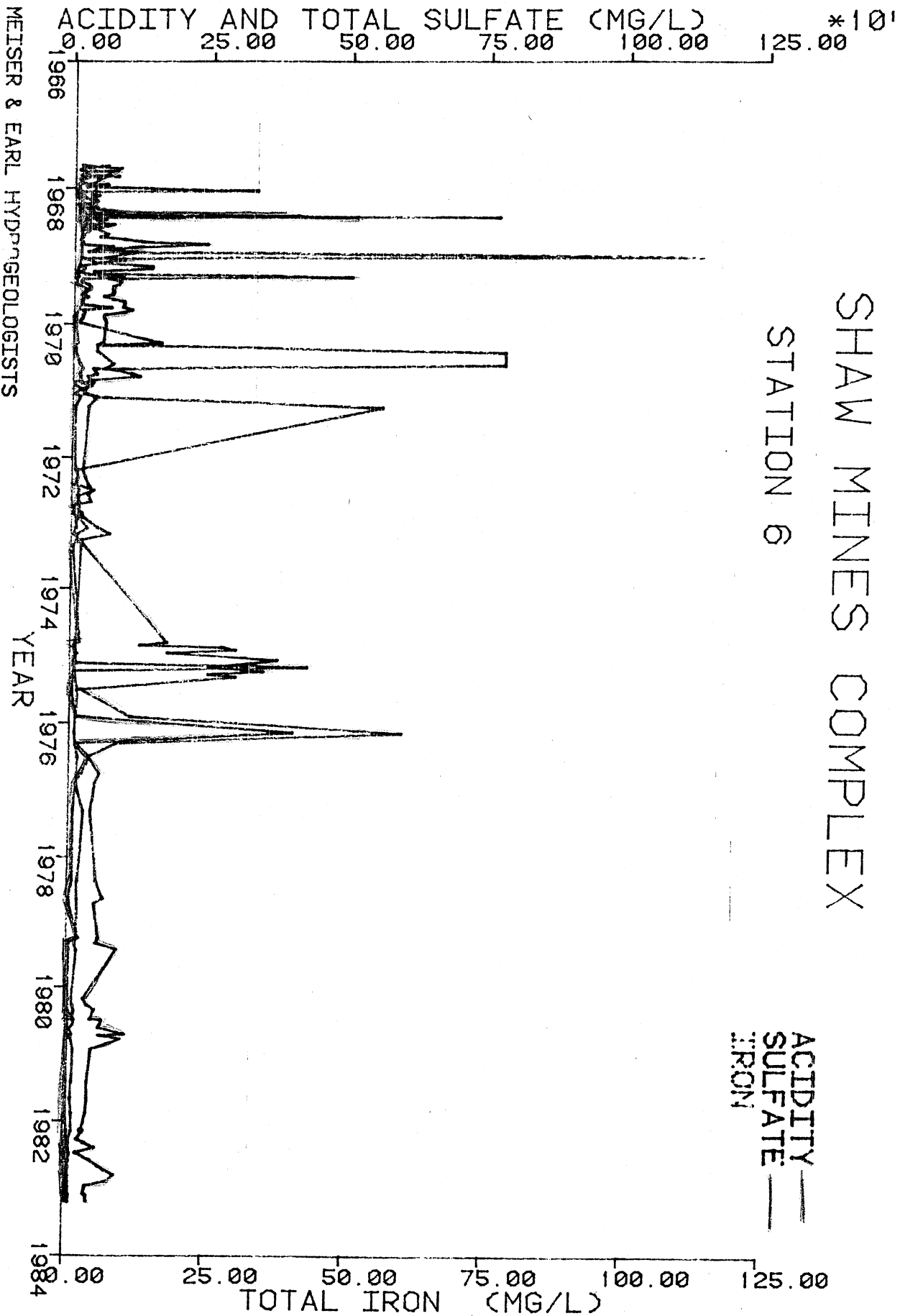
DATE	SHAW MINES COMPLEX		PH	ACIDITY	ACID LOAD	ALKALINITY	STATION 7		MEISER & EARL HYDROGEOLOGISTS				
	AL	MN					TOTAL IRON	TOTAL LOAD	FEROUSSULFATE IRON	SULFATE LOAD	MILLION GAL/DAY	GAL DEVISE MIN	
7/27/67	-1.00	-1.00	3.40	70.	-1.00	-1.00	12.00	-1.00	200.	-1.00	-1.00	-1.00	-1.00
8/ 3/67	-1.00	-1.00	3.60	24.	-1.00	-1.00	8.00	-1.00	106.	-1.00	-1.00	-1.00	-1.00
8/11/67	-1.00	-1.00	3.50	36.	-1.00	-1.00	10.00	-1.00	144.	-1.00	-1.00	-1.00	-1.00
8/18/67	-1.00	-1.00	3.10	110.	-1.00	-1.00	20.00	-1.00	358.	-1.00	-1.00	-1.00	-1.00
8/25/67	-1.00	-1.00	3.20	360.	-1.00	-1.00	14.00	-1.00	198.	-1.00	-1.00	-1.00	-1.00
9/ 1/67	-1.00	-1.00	3.30	64.	-1.00	-1.00	14.00	-1.00	215.	-1.00	-1.00	-1.00	-1.00
9/ 8/67	-1.00	-1.00	3.10	140.	-1.00	-1.00	22.00	-1.00	420.	-1.00	-1.00	-1.00	-1.00
9/15/67	-1.00	-1.00	2.90	520.	-1.00	-1.00	32.00	-1.00	362.	-1.00	-1.00	-1.00	-1.00
9/22/67	-1.00	-1.00	3.10	110.	-1.00	-1.00	14.00	-1.00	298.	-1.00	-1.00	-1.00	-1.00
9/29/67	-1.00	-1.00	4.10	12.	-1.00	-1.00	10.00	-1.00	93.	-1.00	-1.00	-1.00	-1.00
10/ 6/67	-1.00	-1.00	3.00	100.	-1.00	-1.00	20.00	-1.00	280.	-1.00	-1.00	-1.00	-1.00
10/13/67	-1.00	-1.00	3.50	60.	-1.00	-1.00	16.00	-1.00	205.	-1.00	-1.00	-1.00	-1.00
10/20/67	-1.00	-1.00	5.80	2.	-1.00	-1.00	5.00	-1.00	59.	-1.00	-1.00	-1.00	-1.00
10/27/67	-1.00	-1.00	6.50	4.	-1.00	-1.00	1.20	-1.00	42.	-1.00	-1.00	-1.00	-1.00
11/ 3/67	-1.00	-1.00	3.60	22.	-1.00	-1.00	7.00	-1.00	120.	-1.00	-1.00	-1.00	-1.00
11/10/67	-1.00	-1.00	3.50	40.	-1.00	-1.00	10.00	-1.00	137.	-1.00	-1.00	-1.00	-1.00
11/17/67	-1.00	-1.00	3.90	30.	-1.00	-1.00	8.00	-1.00	100.	-1.00	-1.00	-1.00	-1.00
12/ 1/67	-1.00	-1.00	6.10	2.	-1.00	-1.00	5.00	-1.00	40.	-1.00	-1.00	-1.00	-1.00
12/ 8/67	-1.00	-1.00	4.60	2.	-1.00	-1.00	4.00	-1.00	33.	-1.00	-1.00	-1.00	-1.00
12/15/67	-1.00	-1.00	3.80	70.	-1.00	-1.00	2.00	-1.00	40.	-1.00	-1.00	-1.00	-1.00
1/ 5/68	-1.00	-1.00	3.80	30.	-1.00	-1.00	6.00	-1.00	75.	-1.00	-1.00	-1.00	-1.00
1/12/68	-1.00	-1.00	3.80	30.	-1.00	-1.00	12.00	-1.00	117.	-1.00	-1.00	-1.00	-1.00
1/26/68	-1.00	-1.00	4.60	4.	-1.00	-1.00	3.00	-1.00	55.	-1.00	-1.00	-1.00	-1.00
2/ 2/68	-1.00	-1.00	4.70	14.	-1.00	-1.00	3.00	-1.00	35.	-1.00	-1.00	-1.00	-1.00
2/ 9/68	-1.00	-1.00	4.00	22.	-1.00	-1.00	5.00	-1.00	66.	-1.00	-1.00	-1.00	-1.00
2/16/68	-1.00	-1.00	3.70	30.	-1.00	-1.00	17.00	-1.00	92.	-1.00	-1.00	-1.00	-1.00
