THE STUDY

DATA COLLECTION

Data collection was initiated at the beginning of the project and continued throughout the study period. Published data was obtained and is listed in the "Reference" section. In addition to the published data, unpublished reports provide much information concerning geology and mining.

The following data, collected through contact with various governmental agencies, private companies, and individuals, proved helpful in the successful completion of this study.

1) Tax maps and property ownership lists for the entire watershed were obtained from the Luzerne County Courthouse, Wilkes-Barre. This information was used to acquire property access agreements for establishment of sampling stations and for use in "Sting property owners at recommended abatement areas..

2) Recent ortho-photogrammetric mapping was obtained from the Department for field reconnaissance and for use in mapping of quick start projects.

3) Existing water quality data and well drilling records were collected from the Department.

4) Geological data was furnished by Jerrald Hollowell of the Susquehanna River Basin Commission, the United States Geological Survey, and the Pennsylvania Geological Survey. Much of this data came from unpublished reports.

5) Past weather data was acquired from the National Oceanic and Atmospheric Administration Reports. Some of the. present data was obtained directly from the Weather Station recorder to eliminate time delays in publication.

6) Active mining permit numbers were obtained from the Blue Coal Corporation. Water quality permit information has been obtained from Department records. The permit boundaries were found to correspond with deep mine boundaries.

7) Mine maps and geologic cross sections were purchased from the Blue Coal Corporation and the Susquehanna Coal Company. Representatives of these companies supplied information concerning the present status of coal mining within the watershed.

8) Information pertaining to the nature of mineable coals and coal' refuse was acquired through personal communication with Mr. Charles Zink, Vice President of the Blue Coal Corporation.

9) The Pennsylvania Gas and Water Company was consulted about water supplied for human consumption within the Newport Creek Watershed. This information was required to compute a water balance.

10) Monthly Mine pool elevation records were obtained from the Wilkes-Barre DER office. This data was used to discuss possible subsurface water flow patterns.

Geologic data collected through personal contacts was very comprehensive. This provided an excellent wealth of information for preparing the geological presentations and discussions in this report. Without these sources of information, a detailed geological study would have to be required to establish the complex geology represented in the Newport Creek Watershed.

SAMPLING PROGRAM

The basis of the watershed study is the water sampling and flow measuring program. The sampling program, in conjunction with a hydrologic balance, has three primary goals:

1) to measure the amount of pollution discharged from individual sources.

2) to measure the effect of mine drainage on receiving streams.

3) to assess the magnitude of surface flow losses to deep mines.

A field reconnaissance was performed early in the study to locate pollution sources and areas where surface water could be entering underlying deep mines. This reconnaissance also served to locate the sampling stations. Sampling stations were deleted or added as a result of the analysis of initial sampling data and the continuing field exploration. The field exploration provided information required for the mapping of pertinent mining and geologic features related to sources and causes of surface water loss to deep mines and to gather data necessary in the formulation of the abatement plan.

Twelve sampling and measuring rounds were conducted over a period of twelve months. The sampling and measuring rounds were scheduled to insure that at least two periods of both high and low flow conditions were included. The sampling round was altered during the final two months when mine pumps discharging at Stations N5 and F2 were abandoned. This cessation of pumping resulted with no flow in most of the North Branch Newport Creek. All of the appropriate charts, tables and computations have been adjusted to compensate for these unnatural flow conditions. Most of the analyses are based on the first ten sampling rounds.

Wood V-notch weirs were installed where feasible to facilitate accurate flow measurements. Stream cross sections were established on the larger channels. Each cross section was accurately surveyed using transit and elevation rod from permanently established reference posts driven into the stream banks. Channel configuration data from the cross section surveying was plotted on graph paper for flow calculations. These sections have been resurveyed to check for changes in channel configuration produced by high flows. Excessive amounts of surface runoff in conjunction with poor bank fill material caused repeated washouts of weirs. This necessitated conversion of several V-notch weirs into rectangular weirs. The rectangular weirs transmit larger quantities of water, reducing the chance of overflow and erosion of stream bank fill. In addition, skirting with polyethylene liner was employed at several stations to preclude bank fill erosion.

A sampling round consisted of a field visit to each sampling station
for the purpose of measuring stream flow and collecting water samples. Flow measurements were recorded using standard cross section, field cross section, weir discharge levels or bucket and stop watch. An aluminum funnel was constructed to accurately gage V-notch weirs by the bucket and stop watch method.

Two samples were collected at each sampling station and submitted for chemical analysis. The first of these samples was a one pint bottle analyzed for the standard mine drainage constituents: pH, total hot acidity, alkalinity, and sulfates. The second of these two samples was a half pint bottle that was field acidified for later laboratory analysis for total and ferrous iron. Field pH measurements were recorded for each sample taken.

Flow and water quality data have been averaged and are presented in the following Newport Creek Sampling Data Tables. (All sample stations

NEWPORT CREEK SAMPLING DATA

STA. NO. N1

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-25-73	28.3	2.5	890	135,758	0	0	370	56,439	20	3,051	2,800	427,104	Fair
8-21-73	21.0	2.8	770	87,156	0	0	310	35,089	210	23,770	2,500	282,975	Fair
9-25-73	22.6	2.8	760	92,579	0	0	340	41,417	270	32,890	8,300	1,011,056	Fair
10-11-73	22.6	2.9	820	99,887	0	0	347	42,269	192	23,388	3,500	426,349	Fair
10-29-73	19.2	3.0	700	72,442	0	0	165	17,076	87	9,003	2,050	212,150	Rain
12-03-73	21.6	2.8	820	95,468	0	0	270	31,434	156	18,162	2,300	267,775	Fair
1-14-74	23.0	2.9	400	49,588	0	0	248	30,745	101	12,521	1,600	198,352	Fair
2-04-74	22.4	3.0	436	52,641	0	0	197	23,785	136	16,420	1,225	147,902	Fair
3-11-74	35.3	3.2	320	60,885	0	0	161	30,633	104	19,788	925	175,997	Fair
4-10-74	49.0	3.1	300	79,233	0	0	89	23,506	87	22,978	1,025	270,713	Fair
Average	26.5		622	82,564	0	0	250	33,239	136	18,197	2,623	342,037	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	5.40	3.0	180	5,239	0	0	23	669	17	495	800	23,285	Fair
6-07-74	5.62	3.6	144	4,362	0	0	21	636	13	394	600	18,175	Fair
Average	5.51		162	4,801	0	0	22	653	15	445	700	20,730	

STA. NO. NS1

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-25-73	4.09	3.6	66	1455	0	0	30	661	24	529	900	19,841	Fair
8-21-73	2.81	3.6	72	1091	0	0	39	591	31	470	850	12,874	Fair
9-25-73	2.57	4.2	24	332	0	0	30	416	22	305	800	11,082	Fair
10-11-73	2.34	3.9	100	1261	0	0	37	467	36	454	600	7,568	Fair
10-29-73	0	3.5	200	0	0	0	38	0	22	0	700	0	Rain
12-03-73	3.92	6.0	212	4479	190	4014	24	507	12	254	325	6,867	Fair
1-14-74	3.92	5.9	146	3085	82	1733	27	570	11	232	700	14,790	Fair
2-04-74	3.92	–	–	–	–	–	–	–	–	–	–	–	Fair
3-11-74	4.20	5.8	118	2671	62	1404	14	317	6	127	700	15,847	Fair
4-10-74	7.20	4.2	90	3493	0	0	18	699	13	505	800	31,046	Fair
Average	3.50		114	1985	37	795	29	470	20	320	708	13,324	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	1.60	3.1	82	707	0	0	18	155	13	112	825	7,115	Fair
6-07-74	2.40	5.8	12	155	110	1423	13	168	8	101	475	6,145	Fair
Average	2.00		47	431	55	712	16	162	10	107	650	6,630	

STA. NO. N2

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-25-73	21.0	2.5	850	96,028	0	0	400	45,190	42	4,745	2900	327,626	Fair
8-21-73	17.2	2.7	830	76,948	0	0	350	32,448	270	25,031	2800	259,582	Fair
9-25-73	15.1	2.8	770	62,670	0	0	360	29,300	150	12,208	2800	227,889	Fair
10-11-73	21.2	2.9	920	105,127	0	0	367	41,936	196	22,397	2750	314,237	Fair
10-29-73	19.9	2.9	1000	107,261	0	0	169	18,127	88	9,439	2250	241,337	Rain
12-03-73	18.2	2.6	980	96,136	0	0	355	34,825	188	18,442	2525	247,697	Fair
1-14-74	19.4	2.9	800	83,653	0	0	318	33,252	161	16,835	1875	196,061	Fair
2-04-74	16.5	3.0	592	52,650	0	0	229	20,366	159	14,141	1425	126,732	Fair
3-11-74	31.2	3.1	386	64,913	0	0	154	25,898	118	19,844	1225	206,006	Fair
4-10-74	43.2	3.1	500	116,424	0	0	112	26,079	103	23,983	1400	325,987	Fair
Average	22.3		763	86,181	0	0	281	30,742	148	16,707	2195	247,315	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	4.35	2.9	204	4,783	0	0	25	586	19	445	350	8,206	Fair
6-07-74	2.44	2.9	220	2,893	0	0	30	395	19	250	825	10,850	Fair
Average	3.40		212	3,838	0	0	28	491	19	348	588	9,528	

NEWPORT CREEK SAMPLING DATA

STA. NO. N3

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-25-73	13.6	2.5	1,000	73,358	0	0	550	40,347	200	14,672	3,400	249,417	Fair
8-21-73	11.7	2.7	840	52,973	0	0	280	17,658	130	8,198	2,900	182,883	Fair
9-25-73	12.0	2.8	870	56,272	0	0	400	25,872	270	17,464	3,100	200,508	Fair
10-11-73	12.3	2.9	1,020	67,623	0	0	547	36,264	179	11,867	2,225	147,511	Fair
10-29-73	11.1	3.0	800	47,863	0	0	194	11,607	90	5,385	3,000	179,487	Rain
12-03-73	13.0	2.7	1,000	70,070	0	0	404	28,308	243	17,027	2,700	189,189	Fair
1-14-74	13.0	2.8	900	63,063	0	0	491	34,404	291	20,390	2,475	173,423	Fair
2-04-74	12.0	3.1	702	45,405	0	0	349	22,573	237	15,329	1,750	113,190	Fair
3-11-74	17.2	3.1	840	77,875	0	0	335	31,057	240	22,250	1,850	171,510	Fair
4-10-74	19.2	2.9	600	62,093	0	0	203	21,008	200	20,698	1,875	194,040	Fair
Average	13.5		857	61,660	0	0	375	26,910	208	15,328	2,528	180,116	
			Pumping Operations Discontinued at Stations F2 and N5										

STA. NO. F2

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-25-73	5.14	2.7	1,100	30,475	0	0	670	18,562	380	10,528	3,400	94,196	Fair
8-21-73	5.88	3.3	1,100	34,863	0	0	580	18,382	510	16,164	3,400	107,757	Fair
9-25-73	6.58	3.0	980	34,757	0	0	550	19,506	410	14,541	3,300	117,038	Fair
10-11-73	6.39	3.0	1,100	37,886	0	0	415	14,293	253	8,714	3,250	111,937	Fair
10-29-73	7.02	3.0	900	34,054	0	0	295	11,162	157	5,941	2,550	96,486	Rain
12-03-73	8.17	2.9	1,000	44,036	0	0	402	17,703	399	17,570	2,475	108,990	Fair
1-14-74	10.9	3.0	1,000	58,751	0	0	396	23,265	392	23,030	1,850	108,689	Fair
2-04-74	10.5	3.3	946	53,539	0	0	581	32,882	396	22,412	2,025	114,605	Fair
3-11-74	11.7	3.3	716	45,153	0	0	516	32,541	361	22,766	1,825	115,090	Fair
4-10-74	15.2	3.3	1,000	81,928	0	0	338	27,692	327	26,790	1,975	161,808	Fair
Average	8.75		984	45,544	0	0	474	21,599	359	16,846	2,605	113,660	
				Pumping Operations Discontinued									

STA. NO. N4

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-25-73	5.20	2.5	740	20,741	0	0	270	7,568	2	56	2,700	75,676	Fair
8-21-73	9.88	2.8	940	50,058	0	0	430	22,899	330	17,574	3,000	159,760	Fair
9-25-73	7.10	2.7	690	26,406	0	0	250	9,567	70	2,679	2,800	107,153	Fair
10-11-73	9.32	2.8	660	33,155	0	0	237	11,906	133	6,681	2,025	101,725	Fair
10-29-73	4.97	3.0	300	8,036	0	0	148	3,965	87	2,331	2,275	60,943	Rain
12-03-73	8.34	2.7	880	39,558	0	0	180	8,091	46	2,068	2,450	110,134	Fair
1-14-74	5.75	2.9	500	15,496	0	0	232	7,190	69	2,138	2,025	62,760	Fair
2-04-74	2.30	3.0	472	5,851	0	0	167	2,070	66	818	1,875	23,244	Fair
3-11-74	6.40	3.1	440	15,178	0	0	211	7,279	97	3,346	1,900	65,542	Fair
4-10-74	6.59	2.9	400	14,208	0	0	133	4,724	110	3,907	2,000	71,040	Fair
Average	6.59		602	22,869	0	0	226	8,526	101	4,160	2,305	83,798	
			Pumping Operations Discontinued at Stations F2 and N5										

NEWPORT CREEK SAMPLING DATA

STA. NO. N5

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-25-73	5.22	2.5	800	22,509	0	0	290	8,159	17	478	2,900	81,594	Fair
8-21-73	9.37	2.7	770	38,888	0	0	280	14,141	160	8,081	2,900	146,462	Fair
9-25-73	6.55	2.7	720	25,419	0	0	240	8,473	45	1,589	2,800	98,853	Fair
10-11-73	8.24	2.9	600	26,648	0	0	224	9,949	118	5,241	2,225	98,820	Fair
10-29-73	5.81	2.9	400	12,526	0	0	122	3,821	85	2,662	2,525	79,073	Rain
12-03-73	7.80	2.8	820	34,474	0	0	205	8,619	53	2,228	1,975	83,033	Fair
1-14-74	5.43	2.9	500	14,634	0	0	240	7,024	91	2,663	1,800	52,682	Fair
2-04-74	3.80	3.0	482	9,872	0	0	178	3,646	75	1,536	1,700	34,819	Fair
3-11-74	6.53	3.1	540	19,006	0	0	218	7,673	100	3,520	1,900	66,874	Fair
4-10-74	5.63	2.9	400	12,138	0	0	144	4,370	142	4,309	1,925	58,415	Fair
Average	6.44		603	21,611	0	0	214	7,588	89	3,231	2,265	80,063	
			Pumping Operations Discontinued										

STA. NO. N6

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-25-73	0.51	6.7	0	0	26	71	4.2	12.0	2.6	7.1	130	357	Fair
8-21-73	0.19	7.2	0	0	36	37	3.9	4.0	2.7	2.8	58	59	Fair
9-25-73	0.01	6.5	0	0	0	0	3.2	0.2	1.4	0.1	200	11	Fair
10-11-73	0.01	7.1	46	2	124	7	4.9	0.3	0	0	25	1	Fair
10-29-73	0.12	6.7	120	78	128	83	6.6	4.3	0	0	350	226	Rain
12-04-73	0.05	6.1	86	23	62	17	3.4	0.9	0	0	295	80	Fair
1-14-74	0	-	-	0	-	0	-	0	-	0	-	0	Fair
2-04-74	0.03	3.7	128	21	0	0	16.0	2.6	12.0	1.9	275	44	Fair
3-11-74	0.45	6.4	40	97	130	315	3.4	8.2	1.1	2.7	175	424	Fair
4-10-74	3.20*	2.9*	300*	5,174*	0*	0*	92*	1587*	69.0*	1190.0*	800*	13,798*	Fair
Average	0.15		53	25	63	59	5.7	3.6	2.5	1.6	189	134	
				Pumping Operations Discontinued at Stations F2 and N5									
5-08-74	0.09	5.6	48	23	124	60	5.0	2.4	0	0	150	73	Fair
6-07-74	0.05	6.1	40	11	94	25	9.3	2.5	2.2	0.6	200	54	Fair
Average	0.07		44	17	109	43	7.2	2.5	1.1	0.3	175	64	

* Not Included In Averages

STA. NO. N8

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-25-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
8-21-73	0.23	7.1	0	0	36	45	2.0	2.5	1.4	1.7	43	53	Fair
9-25-73	0.15	7.0	0	0	28	23	3.7	3.0	2.8	2.3	22	18	Fair
10-11-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
10-29-73	-	-	-	-	-	-	-	-	-	-	-	-	Rain
12-04-73	0.38	6.6	114	233	190	389	2.0	4.1	0	0	150	307	Fair
1-14-74	0	-	-	0	-	0	-	0	-	0	-	0	Fair
2-04-74	0.65	3.8	150	526	0	0	18.0	63.0	12.0	42.0	150	526	Fair
3-11-74	1.03	3.9	150	833	0	0	29.0	161.0	29.0	161.0	275	1,527	Fair
4-10-74	3.25*	3.0*	400*	7,007*	0*	0*	96.0*	1682.0*	76.0*	1,331.0*	775*	13,576*	Fair
Average	0.41		83	265	51	76	11	39	9.0	35	128	405	
				Pumping Operations Discontinued at Stations F2 and N5									
5-08-74	0.33	5.9	44	78	98	174	4.5	8.0	2.2	3.9	150	267	Fair
6-07-74	0.25	6.6	60	81	186	251	2.5	3.4	0	0	150	202	Fair
Average	0.29		52	80	142	213	3.5	5.7	1.1	2.0	150	235	

* Not Included in Averages

NEWPORT CREEK SAMPLING DATA

STA. NO. MI

DATE	FLOW cfs	pH	ACIDITY CONC. mg /l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg /l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg /l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg /l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg /l	SULFATE LOAD lbs/day	WEATHER
7-26-73	1.34	2.5	380	2,745	0	0	30.0	217	20.0	144	400	2,889	Fair
8-21-73	0.66	6.3*	56*	199*	0*	0*	9.0	32	5.0	18	220	783	Fair
9-25-73	1.55	3.5	340	2,841	0	0	28.0	234	22.0	184	540	4,511	Fair
10-10-73	0.87	3.3	154	722	0	0	27.0	127	15.0	70	200	938	Fair
10-29-73	0.55	3.9	200	593	0	0	19.0	56	17.0	50	325	963	Rain
12-03-73	1.39	4.0	68	509	0	0	9.7	73	9.0	67	180	1,349	Fair
1-14-74	1.99	3.3	216	2,317	0	0	23.0	247	7.8	84	350	3,754	Fair
2-04-74	4.10	3.7	168	3,713	0	0	23.0	508	6.7	148	125	2,762	Fair
3-11-74	11.0	4.2	50	2,965	0	0	6.7	397	2.2	130	80	4,743	Fair
4-10-74	14.6	4.0	64	5,036	0	0	7.2	567	1.1	87	115	9,050	Fair
Average	3.81		182	2,382	0	0	18	246	11	98	254	3,174	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	1.54	3.7	140	1,162	0	0	20	166	6.7	56	250	2,075	Fair
6-07-74	1.05	4.2	66	374	0	0	14	79	10	57	275	1,556	Fair
Average	1.30		103	768	0	0	17	123	8.4	57	263	1,816	

* Not Included In Averages

STA. NO. MSI

DATE	FLOW cfs	pH	ACIDITY CONC. mg /l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg /l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg /l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg /l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg /l	SULFATE LOAD lbs/day	WEATHER
7-26-73	0.31	6.4	0	0	12	20	2.0	3.3	1.2	2.0	120	201	Fair
8-21-73	0.24	6.8*	26*	34*	0*	0*	5.0	6.5	0.9	1.2	120	155	Fair
9-25-73	0.05	3.7	150	40	0	0	30	8.1	17	4.6	260	70	Fair
10-10-73	0.27	6.0	144	210	174	253	2.9	4.2	0	0	225	327	Fair
10-29-73	0.26	6.8	120	168	176	247	6.6	9.2	0	0	175	245	Rain
12-04-73	0.17	6.1	114	104	196	180	0.6	0.5	0	0	58	53	Fair
1-14-74	0.23	6.6	76	94	176	218	0.7	0.9	0	0	45	56	Fair
2-04-74	0.20	4.1	96	103	0	0	10	11.0	4.5	4.9	165	178	Fair
3-11-74	0.38	6.4	32	66	92	188	1.0	2.0	0	0	30	61	Fair
4-10-74	0.29	5.4	56	88	112	175	2.6	4.1	0	0	70	109	Fair
Average	0.24		88	97	104	142	6.1	5.0	2.4	1.3	127	146	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	0.12	5.1	2.2	1	4.1	3	0.3	0.2	0	0	150	97	Fair
6-07-74	0.36	6.3	44	85	202	392	0.7	1.4	0	0	150	291	Fair
Average	0.24		23	43	103	198	0.5	0.8	0	0	150	194	

* Not Included In Averages

STA. NO. M2

DATE	FLOW cfs	pH	ACIDITY CONC. mg /l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg /l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg /l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg /l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg /l	SULFATE LOAD lbs/day	WEATHER
7-26-73	1.15	2.5	430	2,665	0	0	57	353	3.5	22	580	3,595	Fair
8-21-73	0.18	2.9	340	330	0	0	44	43	21	20	570	553	Fair
9-25-73	0.87	2.8	300	1,407	0	0	34	159	9.0	42	400	1,876	Fair
10-10-73	0.52	3.1	190	533	0	0	18	50	17	48	250	701	Fair
10-29-73	0.19	3.2	400	410	0	0	34	35	29	30	400	410	Rain
12-04-73	0.74	3.0	120	479	0	0	21	84	9.0	36	190	758	Fair
1-14-74	1.50	3.1	238	1,924	0	0	28	226	12	97	475	3,840	Fair
2-04-74	2.93	3.4	174	2,748	0	0	26	411	4.5	71	225	3,553	Fair
3-11-74	10.6	3.8	52	2,971	0	0	7.3	417	2.2	126	85	4,856	Fair
4-10-74	13.0	3.5	70	4,905	0	0	7.8	547	0	0	105	7,357	Fair
Average	3.17		231	1,837	0	0	28	233	11	49	328	2,750	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	1.58	3.1	270	2,299	0	0	30	255	9.0	77	350	2,981	Fair
6-07-74	0.51	3.0	320	880	0	0	40	110	17	47	350	962	Fair
Average	1.05		295	1,590	0	0	35	183	13	62	350	1,972	