3/ 1/68	-1.00	-1.00	4.50	12.	-1.00	-1.00	9.00	-1.00	93.	-1.00	-1.00	-1.00	-1.00
3/15/68	-1.00	-1.00	4.90	8.	-1.00	-1.00	2.00	-1.00	25.	-1.00	-1.00	-1.00	-1.00
3/22/68	-1.00	-1.00	4.60	20.	-1.00	-1.00	3.00	-1.00	43.	-1.00	-1.00	-1.00	-1.00
3/29/68	-1.00	-1.00	4.40	20.	-1.00	-1.00	5.00	-1.00	60.	-1.00	-1.00	-1.00	-1.00
4/12/68	-1.00	-1.00	3.70	60.	-1.00	-1.00	9.00	-1.00	129.	-1.00	-1.00	-1.00	-1.00
4/19/68	-1.00	-1.00	4.10	32.	-1.00	-1.00	1.60	-1.00	86.	-1.00	-1.00	-1.00	-1.00
4/26/68	-1.00	-1.00	5.20	8.	-1.00	-1.00	4.00	-1.00	57.	-1.00	-1.00	-1.00	-1.00
5/ 3/68	-1.00	-1.00	4.40	24.	-1.00	-1.00	2.00	-1.00	75.	-1.00	-1.00	-1.00	-1.00
5/10/68	-1.00	-1.00	4.80	24.	-1.00	-1.00	2.00	-1.00	40.	-1.00	-1.00	-1.00	-1.00
5/17/68	-1.00	-1.00	7.40	20.	-1.00	-1.00	1.20	-1.00	40.	-1.00	-1.00	-1.00	-1.00
5/24/68	-1.00	-1.00	3.70	160.	-1.00	-1.00	40.00	-1.00	452.	-1.00	-1.00	-1.00	-1.00
5/31/68	-1.00	-1.00	4.50	10.	-1.00	-1.00	3.60	-1.00	43.	-1.00	-1.00	-1.00	-1.00
6/ 7/68	-1.00	-1.00	4.00	22.	-1.00	-1.00	5.20	-1.00	67.	-1.00	-1.00	-1.00	-1.00
6/14/68	-1.00	-1.00	4.30	50.	-1.00	-1.00	4.40	-1.00	134.	-1.00	-1.00	-1.00	-1.00
6/21/68	-1.00	-1.00	3.50	58.	-1.00	-1.00	14.00	-1.00	144.	-1.00	-1.00	-1.00	-1.00
6/28/68	-1.00	-1.00	4.40	16.	-1.00	-1.00	5.00	-1.00	76.	-1.00	-1.00	-1.00	-1.00
7/ 9/68	-1.00	-1.00	3.60	80.	-1.00	-1.00	4.70	-1.00	175.	-1.00	-1.00	-1.00	-1.00
7/16/68	-1.00	-1.00	3.30	94.	-1.00	-1.00	8.50	-1.00	60.	-1.00	-1.00	-1.00	-1.00
7/23/68	-1.00	-1.00	2.50	104.	-1.00	-1.00	1.80	-1.00	240.	-1.00	-1.00	-1.00	-1.00
7/30/68	-1.00	-1.00	2.50	122.	-1.00	-1.00	22.00	-1.00	210.	-1.00	-1.00	-1.00	-1.00
8/ 6/68	-1.00	-1.00	3.20	94.	-1.00	-1.00	7.00	-1.00	130.	-1.00	-1.00	-1.00	-1.00
9/ 4/68	-1.00	-1.00	3.00	144.	-1.00	-1.00	17.00	-1.00	1110.	-1.00	-1.00	-1.00	-1.00
9/27/68	-1.00	-1.00	3.60	42.	-1.00	-1.00	4.25	-1.00	125.	-1.00	-1.00	-1.00	-1.00
10/11/68	-1.00	-1.00	3.30	190.	-1.00	-1.00	15.00	-1.00	810.	-1.00	-1.00	-1.00	-1.00
10/25/68	-1.00	-1.00	3.30	98.	-1.00	-1.00	17.50	-1.00	2400.	-1.00	-1.00	-1.00	-1.00
11/ 8/68	-1.00	-1.00	4.30	90.	-1.00	-1.00	17.50	-1.00	1800.	-1.00	-1.00	-1.00	-1.00
11/21/68	-1.00	-1.00	4.80	6.	-1.00	-1.00	10.00	-1.00	160.	-1.00	-1.00	-1.00	-1.00
12/ 5/68	-1.00	-1.00	5.60	-1.	-1.00	-1.00	2.30	-1.00	52.	-1.00	-1.00	-1.00	-1.00
							2.10	-1.00	46.	-1.00	-1.00	-1.00	-1.00