NEWPORT CREEK SAMPLING DATA

STA. NO. P5

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR IRON CONC. mg/l	FERR IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-26-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
8-21-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
9-24-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
10-10-73	-	4.8	160	-	0	-	24	-	22	-	350	-	Fair
10-29-73	0.08	4.2	200	86	0	0	42	18	34	15	275	119	Rain
12-04-73	0.15	4.4	138	112	2	2	34	27	25	20	300	243	Fair
1-14-74	0	5.7	122	0	30	0	22	0	16	0	140	0	Fair
2-04-74	0.31	3.5	106	177	0	0	32	53	10	17	125	209	Fair
3-11-74	3.00	3.9	54	873	0	0	7.3	118	2.2	36	150	2,426	Fair
4-10-74	3.64	3.5	72	1,490	0	0	7.6	157	1.1	23	225	4,657	Fair
Average	1.23		122	456	5	0	24	62	16	19	224	1,276	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	0.19	4.7	46	47	0	0	24	25	13	13	100	102	Fair
6-07-74	0.18	4.8	14	14	22	21	26	25	18	17	225	218	Fair
Average	0.19		30	31	11	11	25	25	16	15	163	160	

STA. NO. M3

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-26-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
8-21-73	-	-	-	-	-	-	-	-	-	-	-	-	Fair
9-24-73	0.68	6.5	0	0	0	0	0.2	0.7	0.2	0.7	10	37	Fair
10-10-73	0	-	-	0	-	0	-	0	-	0	-	0	Fair
10-29-73	0	-	-	0	-	0	-	0	-	0	-	0	Rain
12-03-73	0.50	5.9	2	5	8	22	0.1	0.3	0	0	18	49	Fair
1-14-74	0	-	-	0	-	0	-	0	-	0	-	0	Fair
2-04-74	1.63	6.0	2	18	16	141	0.1	0.9	0	0	14	123	Fair
3-11-74	1.48	6.0	2	16	20	160	1.2	9.6	0	0	35	279	Fair
4-10-74	2.32	5.7	4	50	14	175	0.1	1.3	0	0	35	438	Fair
Average	0.83		2	11	12	62	0.3	1.6	0	0	22	116	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	0.34	5.4	4	7	22	40	0.1	0.2	0	0	100	183	Fair
6-07-74	0.14	6.1	2	2	16	12	0	0	0	0	175	132	Fair
Average	0.24		3	5	19	26	0.1	0.1	0	0	138	158	

STA. NO. M4

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-26-73	0.34	6.3	4	7	0	0	0.6	1.1	0.5	0.9	19	35	Fair
8-21-73	0.05	6.4	0	0	16	4	0.2	0.1	0.2	0.1	36	10	Fair
9-24-73	0.46	6.5	0	0	4	10	0.3	0.7	0.3	0.7	5	12	Fair
10-10-73	0.13	6.2	4	3	12	8	0.6	0.4	0	0	5	4	Fair
10-29-73	0.09	6.2	10	5	10	5	0.3	0.1	0	0	45	22	Rain
12-03-73	0.53	5.8	2	6	8	23	0.3	0.9	0	0	14	40	Fair
1-14-74	0.52	6.2	2	6	20	56	0.3	0.8	0	0	14	39	Fair
2-04-74	0.89	6.1	6	29	16	77	0.1	0.5	0	0	14	67	Fair
3-11-74	2.59	6.1	2	28	18	251	0.2	2.8	0	0	30	419	Fair
4-10-74	2.78	6.0	4	60	10	150	0	0	0	0	35	524	Fair
Average	0.84		3	14	11	58	0.3	0.7	0.1	0.2	22	117	
			Pumping Operations Discontinued at Stations F2 and N5										
5-08-74	0.70	5.7	6	23	20	75	2.8	11	0	0	150	566	Fair
6-07-74	0.34	6.2	2	4	26	48	0.6	1.1	0	0	225	412	Fair
Average	0.52		4	14	23	62	1.7	6.1	0	0	188	489	

NEWPORT CREEK SAMPLING DATA

STA. NO. M5

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-26-73	0.57	2.5	480	1,475	0	0	58	178	15	46	570	1,751	Fair
8-21-73	0.10	2.8	820	442	0	0	92	50	38	20	960	517	Fair
9-25-73	0.67	2.7	350	1,264	0	0	37	134	1.9	6.9	430	1,553	Fair
10-10-73	0.44	3.0	230	545	0	0	21	50	0	0	340	806	Fair
10-29-73	0.19	3.1	400	410	0	0	53	54	30	31	600	614	Rain
12-03-73	0.74	3.0	80	319	0	0	9.7	39	6.8	27	135	538	Fair
1-14-74	1.03	3.0	322	1,788	0	0	36	200	6.7	37	325	1,804	Fair
2-04-74	1.79	3.2	256	2,470	0	0	42	405	4.5	43	150	1,447	Fair
3-11-74	7.68	3.7	74	3,063	0	0	9.7	402	2.2	91	90	3,726	Fair
4-10-74	10.4	3.4	96	5,381	0	0	10	561	0	0	105	5,886	Fair
Average	2.36		311	1,716	0	0	37	207	11	30	371	1,864	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.86	3.0	400	1,854	0	0	48	222	9.0	42	425	1,970	Fair
6-07-74	0.26	2.8	680	953	0	0	67	94	21	29	475	666	Fair
Average	0.56		540	1,404	0	0	58	158	15	36	450	1,318	

STA. NO. S10

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-26-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
8-21-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
9-24-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
10-10-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
10-29-73	–	–	–	–	–	–	–	–	–	–	–	–	Rain
12-04-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
1-14-74	–	–	–	–	–	–	–	–	–	–	–	–	Fair
2-04-74	–	–	–	–	–	–	–	–	–	–	–	–	Fair
3-11-74	0.01	2.8	4,200	226	0	0	1,206	65	52	2.8	4,500	243	Fair
4-10-74	0.03	2.6	2,400	388	0	0	437	71	13	2.1	2,525	408	Fair
Average	0.02		3,300	307	0	0	822	68	33	2.5	3,513	326	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.03	2.5	4,100	663	0	0	618	100	9.0	1.5	4,625	748	Fair
6-07-74	0	2.4	3,200	0	0	0	665	0	72	0	3,500	0	Fair
Average	0.02		3,650	332	0	0	642	50	41	0.8	4,063	374	

STA. NO. S11

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	CONC. mg/l	LOAD lbs/day	
7-26-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
8-21-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
9-24-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
10-10-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
10-29-73	–	–	–	–	–	–	–	–	–	–	–	–	Rain
12-04-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
1-14-74	–	–	–	–	–	–	–	–	–	–	–	–	Fair
2-04-74	–	–	–	–	–	–	–	–	–	–	–	–	Fair
3-11-74	0.01	3.0	800	43	0	0	122	6.6	3.4	0.2	1,325	71	Fair
4-10-74	0.09	3.0	346	168	0	0	34	16	1.1	0.5	325	158	Fair
Average	0.05		573	106	0	0	78	11	2.3	0.4	825	115	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.02	2.5	3,400	367	0	0	488	53	40	4.3	3,725	402	Fair
6-07-74	0.01	2.4	3,200	172	0	0	602	32	204	11	3,775	203	Fair
Average	0.02		3,300	270	0	0	545	43	122	7.7	3,750	303	

NEWPORT CREEK SAMPLING DATA

STA. NO. M6

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	
7-26-73	0.71	3.4	50	191	0	0	0.4	1.6	0.4	1.5	86	329	Fair
8-21-73	0.07	3.3	78	29	0	0	0.2	0.1	0.2	0.1	130	49	Fair
9-25-73	0.60	4.2	32	103	0	0	0.7	2.3	0.5	1.6	86	278	Fair
10-10-73	0.43	4.2	24	56	0	0	0.1	0.2	0	0	45	104	Fair
10-29-73	0.05	3.7	222	60	0	0	1.7	0.5	0	0	125	34	Rain
12-03-73	0.53	3.2	36	103	0	0	0	0	0	0	30	86	Fair
1-14-74	0.58	3.8	30	94	0	0	0.3	0.9	0	0	150	469	Fair
2-04-74	1.51	4.1	24	195	0	0	0.1	0.8	0	0	45	366	Fair
3-11-73	7.17	4.1	6	232	0	0	1.4	54	0	0	40	1,546	Fair
4-10-74	7.78	4.7	4	168	4	168	0	0	0	0	35	1,468	Fair
Average	1.94		51	123	0.4	17	0.5	6.0	0.1	0.3	77	473	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.62	4.5	12	40	0	0	0.1	0.3	0	0	175	585	Fair
6-07-74	0.23	3.6	38	47	0	0	0.1	0.1	0	0	225	279	Fair
Average	0.43		25	44	0	0	0.1	0.2	0	0	200	432	

STA. NO. P4

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	
7-25-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
8-21-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
9-25-73	0.09	3.2	120	58	0	0	0.6	0.3	0.6	0.3	170	82	Fair
10-11-73	0.08	3.4	126	54	0	0	0.3	0.1	0	0	185	80	Fair
10-29-73	0	–	–	0	–	0	–	0	–	0	–	0	Rain
12-03-73	0.08	3.5	34	15	0	0	0.1	0	0	0	35	15	Fair
1-14-74	0.11	4.0	24	14	0	0	0	0	0	0	30	18	Fair
2-04-74	0.34	4.1	14	26	0	0	0.1	0.2	0	0	44	81	Fair
3-11-74	0.50	4.2	10	27	0	0	0.2	0.5	0	0	45	121	Fair
4-10-74	0.60	3.9	24	78	0	0	0	0	0	0	225	728	Fair
Average	0.23		50	34	0	0	0.2	0.1	0	0	105	141	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.05	3.3	54	15	0	0	0	0	0	0	150	40	Fair
6-07-74	0.16	3.4	38	33	0	0	0.1	0.1	0	0	100	86	Fair
Average	0.11		46	24	0	0	0.1	0.1	0	0	125	63	

STA. NO. M9

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	CONC. mg /l	LOAD lbs /day	
7-26-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
8-21-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
9-24-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
10-10-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
10-29-73	–	–	–	–	–	–	–	–	–	–	–	–	Rain
12-03-73	0.53	3.4	24	69	0	0	0	0	0	0	40	114	Fair
1-14-74	0.49	4.0	18	48	0	0	0.1	0.3	0	0	40	106	Fair
2-04-74	2.16	4.3	12	140	0	0	0	0	0	0	44	512	Fair
3-11-74	6.91	5.5	4	149	10	372	0.2	7.4	0	0	60	2,235	Fair
4-10-74	6.03	5.0	4	130	6	195	0	0	0	0	45	1,463	Fair
Average	3.22		12	107	3	113	0.1	1.5	0	0	46	886	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.78	5.7	4	17	10	42	0	0	0	0	75	315	Fair
6-07-74	0.42	3.7	34	77	0	0	0.1	0.2	0	0	69	156	Fair
Average	0.60		19	47	5	21	0.1	0.1	0	0	72	236	

NEWPORT CREEK SAMPLING DATA

STA. NO. M8

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	
7-26-73	1.00	6.7	0	0	0	0	0.4	2.2	0.4	2.2	24	129	Fair
8-21-73	0.08	6.3	0	0	4	2	0.2	0.1	0.2	0.1	34	15	Fair
9-24-73	0.67	6.5	0	0	6	22	0.2	0.7	0.2	0.7	17	61	Fair
10-10-73	0.27	6.6	2	3	12	17	0.3	0.4	0	0	25	36	Fair
10-29-73	0.13	–	–	–	–	–	–	–	–	–	–	–	Rain
12-04-73	0.53	6.1	8	23	8	23	0.1	0.3	0	0	18	51	Fair
1-14-74	0.49	6.0	4	11	12	32	0.1	0.3	0	0	18	48	Fair
2-04-74	2.16	5.9	4	47	8	93	0.1	1.2	0	0	19	221	Fair
3-11-74	6.91	5.9	2	74	14	521	0.2	7.4	0	0	30	1,117	Fair
4-10-74	6.03	5.5	4	130	6	195	0	0	0	0	30	975	Fair
Average	1.83		3	32	8	101	0.2	1.4	0.1	0.3	24	295	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.78	5.8	4	17	14	59	0.1	0.4	0	0	125	526	Fair
6-07-74	0.42	6.3	4	9	16	36	0.4	0.9	0	0	175	396	Fair
Average	0.60		4	13	15	48	0.3	0.7	0	0	150	461	

STA. NO. M7

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	
7-26-73	0.17	6.4	2	2	0	0	9.0	8.3	3.0	2.8	140	128	Fair
8-21-73	0.08	6.6	0	0	0	0	3.0	1.3	2.3	1.0	160	69	Fair
9-25-73	0.08	6.1	6	3	0	0	11	4.7	8.9	3.8	130	56	Fair
10-10-73	0.06	6.3	20	6	56	18	3.6	1.2	0	0	135	44	Fair
10-29-73	0.18	6.6	2	2	96	93	17	16	0	0	150	146	Rain
12-03-73	0.14	6.2	120	91	158	119	1.7	1.3	0	0	68	51	Fair
1-14-74	0.19	6.0	52	53	54	55	3.2	3.3	0	0	105	108	Fair
2-04-74	0.20	5.4	68	73	18	19	5.6	6.0	0	0	165	178	Fair
3-11-74	0.40	6.0	36	78	62	134	4.6	9.9	0	0	105	226	Fair
4-10-74	0.49	3.5	134	354	0	0	21	55	1.1	2.9	225	594	Fair
Average	0.20		44	66	44	44	8.0	11	1.5	1.1	138	160	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.19	5.8	64	66	70	72	2.8	2.9	0	0	125	128	Fair
6-07-74	0.09	6.2	52	25	90	44	3.6	1.7	0	0	175	85	Fair
Average	0.14		58	46	80	58	3.2	2.3	0	0	150	107	

STA. NO. P3

DATE	FLOW cfs	pH	ACIDITY		ALKALINITY		TOTAL IRON		FERR. IRON		SULFATE		WEATHER
			CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	CONC. mg /l	LOAD lbs/day	
7-25-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
8-21-73	–	–	–	–	–	–	–	–	–	–	–	–	Fair
9-24-73	0.01	3.2	190	10	0	0	7.0	0.4	0.5	0	290	16	Fair
10-10-73	0.01	4.4	52	3	0	0	0.9	0	0	0	70	4	Fair
10-29-73	0.02	5.3	2	0	24	3	12	1.3	0	0	125	13	Rain
12-04-73	0.01	5.8	6	0	10	1	0.4	0	0	0	20	1	Fair
1-14-74	0.01	4.0	74	4	0	0	1.0	0.1	0	0	80	4	Fair
2-04-74	0.01	3.8	108	6	0	0	4.9	0.3	0	0	125	7	Fair
3-11-74	0.02	3.2	410	44	0	0	70	7.5	2.2	0.2	425	46	Fair
4-10-74	0.03	2.8	1,000	162	0	0	285	46	2.2	0.4	1,700	275	Fair
Average	0.02		230	29	4	1	48	7.0	0.6	0.1	354	46	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.01	3.8	12	1	0	0	0.5	0	0	0	150	8	Fair
6-07-74	0.01	5.9	4	0	10	1	13	0.7	0	0	150	8	Fair
Average	0.01		8	1	5	1	6.8	0.4	0	0	150	8	

NEWPORT CREEK SAMPLING DATA

STA. NO. H1

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-26-73	0.08	6.7	0	0	2	1	1.1	0.5	0.5	0.2	29	13	Fair
8-21-73	0.02	6.5	0	0	4	0	1.4	0.2	0.5	0.1	34	4	Fair
9-24-73	0.09	6.2	0	0	0	0	0.7	0.3	0.5	0.2	19	9	Fair
10-10-73	0.02	6.3	6	1	12	1	0.6	0.1	0	0	55	6	Fair
10-29-73	0.02	6.2	8	1	10	1	0.6	0.1	0	0	30	3	Rain
12-04-73	0.24	5.9	2	3	2	3	0.3	0.4	0	0	11	14	Fair
1-14-74	0.30	6.3	4	6	24	39	0.3	0.5	0	0	13	21	Fair
2-04-74	0.54	5.9	4	12	16	47	0.4	1.2	0	0	12	35	Fair
3-11-74	1.11	6.2	2	12	26	156	0.2	1.2	0	0	30	179	Fair
4-10-74	1.69	5.5	4	36	16	146	0	0	0	0	30	273	Fair
Average	0.41		3	7	11	39	0.6	0.5	0.2	0.1	26	56	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.35	5.6	2	4	24	45	0.8	1.5	0	0	175	330	Fair
6-07-74	0.30	5.9	4	6	28	45	2.7	4.4	0	0	100	162	Fair
Average	0.33		3	.5	26	45	1.8	3.0	0	0	138	246	

STA. NO. H2

DATE	FLOW cfs	pH	ACIDITY CONC. mg/l	ACIDITY LOAD lbs/day	ALKALINITY CONC. mg/l	ALKALINITY LOAD lbs/day	TOTAL IRON CONC. mg/l	TOTAL IRON LOAD lbs/day	FERR. IRON CONC. mg/l	FERR. IRON LOAD lbs/day	SULFATE CONC. mg/l	SULFATE LOAD lbs/day	WEATHER
7-26-73	1.35	6.2	4	29	0	0	0.4	2.9	0.4	2.9	110	800	Fair
8-21-73	0.07	6.7	0	0	16	6	1.2	0.5	0.5	0.2	34	13	Fair
9-24-73	0.30	6.8	4	6	0	0	0.4	0.6	0.4	0.6	5	8	Fair
10-10-73	0.51	6.4	4	11	10	27	0.3	0.8	0	0	30	82	Fair
10-29-73	0.61	5.8	4	13	4	13	0.3	1.0	0	0	30	99	Rain
12-04-73	0.38	5.6	2	4	2	4	0.1	0.2	0	0	9	18	Fair
1-14-74	1.22	6.0	2	13	8	53	0	0	0	0	8	53	Fair
2-04-74	2.12	5.8	4	46	10	114	1.4	1.6	0	0	4	46	Fair
3-11-74	0.46	5.5	72	179	16	40	0.6	1.5	0	0	40	99	Fair
4-10-74	3.38	5.5	6	109	8	146	–	–	–	–	30	547	Fair
Average	1.04		10	41	7	40	0.5	2.6	0.1	0.4	30	177	
		Pumping Operations Discontinued at Stations F2 and N5											
5-08-74	0.85	5.4	2	9	8	37	1.7	7.8	0	0	35	160	Fair
6-07-74	0.44	5.8	4	9	12	28	0.2	0.5	0	0	200	474	Fair
Average	0.65		3	9	10	33	1.0	4.2	0	0	118	317	

were plotted on the "Mine Development and Pollution Source Map"). Separate flow and water quality averages were computed for the first 10 and the last 2 sampling rounds. These separate averages were computed to provide data representative of conditions both before and after the cessation of mine pumping. Since most of the study was conducted during the period of continuous mine pumping, data from the first 10 months will be discussed and analyzed prior to examining the final 2 months and prospects for the future.

The average flow from the Newport Creek Watershed was 26.5 cfs during the first 10 months. Fresh water and sewage sources contributed approximately 2.7 cfs and 3.8 cfs respectively to the total flow. Thus, 19 cfs or approximately 72 percent of the total flow was mine drainage. The major portion (15.2 cfs) of this mine drainage was discharged from the deep mine pumps monitored at sample stations N5 and F2. Mine pool overflows from the abandoned Susquehanna #7 deep mine are suspected of contributing the balance of the mine drainage. Acid seeps from culm and spoil piles provide relatively small volumes of acid drainage to the streams.

The Susquehanna #7 deep mine is apparently discharging into Newport Creek between the confluence of the North and South Branch Newport Creek and sample station N2. The presence of mine drainage indicators in the flow at station NS1 (a small tributary to Newport Creek near station N2) also suggests a discharge from the Susquehanna #7 mine. Field investigations located only a small discharge into Newport Creek and the flooded mine shaft. However, examination of mapping, mine pool elevations and sampling data strongly indicates the presence of a discharge.

The Susquehanna #7 mine pool elevations recorded by DER show that the pool level should be at or near the stream channel upstream from sample station N2. This establishes the potential for a discharge. However, flow and water quality data provide the most definitive evidence of the mine discharge. Flows measured during the final two sampling rounds show an increase of 2.1 cfs between stations M1 and N2. The additional flow contributed 3070 pounds per day of acid to Newport Creek. For a flow of 2.1 cfs to supply 3070 pounds per day of acid, the discharge should have an acid concentration of approximately 271 ppm. This value is almost identical to the 272 ppm of acidity found in grab samples of the Susquehanna Mine pool. Thus, it is reasonably safe to state that the Susquehanna #7 mine is gravity discharging into Newport Creek. Discharge is probably occurring gradually through permeable glaciofluvial deposits below the streambed.