DATE	SHAW MINES COMPLEX		PH	ACIDITY	ACID LOAD	ALKALINITY	STATION 7		MEISER & EARL HYDROGEOLOGISTS				
	AL	MN					TOTAL IRON	IRON	FERROUSSULFATE	SULFATE LOAD	MILLION GAL/DAY	GAL DEVICE MIN	
12/18/68	-1.00	-1.00	4.10	6.	-1.00	-1.00	1.40	-1.00	90.	-1.00	-1.00	-1.00	-1.00
1/3/69	-1.00	-1.00	3.50	29.	-1.00	-1.00	3.00	-1.00	100.	-1.00	-1.00	-1.00	-1.00
1/16/69	-1.00	-1.00	3.30	100.	-1.00	-1.00	7.00	-1.00	745.	-1.00	-1.00	-1.00	-1.00
1/31/69	-1.00	-1.00	4.60	0.	-1.00	0.0	8.50	-1.00	46.	-1.00	-1.00	-1.00	-1.00
2/13/69	-1.00	-1.00	3.52	200.	-1.00	-1.00	4.00	-1.00	160.	-1.00	-1.00	-1.00	-1.00
2/28/69	-1.00	-1.00	3.80	20.	-1.00	-1.00	4.40	-1.00	170.	-1.00	-1.00	-1.00	-1.00
3/13/69	-1.00	-1.00	3.50	150.	-1.00	-1.00	15.00	-1.00	85.	-1.00	-1.00	-1.00	-1.00
3/28/69	-1.00	-1.00	4.20	6.	-1.00	-1.00	2.00	-1.00	800.	-1.00	-1.00	-1.00	-1.00
4/10/69	-1.00	-1.00	3.90	284.	-1.00	-1.00	10.50	-1.00	700.	-1.00	-1.00	-1.00	-1.00
4/25/69	-1.00	-1.00	4.40	8.	-1.00	-1.00	3.40	-1.00	190.	-1.00	-1.00	-1.00	-1.00
5/8/69	-1.00	-1.00	4.00	6.	-1.00	-1.00	3.90	-1.00	80.	-1.00	-1.00	-1.00	-1.00
5/23/69	-1.00	-1.00	3.70	50.	-1.00	-1.00	5.75	-1.00	95.	-1.00	-1.00	-1.00	-1.00
6/5/69	-1.00	-1.00	3.30	100.	-1.00	-1.00	7.70	-1.00	800.	-1.00	-1.00	-1.00	-1.00
6/29/69	-1.00	-1.00	3.70	22.	-1.00	-1.00	2.50	-1.00	230.	-1.00	-1.00	-1.00	-1.00
7/18/69	-1.00	-1.00	3.40	120.	-1.00	-1.00	4.75	-1.00	340.	-1.00	-1.00	-1.00	-1.00
8/1/69	-1.00	-1.00	3.50	22.	-1.00	-1.00	4.50	-1.00	80.	-1.00	-1.00	-1.00	-1.00
8/15/69	-1.00	-1.00	3.60	280.	-1.00	-1.00	4.25	-1.00	280.	-1.00	-1.00	-1.00	-1.00
8/28/69	-1.00	-1.00	3.70	44.	-1.00	-1.00	5.00	-1.00	95.	-1.00	-1.00	-1.00	-1.00
9/12/69	-1.00	-1.00	3.30	100.	-1.00	-1.00	5.00	-1.00	220.	-1.00	-1.00	-1.00	-1.00
9/25/69	-1.00	-1.00	3.30	36.	-1.00	-1.00	2.50	-1.00	540.	-1.00	-1.00	-1.00	-1.00
10/9/69	-1.00	-1.00	3.30	180.	-1.00	-1.00	15.00	-1.00	800.	-1.00	-1.00	-1.00	-1.00
10/23/69	-1.00	-1.00	2.90	80.	-1.00	-1.00	9.00	-1.00	210.	-1.00	-1.00	-1.00	-1.00
11/10/69	-1.00	-1.00	2.90	180.	-1.00	-1.00	15.00	-1.00	550.	-1.00	-1.00	-1.00	-1.00
11/20/69	-1.00	-1.00	4.90	60.	-1.00	-1.00	3.40	-1.00	96.	-1.00	-1.00	-1.00	-1.00
12/5/69	-1.00	-1.00	4.10	6.	-1.00	-1.00	7.00	-1.00	170.	-1.00	-1.00	-1.00	-1.00
12/19/69	-1.00	-1.00	4.20	18.	-1.00	-1.00	4.50	-1.00	160.	-1.00	-1.00	-1.00	-1.00
4/6/70	-1.00	-1.00	2.50	10.	-1.00	-1.00	2.90	-1.00	130.	-1.00	-1.00	-1.00	-1.00