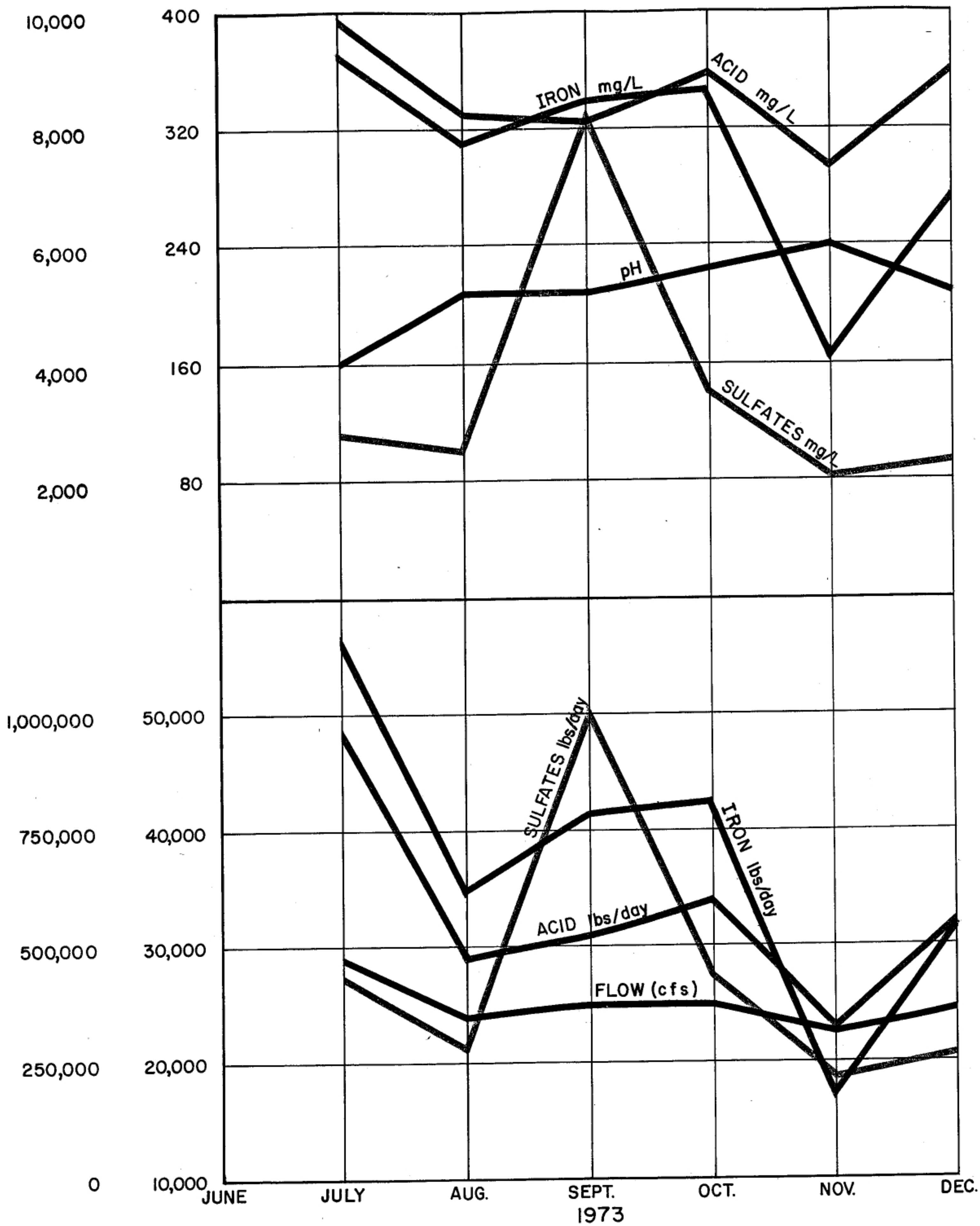
Further analysis of the flow data reveals two areas where surface flow is being lost via streambed infiltration. Between sample stations N8 and N6 on the North Branch Newport Creek, an average flow of 0.25 cfs was lost over the entire sampling period. Water was also being lost between station N6 and the mine discharge as station N5. Most of the time all of the flow recorded at Station N6 had infiltrated before reaching station N5.

Streambed infiltration losses were also recorded between stations

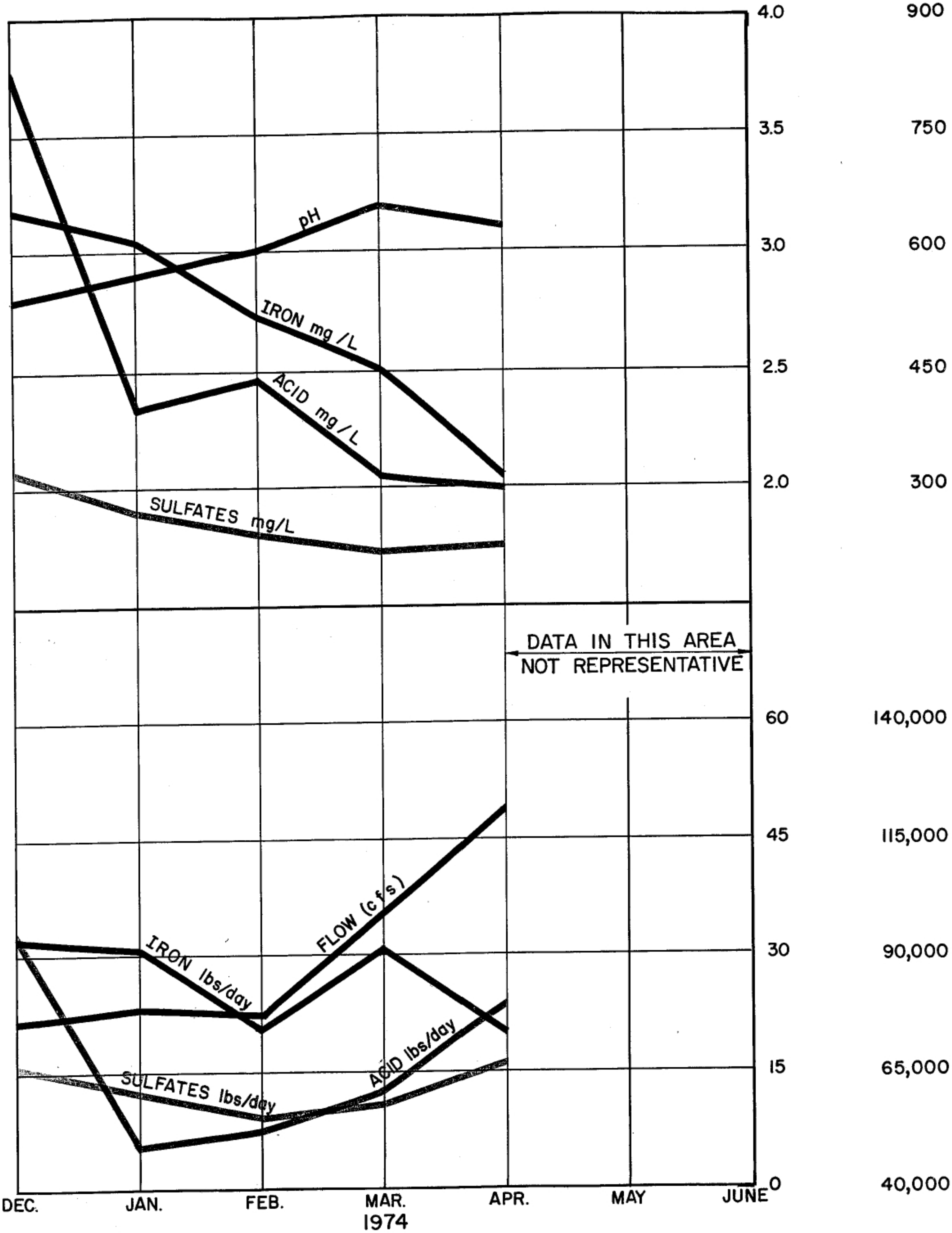
M4 and M3 on the Fairchild Pond discharge. The average flow calculations do not reflect the true amount of infiltration losses because flows were not recorded at station M3 during the first two sampling rounds. These sampling periods had low flows that would have lowered the average flow for station M3. All but two of the flows measured indicated a significant amount of infiltration. The two discrepancies indicate some type of recharge into the stream. Good water quality and the elevation of the stream negate any possibility of a discharge from the Alden deep mine. One explanation is that on these particular sampling dates the permeable alluvial material beneath the streambed was saturated, causing a recharge to the stream.

The flow data also shows a flow loss between stations F2 and N3. However, a relatively impervious iron hydroxide coating on the stream channel should prevent infiltration. An eight foot rectangular weir was used to measure flows at station N3, and a slight misreading of the weir height could have resulted in low readings. Because of the questionable readings at this station, data from stations N4 and F2 was used for analyses and discussions.

The water quality of main streams within the Newport Creek Watershed is highly indicative of the large quantities of mine drainage. The following constituent chart was developed for sample station N 1 to illustrate pollutant concentrations and loadings in relationship to flow at the mouth of Newport Creek. Pollutant loading trends generally reflect



ACID MINE DRAINAGE CONSTITUENTS — SAMPLE



STATION N-1 MOUTH OF NEWPORT CREEK

changes in flow with only two apparent variations. Sulfate loading increased dramatically in September while the flow and other constituent loadings show only a small increase. This increase in sulfate loading was mainly a result of an unusually high sulfate concentration. Since the other constituents do not show corresponding large loading and concentration increases in September, it is likely that there was an error in the laboratory sulfate analysis. In addition to the variation in sulfates, total iron loading decreased significantly in April while flow, acid loading and sulfate loading all increased. This decrease was caused by a major decrease in iron concentration which could reflect some oxidation of ferrous iron. Aeration at the Glen Nan mine pump station could have produced the ,oxidation because the total iron concentration at station N5 was low during April.

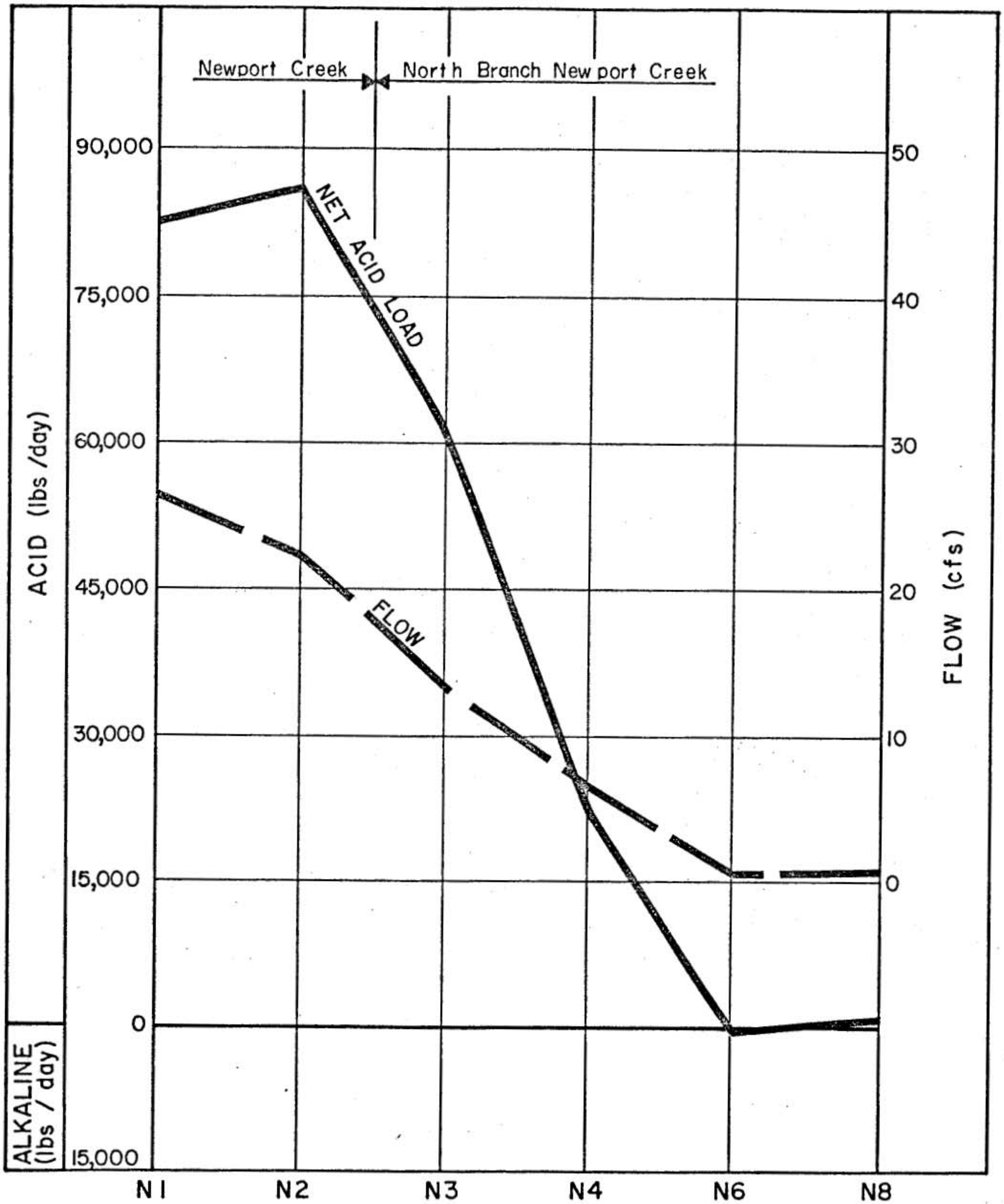
An average loading of 82,564 pounds per day of acid was discharged to the Susquehanna River when mine pumps were still operating. The North Branch Newport Creek was the chief contributor supplying over 68,000 pounds per day of acid to Newport Creek. The following sample station chart illustrates the increase in flow and sharper increase in acidity loading between stations N6 and N4 and Stations N4 and N3 on the North Branch Newport Creek. These augmentations of flow and loading are the result of mine pump discharges at stations, N5 and F2 respectively. The discharge at station F2 was the largest source of acid in the entire watershed, contributing greater than 45,000 pounds per day. The mine pump discharge monitored at station N5 was the second largest influx of acid, releasing over 21,000 pounds per day.

A comparison of water quality at stations F2 and N5 illustrates the increasing deterioration of mine water resulting from a longer flow path and retention time within the deep mine workings. The discharge at station N5 had been pumped from the active Glen Nan deep mine, while waters at station F2 were pumped from a sump which drained several abandoned workings overlying the Glen Nan active workings.

The water quality analyses indicate increased degradation of the discharge at station F2 with an additional 381 ppm acidity, 260 ppm total iron, and 340 ppm sulfates (this discharge was receiving limited lime treatment and aeration). It is probable that not all of the additional degradation is due to increased flow distance and retention time, but it is apparent that fast removal of mine waters can limit the amount of degradation.

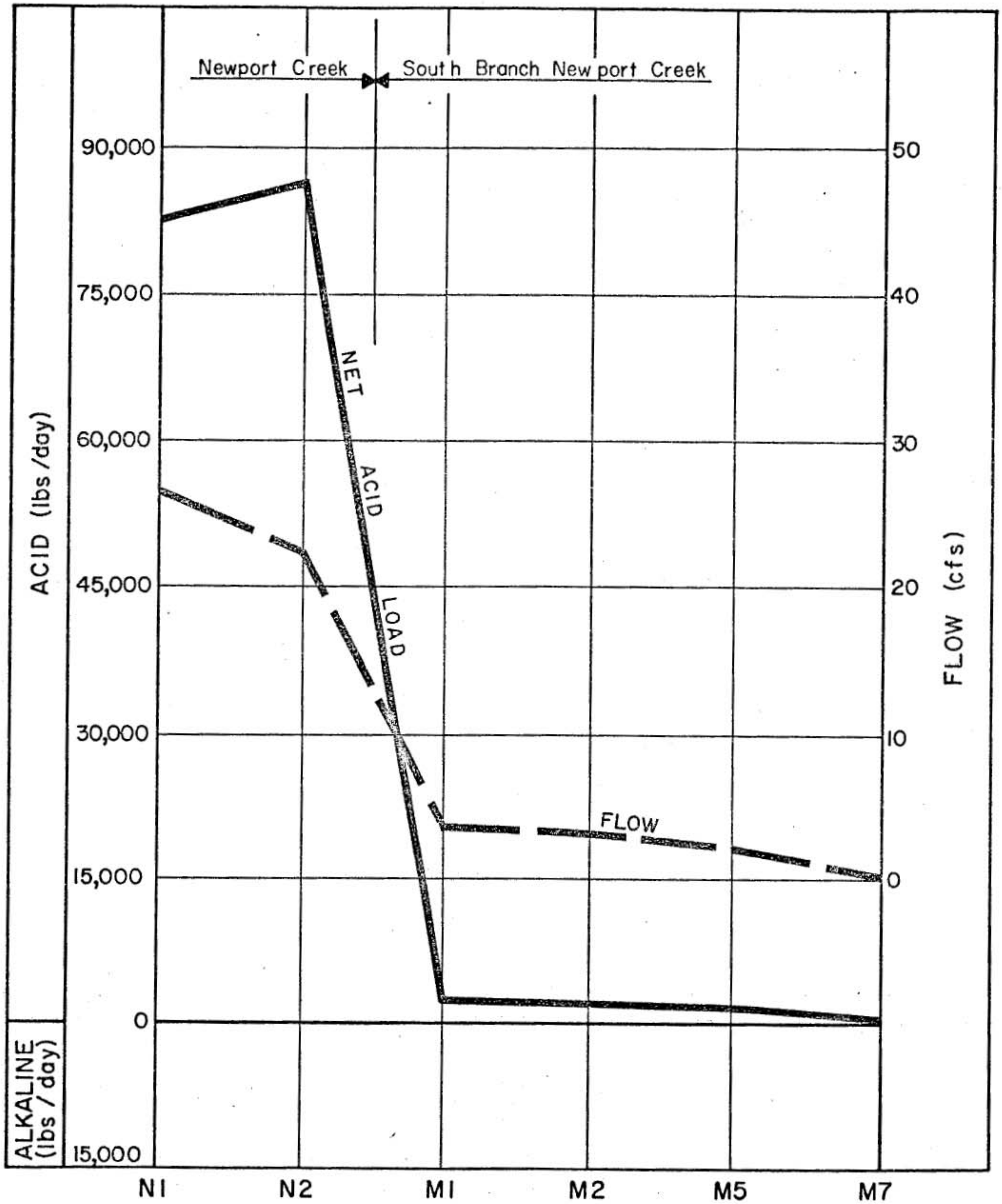
The South Branch Newport Creek does not receive any major deep mine discharges. This is reflected on the following sample station chart by a gradual increase in acidity loading and flow until reaching the confluence with the North Branch Newport Creek. As previously noted, the South Branch Newport Creek is augmented by the only fresh water tributaries (Fairchild Pond and the Wanamie Reservoir) in the watershed. Acid seeps and sewage discharges quickly contaminate these fresh waters.

Although the South Branch Newport Creek does not receive a major mine discharge, it does acquire pollutants from the most degraded discharge



SAMPLING STATIONS
(Newport Creek & North Branch Newport Creek)

ACID/ALKALINE & FLOW DISTRIBUTION



SAMPLING STATIONS
(Newport Creek & South Branch Newport Creek)

ACID/ALKALINE & FLOW DISTRIBUTION

in the watershed. The sources of this drainage are two ponds located adjacent to the calm pile from the Wanamie #18 slope. Samples collected at stations S10 and S11 contained acidity concentration in excess of 3000 ppm. Most of the acidity in the South Branch Newport Creek originates at this culm pile. The two ponds apparently collect seepage from the culm pile, since surface elevations are too high for a gravity discharge from the Wanamie deep mine.

Water quality data also indicates an apparent source of acid between sampling stations M2 and M1. Field investigations found no logical source of mine drainage along this segment of the South Branch Newport Creek. In fact, sewage discharges should reduce the acid loadings calculated for station M1 . Careful examination of flow data suggests that several low flow measurements were recorded at station M2. With the relatively high acid concentrations at station M2, these low flow measurements could have caused the difference in acid loadings between V1 and M2.

Sample stations P3 and P4 are of particular interest because DER mine permit records show these as gravity discharge points from the Wanamie deep mine. However, mine pool elevations and the water quality data do not suggest that these discharges are deep mine waters. Pollutant concentrations at station P4 are much lower than recorded for deep mine discharges in the watershed. Flow at P4 comes from the culm pile adjacent to the Wanamie Reservoir discharge. This flow could represent rainfall infiltration or seepage through the culm from the Wanamie Reservoir dis charge.

Flow at station P3 is emanating from a small concrete structure. The water quality at station P3 was extremely variable during the study. The discharge ranged from 24 ppm alkalinity to 1000 ppm acidity. During several sampling rounds, the presence of detergents was detected. Thus, a possible source of the P3 discharge could be from the Wanamie Colliery. Water from both facilities and water associated with any coal handled at the colliery could be discharged at station P3.

Flow conditions and water quality in the South Branch Newport Creek were not affected by cessation of mine pumping prior to the eleventh sampling round. However, the North Branch Newport Creek was no longer flowing at the point of confluence with the South Branch Newport Creek. The average flow and acid loading at the mouth of Newport Creek was 5.51 cfs and 4,801 ppm for the eleventh and twelfth sampling rounds. Gravity drainage from the Susquehanna #7 deep mine complex produced more than 3,000 pounds per day of the acidity loading.

For an undetermined time period, flows and pollutants loadings from the Newport Creek Watershed should be comparatively low. If pumping does not begin in the future, the abandoned deep mine workings will eventually flood, resulting in one or more gravity discharges. Initially the water quality should be similar to and possibly worse than the station F2 sample data. Data collected from several borehole discharges located in the Northern Anthracite Field indicates that the water quality from flooded deep mines will improve with time. Thus, the future Glen Nan gravity discharge should gradually show an improvement in the water quality. The Susquehanna #7 mine has been abandoned for approximately twenty years. Grab samples from this discharge contained the following pollutant concentrations: pH = 3.4; 272 ppm acidity; 44.8 ppm total iron; 7.8 ppm ferrous iron; 1425 ppm sulfates. The Glen Nan discharge could have a similar water quality within twenty years.

FIELD EXPLORATION

Field exploration was conducted in two steps as follows:

1) Initial Field Reconnaissance

2) Detailed Field Exploration

The initial field reconnaissance entailed walking of all main branch and tributary streams. Pollution sources were identified and individual sampling stations were located and flagged. This provided the basis for initiation of the sampling program.