4/17/70	-1.00	-1.00	4.00	44.	-1.00	-1.00	4.40	-1.00	110.	-1.00	-1.00	-1.00	-1.00
5/22/70	-1.00	-1.00	4.00	20.	-1.00	-1.00	3.15	-1.00	130.	-1.00	-1.00	-1.00	-1.00
7/31/70	-1.00	-1.00	3.80	18.	-1.00	-1.00	3.10	-1.00	150.	-1.00	-1.00	-1.00	-1.00
8/28/70	-1.00	-1.00	4.40	6.	-1.00	-1.00	3.75	-1.00	130.	-1.00	-1.00	-1.00	-1.00
9/25/70	-1.00	-1.00	3.40	60.	-1.00	-1.00	8.00	-1.00	280.	-1.00	-1.00	-1.00	-1.00
10/9/70	-1.00	-1.00	3.50	80.	-1.00	-1.00	12.00	-1.00	300.	-1.00	-1.00	-1.00	-1.00
10/30/70	-1.00	-1.00	3.40	72.	-1.00	-1.00	7.50	-1.00	185.	-1.00	-1.00	-1.00	-1.00
11/12/70	-1.00	-1.00	3.80	22.	-1.00	-1.00	6.75	-1.00	120.	-1.00	-1.00	-1.00	-1.00
11/27/70	-1.00	-1.00	5.00	6.	-1.00	-1.00	2.40	-1.00	60.	-1.00	-1.00	-1.00	-1.00
12/15/70	-1.00	-1.00	4.10	18.	-1.00	-1.00	4.50	-1.00	80.	-1.00	-1.00	-1.00	-1.00
1/8/71	-1.00	-1.00	4.30	6.	-1.00	-1.00	4.50	-1.00	60.	-1.00	-1.00	-1.00	-1.00
1/22/71	-1.00	-1.00	3.50	24.	-1.00	-1.00	5.00	-1.00	95.	-1.00	-1.00	-1.00	-1.00
3/17/71	-1.00	-1.00	3.40	40.	-1.00	-1.00	7.00	-1.00	140.	-1.00	-1.00	-1.00	-1.00
3/3/72	-1.00	-1.00	4.10	12.	-1.00	-1.00	55.00	-1.00	70.	-1.00	-1.00	-1.00	-1.00
4/11/72	-1.00	-1.00	4.40	24.	-1.00	0.0	27.00	-1.00	26.	-1.00	-1.00	-1.00	-1.00
5/26/72	-1.00	-1.00	4.50	24.	-1.00	0.0	23.00	-1.00	52.	-1.00	-1.00	-1.00	-1.00
6/30/72	-1.00	-1.00	7.20	3.	-1.00	16.00	21.00	-1.00	0.03	-1.00	-1.00	-1.00	-1.00
7/28/72	-1.00	-1.00	5.80	10.	-1.00	4.00	2.60	-1.00	0.08	-1.00	-1.00	-1.00	-1.00
8/31/72	-1.00	-1.00	3.70	110.	-1.00	0.0	2.26	-1.00	0.12	-1.00	-1.00	-1.00	-1.00
9/28/72	-1.00	-1.00	4.50	61.	-1.00	0.0	8.16	-1.00	0.20	-1.00	-1.00	-1.00	-1.00
11/3/72	-1.00	-1.00	3.60	13.	-1.00	0.0	9.90	-1.00	0.13	-1.00	-1.00	-1.00	-1.00
11/30/72	-1.00	-1.00	6.00	14.	-1.00	14.00	8.36	-1.00	0.02	-1.00	-1.00	-1.00	-1.00
1/22/73	-1.00	-1.00	4.50	9.	-1.00	0.0	3.00	-1.00	0.02	-1.00	-1.00	-1.00	-1.00
2/28/73	-1.00	-1.00	5.40	15.	-1.00	0.0	6.50	-1.00	70.	-1.00	-1.00	-1.00	-1.00
3/29/73	-1.00	-1.00	4.40	14.	-1.00	0.0	7.60	-1.00	58.	-1.00	-1.00	-1.00	-1.00
5/1/73	-1.00	-1.00	4.00	30.	-1.00	0.0	4.90	-1.00	100.	-1.00	-1.00	-1.00	-1.00
10/15/74	-1.00	-1.00	6.60	0.	-1.00	0.0	2.70	-1.00	65.	-1.00	-1.00	-1.00	-1.00
10/31/74	-1.00	-1.00	3.00	300.	-1.00	0.0	11.00	-1.00	5.	-1.00	-1.00	-1.00	-1.00
			3.00	200.	-1.00	0.0	10.50	-1.00	450.	-1.00	-1.00	-1.00	-1.00
					-1.00				300.	-1.00	-1.00	-1.00	-1.00