Existing data collected during the initial stages of the study proved helpful in locating pollution sources. Local residents were also contacted to locate additional pollution sources, to obtain access to construct and monitor sample stations, and to conduct further detailed field explorations.

Detailed field exploration began while weirs were being constructed, and continued for the duration of the study. Sites where surface waters enter deep mines through crop falls and. old mine entries were located during this exploration.. Infiltration through permeable streambed materials was also observed. Periodic field pH measurements aided in locating obscure pollution sources.

Detailed exploration involved walking of dry stream channels, investigation of active and abandoned strip mines, and the location of coal crops, glacial drift and any other significant geologic features. Possible surface water flow paths were investigated. The effect of strip mines on surface flow was also evaluated. The perimeters of all lakes and ponds were walked to locate feeder streams and discharge points. All surface mines and culm piles were also mapped during the field investigations.

Further field investigations were performed in conjunction with the abatement projects submitted in the Interim Report. Capacities were determined for all water conveyances that will carry increased flow resulting from construction of recommended abatement projects. Other investigations related to these abatement projects included an evaluation of the need for erosion protection along the Wanamie Reservoir channel, and a survey to determine the gradient of the Wanamie Reservoir channel near its confluence with the South Branch Newport Creek. Culvert and pipe capacities have been tabulated and listed in the "Abatement Project" section of this report.

Final detailed exploration was conducted during the last month of the study. This exploration served to evaluate potential abatement projects that had been established through earlier field investigations and stereo viewing of aerial photographs borrowed from the SCS. Observations during the exploration indicated no active strip mining. The vegetation had been cleared from an area in the Northeast corner of the watershed. Subsequent conversations with mining personnel confirmed that no surface mining was occurring during the last month of the study. It was also learned that the cleared land in the northeast corner of the watershed is being developed for an industrial park.

HYDROLOGIC BALANCE

Information acquired during the sampling program and the field investigations provided insight into the nature of surface flow within the. Newport Creek Watershed. Extensive strip mining, crop falls and surface subsidence have blocked natural drainage paths and provided direct infiltration routes into deep mine workings. Thus, under normal flow conditions very little direct surface runoff reaches the main streams. Some of the drainage that enters stream channels is lost via streambed infiltration. Analysis of precipitation, human water consumption, and mine pumping data (in conjunction with surface flow data), allows determination of the magnitude of surface losses and gains throughout the watershed.

A hydrologic balance was performed to apply data collected during the period from July 1973, through April 1974. Originally the hydrologic balance was intended to represent a twelve month period. However, drastic changes in flow conditions following cessation of mine pumping forced implementation of a ten month analysis period. The results and significance of the hydrologic balance are presented in the following discussions.

The basic concept employed to develop this particular hydrologic balance was that the total precipitation, less evapo-transpiration losses, reflects the potential drainage from the watershed if there are no infiltration losses or gains. All mine discharges and estimated sewage augmentations (only those instances where the public water supply originated outside of the watershed) were totaled and subtracted from the total precipitation (less evapo-transpiration losses). The difference reflects the actual surface runoff resulting from precipitation during the study analysis period.

Total precipitation for the first ten months of the study was 31.24 inches. Considering the 15 square mile area of the watershed, this precipitation represents 41 cfs of water. Evapo-transpiration losses of 50 percent are typical for the region. Thus, potential surface flow from the Newport Creek Watershed was approximately 21 cfs for the study period. The average flow recorded at the mouth of Newport Creek (station N1) was 26.5 cfs. Approximately 23 cfs of the flow measured at station N1 was either from deep mine pumps, the Susquehanna #7 overflow, or sewage discharges. Only 3.7 cfs (or 18 percent of the potential 21 cfs surface runoff following evapo-transpiration losses) reached the Susquehanna River as direct runoff. The amount of infiltration during the study period was approximately 41 percent of the total precipitation. Infiltration rates for this region should be about 20 percent for a drainage area that is relatively undisturbed by coal mining. Thus, the calculated infiltration reflects an extraordinarily higher rate than expected under normal hydrologic conditions.

The infiltration percentage may be even larger than calculated, because the rapid loss of surface water (determined to be 21% above normal for this region) provides less opportunity for evapo-transpiration. This could result in less than the normal 50% evapo-transpiration losses, which would mean increased infiltration losses. Highly permeable surface material and sparce undergrowth can contribute to shorter water retention time and thus, reduce opportunity for evapo-transpiration processes.

The hydrology of a watershed is extremely complex, and usually involves some exchange of water between ground water and surface streams. In an area of ground water discharge a stream may actually receive flow augmentation from ground water. While in a recharge area, the stream will lose flow to the ground water supply. The preceding simplified hydrologic discussions were not intended to depict exact hydrologic occurences within the watershed. The hydrologic balance does reflect general hydrologic conditions.

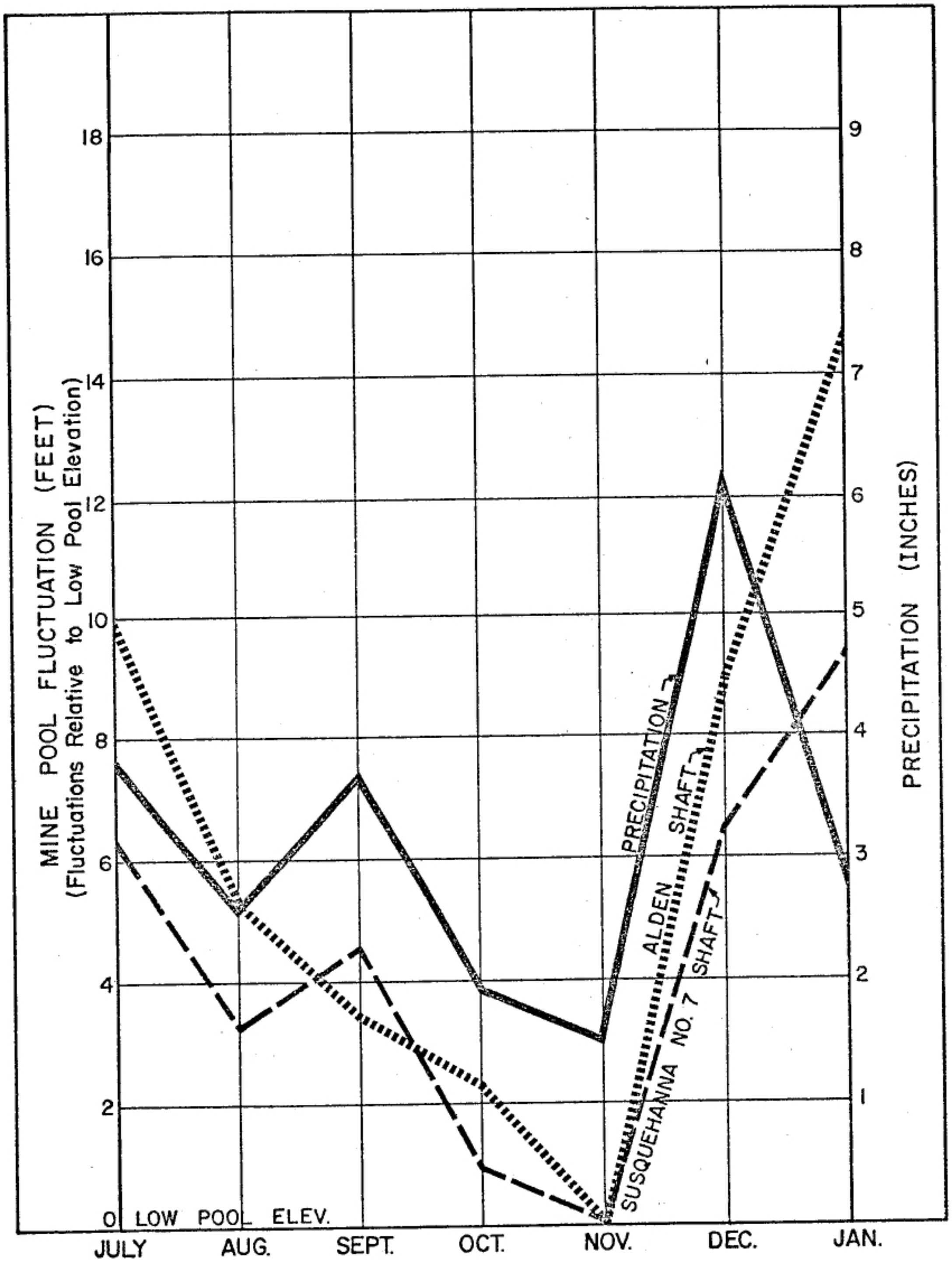
Since extensive underground voids have been created by deep coal mining, the study area can be characterized as a ground water recharge area with limited natural discharge from the ground water storage. Mine pumping and the Susquehanna #7 discharges provided' the only significant return of infiltration losses.

The "Mine Pool vs. Precipitation" (pp. 56 and 57) chart illustrates the almost direct affect of precipitation on mine pool elevations. Pool elevations usually fluctuated in direct response to monthly increases or decreases in precipitation. Mine pool elevations can be determined for any particular month by relating back to the low pool elevations recorded for November, 1973. Pool elevations for the other deep mines underlying the watershed were not plotted because these mines were being affected by pumping.

The nature and extent of inter basin flow via deep mine pools is a very complex problem that can only be discussed in a speculative sense. All, or portions of, seven mines complexes underlie the Newport Creek Watershed. The abandoned mines and their respective mean sea level referenced pool elevations as recorded by the Department during the twelve month study period are: Susquehanna #7, 534 feet; Alden, 567 feet; Glen Lyon, 647 feet; Stearns, 558 feet; Wanamie #18 and #19, 544 feet and 551 feet; Bliss, 576 feet. Since the Glen Nan mine was pumping until near the end of the study, no pool elevations were recorded.