Graphical Trends of Concentrations

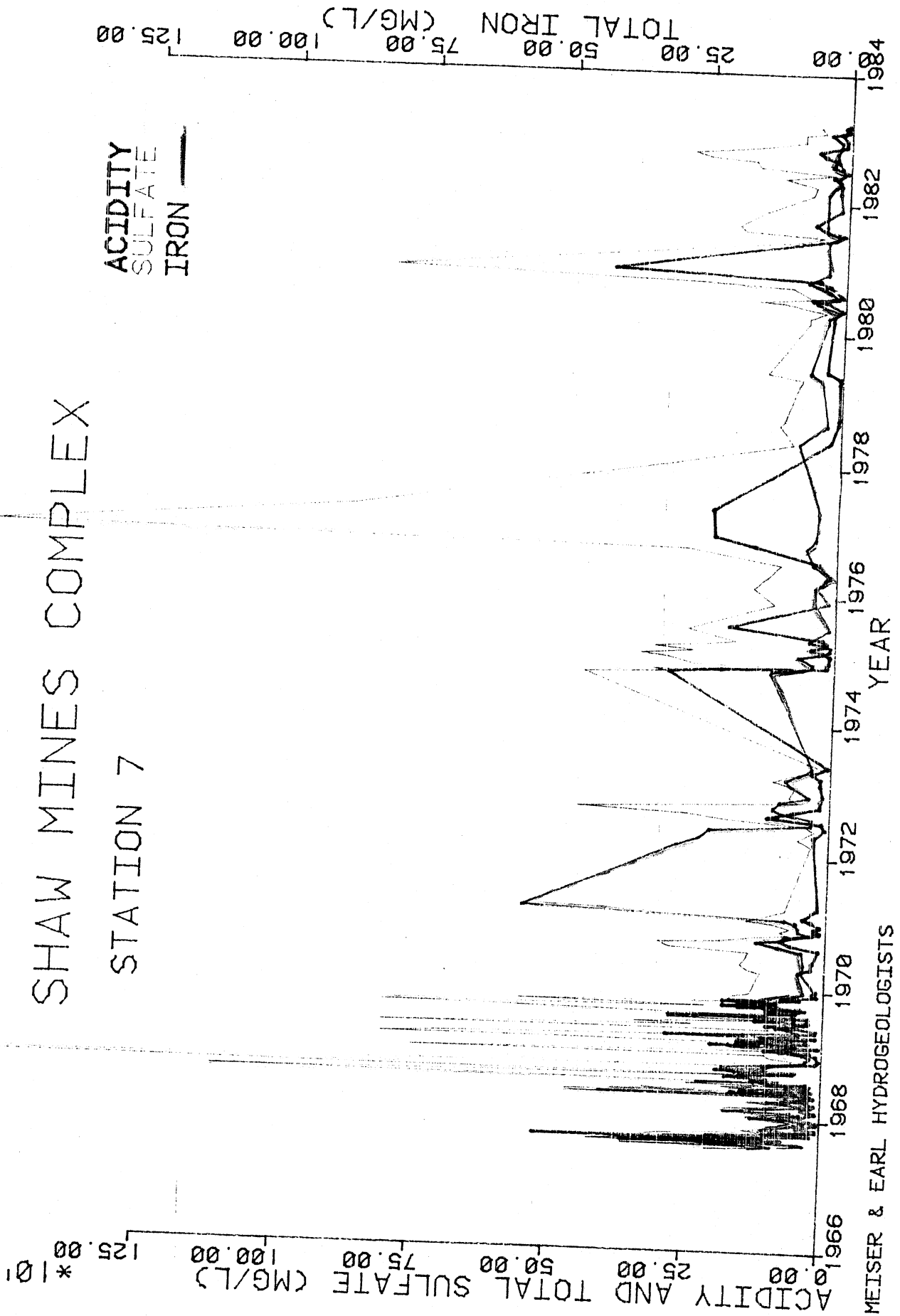
The CalComp plots (three-color) of acidity, iron and sulfate concentrations through time for upstream Station 6 show a decrease in iron and sulfate levels, but very little to no measurable acidity. Trends in concentrations are less obvious at downstream Station 7, except for higher sulfate values in 1968-69.

MEISER & EARL HYDROGEOLOGISTS



SHAW MINES COMPLEX

STATION 7



MEISER & EARL HYDROGEOLOGISTS

Statistical Comparisons

Acidity, iron and sulfate concentrations were grouped into five time groups: 1967-68, 1969-71, 1972-73, 1974-79 and 1980-83 for both stations 6 and 7. The BMDP-7D multiple comparisons for concentrations are included and a summary interpretation follows.

Concentrations are named: "ACID," "TOTFE," and "SULF," for acidity, iron and sulfate.

A. Concentrations - Station 6 (upstream Casselman)

1. Acidity - Extreme variability and enormous standard deviations preclude statistical differentiation. Since 1978, there is generally no measurable acidity.
2. Iron - Extremely variable; although not statistically verified, mean iron levels and ranges are drastically reduced in the three periods since 1972 to present.
3. Sulfate - Earliest periods, although too variable for statistical testing, are higher than 1980-83.
4. Comments - Water quality has improved in the Casselman upstream of SMC since 1967, but quantification of the improvement is inappropriate due to the high degree of variability. Acidity is essentially zero since 1978.