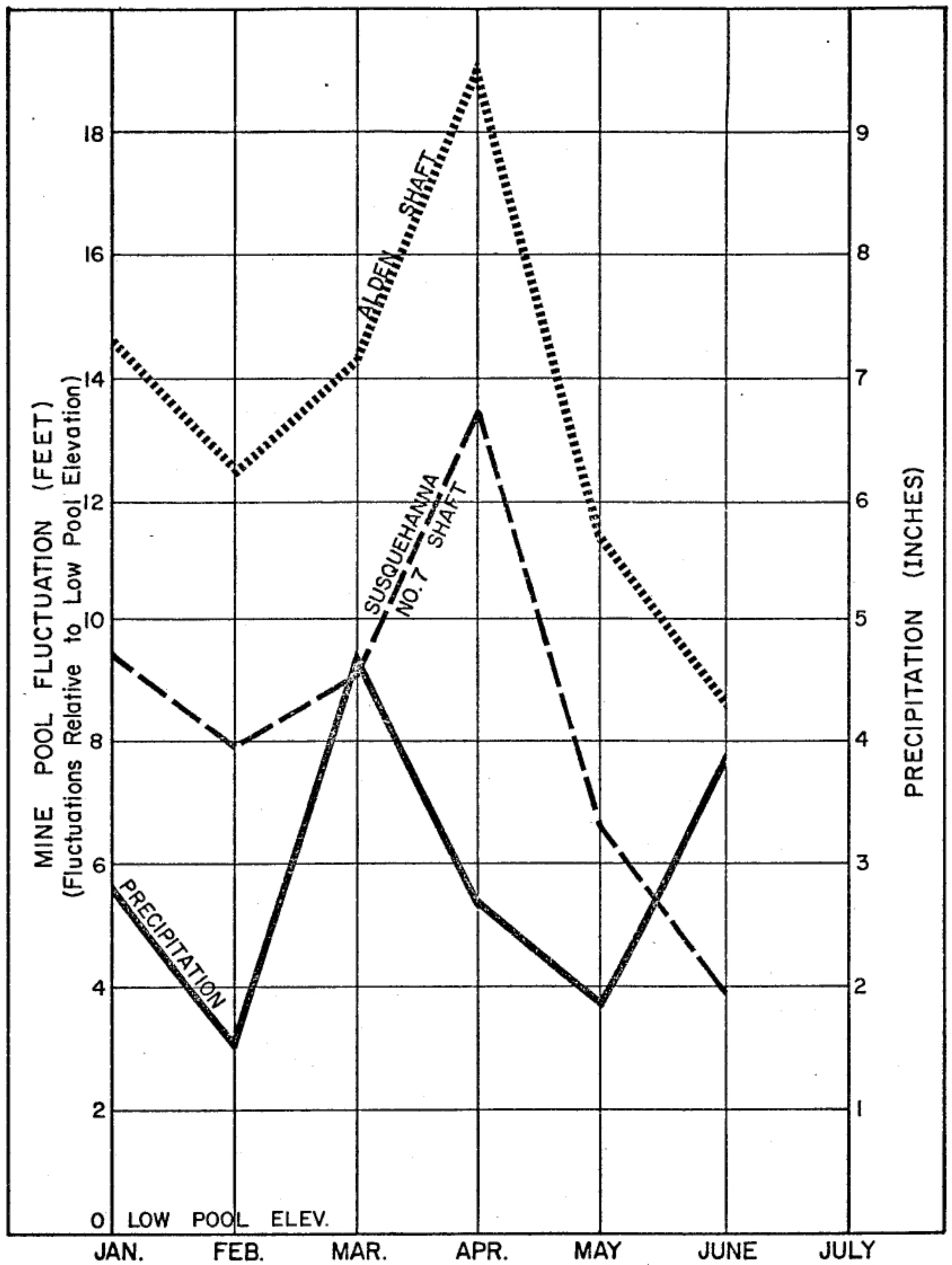
As indicated in previous discussions, interflow between adjacent mine complexes is somewhat controlled by the barrier pillars separating the individual mines. The effectiveness of barrier pillars toward isolating different mine pools is hindered by numerous avenues available for interpool flow. Fracturing, pillar robbing, boreholes, and flow over barrier pillars were all discussed as, probable reasons for flow between adjacent mine pools.

The effective barrier pillar (elevations) are believed to be as follows: 374 feet between the Wanamie and Susquehanna #7 mines, 343 feet between the Wanamie and Alden Mines, 590 feet between the Wanamie and Glen Lyon Mines, and 510 feet between the Stearns and Wanamie mines. The barrier between the Alden and Bliss mines is believed to be breached and the discharge point is not within the Newport Creek Watershed boundary. Examination of the mean pool levels shows that all of the pool elevations are above the effective barrier pillars. The data also suggests that the Stearns and Wanamie mines have a common pool, and that flow between the Glen Lyon and Wanamie mines is restricted. However, past history indicates that water does seep through permeable alluvial fill overlying these abandoned mines. Engineers for the Glen Alden Corporation reported that when the Glen Lyon mine water pool levels rose above 620 feet in April, 1964, seepage into the Wanamie No. 19 mine increased rapidly. The inflow exceeded pump capacities, flooding the No. 3 slope pump station. About 250 million gallons were pumped from the area during a two-week period to restore the pumping station to its former operating condition.



Low Pool Elev. 527.70 – Susquehanna (Nanticoke) No. 7 Shaft
557.25 – Alden Shaft

MINE POOL vs. PRECIPITATION
1973



Low Pool Elev. 527.70 – Susquehanna (Nanticoke) No. 7 Shaft
557.25 – Alden Shaft

MINE POOL vs. PRECIPITATION
1974

It is apparent that strata above the various barrier pillars does in many instances act as a restrictive barrier. If this were not the case, mine pools would never rise to elevations significantly greater than the effective barrier pillars. Seepage may occur between the Wanamie and Susquehanna #7 mines. The difference between pool elevations in these two mines may reflect a seepage rate from the Wanamie that is less than the Susquehanna #7 discharge rate. It is also possible that the higher pool elevation in the Wanamie is providing the hydraulic head for the Susquehanna #7 discharge.

Most of the mine pools were being affected by pumping during the initial ten months of the study. Water was being pumped intermittently from the Glen Lyon mine for extinguishing a mine refuse bank fire. Some of this water was returned to the deep mine while the balance was lost via infiltration and some turned to steam. The Glen Nan, Wanamie and Stearns mine pools were probably all influenced by the two pump stations employed to prevent flooding of active workings in the Glen Nan mine. In addition to drawing water from these mine complexes, the Glen Nan pumps were probably receiving flow from saturated sediments beneath the Susquehanna River. This could explain the fact that the flow recorded at monitoring station N1 was 2 cfs more than expected (considering 50% evapo-transpiration losses). Since the Glen Nan deep mine has been abandoned and the mine pumps are no longer operating, the hydrologic conditions have been altered with the Newport Creek Watershed and associated abandoned deep mines.

The North Branch Newport Creek received almost all of its flow from the mine pumps. During the final two sampling rounds, zero flow was recorded at station N2, rend only 5.51 cfs was recorded at station N1 .

This minimal surface flow will continue for an unknown period of time while infiltrating waters gradually inundate the Glen Nan workings. It is inevitable that eventually the Glen Nan mine pool will discharge by gravity. Due to the existence of permeable glacio-fluvial deposits the mine waters may flow in this subsurface material until reaching a lower surface elevation, providing for surface discharge. The potential discharge point may occur between monitoring stations F2 rend N3.. However, numerous unknown parameters, such as the nature of barrier pillars and the thickness of glacio-fluvial deposits, only allow for speculation as to the exact point of discharge. Another future occurrence may be the appearance of mine pools in existing abandoned open strip mines. If larger stripping equipment is brought into the area to provide deeper stripping capabilities, the mining operations should intersect deep mine pools. The mine. operators will probably attempt to strip through the water because pumping rend treatment will be very costly.

Regardless of future discharges and improvements in the water quality, the immediate concern should be to reduce the influx of surface water into abandoned deep mines. Preventing water from entering the deep mines will lessen the formation of pollutants, rend the added surface flow will dilute existing mine drainage and sewage pollution. Low flow conditions cause stagnation of sewage waters, resulting in unpleasant rend unsanitary conditions.

EVALUATION OF POLLUTION SOURCES

All major pollution sources were located rend sampled during reconnaissance rend detailed field exploration. Sampling stations were strategically located to enable accurate evaluation of individual pollution sources. Pollution sources were evaluated to determine the extent of mine drainage degradation on receiving tributaries rend main branch streams. The number of stream miles affected by mine drainage was calculated. In addition, the quantity and quality of surface waters entering deep mines was recorded.

Pollutant loadings were calculated from flow measurement rend sample analysis data collected at each sample station. These data were examined to evaluate pollution sources and degree of stream degradation. The occurrence of any significant amount of unexpected mine drainage constituents was investigated. Affected stream segments were walked with careful examination of stream banks. The pH was recorded at close intervals in an attempt to pinpoint the pollution source.

Information about individual pollution sources was evaluated to determine the best feasible abatement for amelioration of steam degradation. The estimated costs and anticipated benefits derived from individual abatement projects are listed. Priorities have been assigned to the various abatement projects.

At the time of this report, approximately 3.6 miles of stream within the Newport Creek Watershed were affected by mine drainage. Prior to cessation of mine pumping another 3.6 miles of the North Branch Newport Creek were also affected by mine drainage. Approximately 1.9 miles of the North Branch Newport Creek are presently receiving intermittent mine drainage pollution. However, this entire flow is lost through streambed infiltration before joining Newport Creek.

The major sources of mine drainage pollution were eliminated, at lease for the near future, when mine pumping stopped. Pump discharges at sampling stations F2 and N5 contributed 45,000 and 21,000 pounds per day acid respectively to the North Branch Newport Creek. The principal sources of mine drainage under present flow conditions are the Susquehanna #7 gravity discharge and the refuse piles, (No. 134 and 136) adjacent to the Wanamie Reservoir discharge and the South Branch Newport Creek.

The Susquehanna #7 discharge was easier to define as a result of
low flows recorded in May and June. During this period about 3,500 pounds per day of acid was being discharged directly to Newport Creek and to the sewage flow monitored at Station NS1. Thus, the Susquehanna #7 deep mine contributed 73 percent of the total acid loading within the Newport Creek Watershed in May and June. Data from the first ten sampling rounds indicates that the acid loading may reach 12,000 to 15,000 pounds per day during high flow conditions. Since the gravity discharge points occur near the mouth, the Susquehanna #7 discharge has very little affect on the water quality of most of Newport Creek and its tributaries.

Most of the mine drainage pollution recorded at sample station M5 can be attributed to the massive refuse piles (No. 134 and 136) associated with the abandoned Wanamie #18 and Alden deep mines. A portion of the seepage from these refuse piles was monitored at sample stations M9, P4, S10 and S11 . It is apparent that additional seepage is occurring between stations S1 1 and M5, however, no definitive drainage could be located for flow and quality monitoring. Approximately 1,700 pounds per day of acid, 200 pounds per day of iron and 1,800 pounds per day of sulfates were contributed to the South Branch Newport Creek by these refuse piles. Therefore, this pollution source accounts for the following percentage of the pollutant loadings recorded for the South Branch Newport Creek at sample station Ml: 81 percent of the acid loading; 89 percent of the total iron loading; and 61 percent of the sulfates loading.

Abatement projects were not proposed for the Susquehanna #7 gravity discharge and Wanamie and Alden refuse piles. The only feasible method for ameliorating pollution from the Susquehanna #7 discharge (average flow 5.3 cfs with 300 ppm acidity) is to treat the water. Treatment represents a high capital investment (approximately $2 million) plus a continuous operation cost (from $124,000 to $450,000 per year) which is usually undesirable (reference 18). Effective abatement of mine drainage from the Wanamie and Alden refuse piles would require removal of the refuse material or extensive regrading with trucking of topsoil to support vegetation. Limited space for regrading and reducing the refuse slopes combined with high costs and private ownership of the refuse are some of the reasons why abatement is not deemed feasible at the present time.

But, the increasing demand for new sources of energy and rising coal prices may lead to reprocessing of these and other refuse piles. Subsequent reclamation should ameliorate the pollution problems.