B. Concentrations - Station 7 (downstream Casselman)

1. Acidity - Extreme variability and enormous standard deviations preclude statistical distinction of groups.
2. Iron - Very significant reduction in iron levels in two most recent periods (1974-79 and 1980-83) compared to earlier data.
3. Sulfate - No statistical separation of periods due to high variability of sulfate. Recent means and ranges are lower than earlier data, but highest values occur in 1974-79.

4. Comments - The high volume and variability of flows in the Casselman make Station 7 a poor indicator of AMD impact from SMC. Changes in sulfate and acidity levels cannot be distinguished. Improvements in iron are complicated by sampling procedures such as filtering out colloidal iron and acidification for preserving samples.

PAGE 4 RMDP7D STATION 6 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.
 A STEPISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.
 THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.005000

SIGNIFICANCE LEVEL
 .05
 .01
 .001

BONFERRONI TEST
 0.005000
 0.001000
 0.000100

SYMBOL
 *
 **

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	T-VALUE	POOLED VARIANCE T	P-VALUE
1	1967-8	19.10	2	1969-71	4.56	14.54	1.45	39.85	0.1551	0.94	0.3471
1	1967-8	19.10	3	1972-3	4.31	14.79	1.47	39.90	0.1484	0.77	0.4447
1	1967-8	19.10	4	1974-9	39.12	-20.02	-0.81	33.57	0.4218	-1.30	0.1962
1	1967-8	19.10	5	1980-3	0.57	18.53	1.85	39.17	0.0712	1.24	0.2157
2	1969-71	4.56	3	1972-3	4.31	0.25	0.17	31.30	0.8674	0.01	0.9903
2	1969-71	4.56	4	1974-9	39.12	-34.56	-1.53	24.10	0.1380	-2.02	0.0453
3	1972-3	4.31	5	1980-3	0.57	3.99	3.48	33.62	0.0014 *	0.24	0.8108
3	1972-3	4.31	4	1974-9	39.12	-34.81	-1.55	24.11	0.1353	-1.68	0.0945
4	1974-9	39.12	5	1980-3	0.57	3.74	3.18	16.79	0.0056	0.18	0.8541
			5	1980-3	0.57	38.55	1.71	24.02	0.0996	2.32	0.0220

PAGE 7 BNDP7D STATION 6 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL. THE P VALUE MUST BE LESS THAN 0.005000

SIGNIFICANCE LEVEL

BONFERRONI TEST

0.005000

0.001000

0.000100

SYMBOL

*

**

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	DIFF	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	T-VALUE	POOLED VARIANCE T	T-VALUE	SEPARATE VARIANCE T	T-VALUE	POOLED VARIANCE T
								DF	P-VALUE	DF	P-VALUE	DF	P-VALUE	DF	P-VALUE
1	1967-8	5.45	2	1969-71	7.13	-1.68	-1.68	84.82	0.6705	151	0.5802	151	0.5802	151	0.5802
1	1967-8	5.45	3	1972-3	0.80	4.65	4.65	50.89	0.0862	151	0.2988	151	0.2988	151	0.2988
1	1967-8	5.45	4	1974-9	0.45	5.00	5.00	50.13	0.0647	151	0.1614	151	0.1614	151	0.1614
1	1967-8	5.45	5	1980-3	0.35	5.10	5.10	50.03	0.0599	151	0.1335	151	0.1335	151	0.1335
2	1969-71	7.13	3	1972-3	0.80	6.34	6.34	39.57	0.0366	151	0.1693	151	0.1693	151	0.1693
2	1969-71	7.13	4	1974-9	0.45	6.69	6.69	39.08	0.0275	151	0.0735	151	0.0735	151	0.0735
2	1969-71	7.13	5	1980-3	0.35	6.78	6.78	39.02	0.0254	151	0.0574	151	0.0574	151	0.0574
3	1972-3	0.80	4	1974-9	0.45	0.35	0.35	15.49	0.2101	151	0.9435	151	0.9435	151	0.9435
3	1972-3	0.80	5	1980-3	0.35	0.44	0.44	12.80	0.1053	151	0.9266	151	0.9266	151	0.9266
4	1974-9	0.45	5	1980-3	0.35	0.09	0.09	33.35	0.3780	151	0.9813	151	0.9813	151	0.9813

HISTOGRAM OF * SULF * (VARIABLE 12). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3

MIDPOINTS

3600.000
3420.000
3240.000 *
3060.000
2880.000
2700.000
2520.000
2340.000
2160.000
1980.000
1800.000
1620.000
1440.000
1260.000
1080.000
900.000
720.000 *
540.000
360.000
180.000 M***
0.0) *****45 *****33 *****25

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH M'S, N'S OTHERWISE

MEAN 127.627 76.425 29.016 170.400 53.107
 STD.DEV. 451.460 74.821 16.583 146.031 21.915
 R.E.S.D. 189.725 46.422 15.008 153.561 22.046
 S. F. M. 63.217 11.930 4.599 29.206 4.141
 MAXIMUM 3200.000 500.000 70.000 600.000 108.000
 MINIMUM 15.000 20.000 0.970 20.000 21.000
 SAMPLE SIZE 51 40 13 25 28

ALL GROUPS COMBINED
(EXCEPT CASES WITH UNUSED VALUES FOR YEAR)

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
BETWEEN GROUPS	312098.1250	4	78024.5000	1.08	0.3663
WITHIN GROUPS	*****	152	71955.3835		
TOTAL	*****	156			

LEVENE'S TEST FOR EQUAL VARIANCES

 4, 152
 2.17 0.0747

ONE-WAY ANALYSIS OF VARIANCE
 TEST STATISTICS FOR WITHIN-GROUP
 VARIANCES NOT ASSUMED TO BE EQUAL
 WELCH
 BROWN-FORSYTHE

4, 66 10.43 0.0000
 4, 66 1.95 0.1131

PAGE 10 Bhp7D STATION 6 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL (GROUP) MEANS.
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.005000

SIGNIFICANCE LEVEL
 .05
 .01
 .001

BONFERRONI TEST
 0.005000
 0.001000
 0.000100

SYMBOL
 *
 **

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	DIFF	MEAN	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1967-8	127.63	2	1969-71	76.42	51.20	76.42	0.80	53.48	0.4295	0.90	152	0.3676
1	1967-8	127.63	3	1972-3	29.04	98.59	29.04	1.56	50.52	0.1261	1.18	152	0.2387
1	1967-8	127.63	4	1974-9	170.40	-42.77	170.40	-0.61	67.24	0.5411	-0.65	152	0.5147
2	1969-71	76.42	5	1980-3	53.11	74.52	53.11	1.18	50.43	0.2450	1.18	152	0.2394
2	1969-71	76.42	3	1972-3	29.04	47.39	29.04	3.73	48.11	0.0005 **	0.55	152	0.5808
2	1969-71	76.42	4	1974-9	170.40	-93.97	170.40	-2.98	31.99	0.0054	-1.37	152	0.1714
3	1972-3	29.04	5	1980-3	53.11	23.32	53.11	1.86	48.10	0.0690	0.35	152	0.7247
3	1972-3	29.04	4	1974-9	170.40	-141.36	170.40	-4.78	25.17	0.0001 ***	-1.54	152	0.1254
4	1974-9	170.40	5	1980-3	53.11	-24.07	53.11	-3.89	30.45	0.0005 **	-0.27	152	0.7895
			5	1980-3	53.11	117.29	53.11	3.98	24.97	0.0005 **	1.59	152	0.1141

PAGE 4 BHP7D STATION 7 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.005000

SIGNIFICANCE LEVEL
 .05
 .01
 .001

BONFERRONI TEST
 0.005000
 0.001000
 0.000100

SYMBOL
 *
 **

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1967-8	63.75	2	1969-71	63.25	0.50	0.03	91.29	0.9763	0.03	156	0.9763
1	1967-8	63.75	3	1972-3	25.15	38.59	2.66	58.06	0.0100	1.56	156	0.1207
1	1967-8	63.75	4	1974-9	60.94	2.80	0.13	45.27	0.8980	0.14	156	0.8850
1	1967-8	63.75	5	1980-3	34.68	29.07	1.54	61.05	0.1292	1.56	156	0.1205
2	1969-71	63.25	3	1972-3	25.15	38.10	2.68	48.28	0.0101	1.49	156	0.1388
2	1969-71	63.25	4	1974-9	60.94	2.31	0.11	43.09	0.9153	0.11	156	0.9103
3	1972-3	25.15	5	1980-3	34.68	28.57	1.53	56.12	0.1322	1.45	156	0.1502
3	1972-3	25.15	4	1974-9	60.94	-35.79	-1.79	32.17	0.0827	-1.31	156	0.1938
4	1974-9	60.94	5	1980-3	34.68	-9.52	-0.57	30.19	0.5748	-0.35	156	0.7239
			5	1980-3	34.68	26.26	1.12	47.51	0.2668	1.19	156	0.2358

PAGE 10 RNDP7D STATION 7 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL, THE P VALUE MUST BE LESS THAN 0.005000

SIGNIFICANCE LEVEL
 .05
 .01
 .001

BONFERRONI TEST
 0.005000
 0.001000
 0.000100

SYMBOL
 *
 **

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE	DF	P-VALUE	T-VALUE	POOLED VARIANCE	DF	P-VALUE
1	1967-8	233.13	2	1969-71	244.55	-11.42	-0.17	87.57	0.8645		-0.18	156	0.8573	
1	1967-8	233.13	3	1972-3	106.31	126.82	1.92	62.02	0.0591		1.35	156	0.1799	
1	1967-8	233.13	4	1974-9	279.48	-46.35	-0.55	60.46	0.5833		-0.63	156	0.5299	
2	1969-71	244.55	5	1980-3	136.64	96.48	1.53	75.56	0.1290		1.36	156	0.1753	
2	1969-71	244.55	3	1972-3	106.31	138.24	2.74	38.31	0.0092		1.42	156	0.1580	
2	1969-71	244.55	4	1974-9	279.48	-34.93	-0.48	40.06	0.6324		-0.45	156	0.6542	
3	1972-3	106.31	5	1980-3	136.64	107.91	2.33	65.80	0.0227		1.43	156	0.1534	
3	1972-3	106.31	4	1974-9	279.48	-173.17	-2.41	34.54	0.0212		-1.66	156	0.0991	
4	1974-9	279.48	5	1980-3	136.64	-30.34	-0.67	27.94	0.5067		-0.30	156	0.7676	
			5	1980-3	136.64	142.84	2.07	33.72	0.0459		1.70	156	0.0910	

Total Loads

We have computed the total average loads of acid and sulfate for 1982 data at the three AMD sources to the Casselman, Stations 3, 11 and 13. We then compared these input acid and sulfate loads to the upstream and downstream loads measured in 1982 at Stations 6 and 7. Iron loads in the Casselman proved to be too highly variable for comparison, and complicated by the sampling and preserving procedures.

Acid Loads - The table of average loads for 1980-83 shows the sum of the average acid loads from Stations 3, 11 and 13 (from the DMDP-7D multiple comparisons) to be over 15,000 lbs/day. As there is no upstream acidity at Station 6, the only measure of acid load in the Casselman is at Meyersdale Station 7 where the mean acid load for 1982 is only about 7800 lbs/day. Therefore, the difference between the input of 15,300 lbs/day and the observed downstream total of only 7800 lbs/day is 7500 lbs/day of acid load neutralized in the Casselman by natural in-stream processes and upstream alkalinity. In other words, only about 50% of the acid load discharged to the Casselman from SMC was seen at the downstream Station 7.

From the table of average acid loads, it appears that Coal Run is the greatest source to the Casselman (44%), closely followed by Shaw Mines Run (39%), while Weir 11 contributed only about 17% of the acid load in the most recent period 1980-83.

Sulfate Loads - The sum of the average sulfate loads for 1980-83 at Stations 3, 11 and 13 (from BMDP-7D comparisons) is about 29,500 lbs/day. As sulfate is the only conservative chemical by-product of mine drainage reactions, i.e., sulfate does not precipitate or react and therefore indicates total AMD production, the sulfate loads should be additive. Hence, the addition of the upstream

Station 6 average sulfate load, 16,900 lbs/day to the sum of the average sulfate loads from Stations 3, 11 and 13, 29,500 lbs/day is 46,400 lbs/day and this should be approximately equal to the average sulfate load seen at the downstream Station 7, which is 47,000 lbs/day. The comparison is remarkable in its agreement.

The largest contributor of sulfate from SMC is Shaw Mines Run (49%) while Coal Run provides only 36% and Weir 11 15%. This suggests that some of the AMD generated in the watershed of Shaw Mines Run is neutralized before it is discharged, since Coal Run is the leading acid load contributor to the Casselman.

Average Acid and Sulfate Loads
Shaw Mines Complex

Station	1980-83 Mean Acid Load (lbs/day)	1980-83 Mean Sulfate Load (lbs/day)
Shaw Mines Run No. 3	5900	14,500
Weir No. 11	2600	4,300
Coal Run No. 13	6800	10,700
Casselman River Boynton No. 6 *	0	16,900
Casselman River Meyersdale No. 7 *	7800	47,000

*1982 data only

PAGE 12 BMDP7D STATION 6 DESCRIPTIVE STATISTICS

HISTOGRAM OF * LACID * (VARIABLE 16). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3

VAR 16 EXCLUDED VALUES

MIDPOINTS *****51 *****40 *****25 *****28

TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE

Table with 5 columns: MEAN, STD. DEV., R.F.S.D., S. E. M., MAXIMUM, MINIMUM, SAMPLE SIZE. Values range from 0.0 to -0.0.

PAGE 14 DNDP7D STATION 6 DESCRIPTIVE STATISTICS

HISTOGRAM OF * LTOPPE * (VARIABLE 18). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * PYEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3

*****51 *****40 *****25
TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

Table with columns for variable values (2.800 to 1.200) and group counts (N, *, **, *).

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE

Summary statistics table including MEAN, STD. DEV., R.E.S.D., S.E.M., MAXIMUM, MINIMUM, and SAMPLE SIZE for each year group.

ONLY ONE GROUP IS NOT EMPTY. PAIRWISE COMPARISONS WILL NOT BE PRINTED.

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 3996
CPU TIME USED 1.357 SECONDS

PAGE 13 Bhp7D STATION 6 DESCRIPTIVE STATISTICS

 HISTOGRAM OF * LSULF * (VARIABLE 17). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3

VAP 17
 EXCLUDED
 VALUES

*****51 *****40 *****25 *****
 TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS

- 4.560)
- 4.520)
- 4.480)
- 4.440)
- 4.400)
- 4.360)
- 4.320)
- 4.280)
- 4.240)
- 4.200)
- 4.160)
- 4.120)
- 4.080)
- 4.040)
- 4.000)
- 3.960)
- 3.920)
- 3.880)
- 3.840)
- 3.800)
- 3.760)

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE

MEAN	0.0	0.0	0.0	0.0	0.0
STD.DEV.	0.0	0.0	0.0	0.0	0.0
R.F.S.D.	0.0	0.0	0.0	0.0	0.0
S. E. M.	0.0	0.0	0.0	0.0	0.0
MAXIMUM	0.0	0.0	0.0	0.0	0.086
MINIMUM	-0.0	-0.0	-0.0	-0.0	4.511
SAMPLE SIZE	0	0	-0.0	-0.0	3.755
					10

ONLY ONE GROUP IS NOT EMPTY.
 PAIRWISE COMPARISONS WILL NOT BE PRINTED.

PAGE 11 BMDP7D STATION 7 DESCRIPTIVE STATISTICS

HISTOGRAM OF * SULFL * (VARIABLE 13). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * PYEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3

VAR 13 EXCLUDED VALUES

*****56 *****40 *****25 ***** TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS ***** 6000.000

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH *'S, M'S OTHERWISE

Table with 4 columns: MEAN, STD.DEV., R.E.S.D., S. P. M., MAXIMUM, MINIMUM, SAMPLE SIZE. Values range from 0.0 to 47070.255.

ONLY ONE GROUP IS NOT EMPTY. PAIRWISE COMPARISONS WILL NOT BE PRINTED.

