

II SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. There are about 1,700 miles of streams within the Youghiogheny basin in Pennsylvania. From stream surveys conducted during times of relatively low stream flows, the number of miles of streams, within the major sub-basins, polluted by coal mine drainage was found to be:

Stream miles

<u>Sub- basin</u>	<u>Acid &amp; Iron</u>	<u>Acid only</u>	<u>Iron only</u>	<u>Total</u>
Youghiogheny, main stem	7	-	21	28
Sewickley Creek	30	-	13	43
Jacobs Creek	4	-	4	8
Indian Creek	5	2	5	12
Casselman River	<u>31</u>	<u>23</u>	<u>15</u>	<u>69</u>
	77	25	58	160

Polluted streams are listed on page V-2 and shown on a map on page V-3. Heavy rainfalls and quick thaws periodically cause higher rates of pollutant flush-outs which increase the extent of stream pollution to an estimated 250 mi of polluted streams.

2. Mine drainage pollution was traced to 59 major discharges consisting of an individual mine drainage discharges or streams which are essentially composed of mine drainage from several discharges. The major pollution sources are primarily abandoned coal mines listed On page V-10. Their total pollutant loads by sub-basin are:

<u>Sub-basin</u>	<u>lbs/day</u>	
	<u>Net Acid</u>	<u>Iron</u>
Youghiogheny, main stem	26,200	12,720
Sewickley Creek	73,780	19,610
Jacobs Creek	810	140
Indian Creek	13,510	1,230
Casselman River:		
Coal Run - Shaw Mines	18,900	4,630
Other	<u>9,930</u>	<u>1,880</u>
	143,130	40,210

Shaw Mines-Coal Run area is being investigated by others and is not within the scope of this report. Loads shown for this area are from our samples of main discharges taken to account for loads in the Casselman

3. Active mining operations were, at the time of sampling in 1969 and 1970, associated with, or responsible for some 30% of the pollutant loads as follows:

	<u>lbs/day</u>	
	<u>Net Acid</u>	<u>Iron</u>
Youghiogheny, main stem		
Banning #4 (M 17)	12,600	3,000
Sewickley Creek		
Delmont (M50)	23,200	300
Hutchinson (M13)	<u>11,000</u>	<u>2,990</u>
	46,800	6,290

These discharges have, or soon will be treated or stopped by the mining companies.

4. Pollution sources are grouped into 22 areas located as shown on page IV-2 and which lie within the five major sub-basins of the Youghiogheny basin as follows:

<u>Sub-basin</u>	<u>Area No's.</u>
Youghiogheny, main stem	11-14
Sewickley Creek	22-28
Jacobs Creek	31
Indian Creek	41-43
Casselman River	51-57

Area numbers within each sub-basin are sequenced with the furthest upstream area having the lowest number. These numbered areas are also referred to as project areas and the numbers correspond to Figure numbers in Section VI which outlines conceptual plans for abatement works recommended for each project area.

5. An order of priorities is recommended for abatement works based on first assigning a priority to each major sub-basin and then a priority for each project area within the sub-basin.

The highest sub-basin priority is assigned to Indian Creek, above the reservoir, since there is need to further protect an existing water supply reservoir from mine drainage pollution. The lowest priority is assigned Indian Creek, below the reservoir, since the recommended abatement is neutralization which entails continuing operating costs. Other sub-basins are judged on the basis of the total of acid loads from individual sources versus estimated costs of recommended work. The recommended sub-basin priority order is:

	Net Acid <u>lbs/day</u>	Estimated Abatement <u>Works</u>	Ratio <u>\$/Acid</u>
A Indian Creek (above)	4,640	\$ 594,000	128
B Sewickley Creek	50,580	790,000	16
C Youghiogheny, main stem	13,700	955,000	70
D Casselman River	9,930	1,259,000	127
E Jacobs Creek	810	130,000	160
F Indian Creek (below)	<u>8,200</u>	<u>50,000</u>	6
	87,860	\$3,778,000	

Acid loads and costs listed do not include the Coal Run-Shaw Mines area or loads from the active operations at Banning #4 and Delmont. However, acid from Hutchinson is included since it is believed mining could soon stop at this site and the State might then have responsibility for any abatement work. The Hutchinson discharge is discussed on pg VI-35.

Within each sub-basin, priorities are recommended for project areas based on consideration of; source pollution load, estimated cost of abatement work and improvements expected in the receiving stream and downstream waters. The recommended order of priority is listed in page II-4 with source pollution loads, type of abatement work recommended and order of magnitude cost estimates for the work.

Table II-A, Summary of Recommended Abatement Works

		Refer Area/pg	Net Acid lbs/day	Iron lbs/day	Recommended Work (Refer Section VI)	Estimated Costs	Priority
<u>Indian Creek</u>							
A1	Melcroft Complex:						
	-Melcroft # 3	42/VI-45	4,480	200	50 acre refuse pile reclamation, 2 hydraulic seals, lime injection	\$286,000	A1
	-Melcroft # 1	42/VI-47	1,080	100	2 hydraulic seals, grout curtain, lime injection	155,000	A1
A2	Poplar Run	43/VI-52	140	20	1 hydraulic seal, 1 surface seal, strip mine reclamation	133,000	A2
A3	L. Champion Cr	41/VI-43	20	-	1 hydraulic seal	20,000	A3
F1	Flume Discharge	42/VI-51	8,200	1,050	In-stream neutralization w/operating cost \$94,000/yr	50,000	F1
<u>Sewickley Creek</u>							
B1	Buffalo Run	25/VI-29	6,600	680	1 hydraulic seal	35,000	B1
B2	Marchand	28/VI-37	12,000	5,170	1 hydraulic seal	80,000	B2
B3	Jacks Run	23/VI-23	7,200	1,260	1 hydraulic seal, 3 surface seals	50,000	B3
B4	Brinkerton Overflow	22/VI-19	10,240	8,040	5 hydraulic seals, grout curtains	360,000	B4
B5	Fayette Anticline	26/VI-32	3,540	500	5 hydraulic seals, grout curtain	185,000	B5
B6	Hutchinson	27/VI-35	11,000	2,990	By mine operator, discharges will stop when mine shuts	-	B6
B7	Wilson Run	24/VI-26	-	670	2 hydraulic seals, 2 surface seals	80,000	B7
<u>Youghiogheny, main stem</u>							
C1	Galley Run	11/VI-8	7,290	420	6 hydraulic seals, backfill subsidence, grout curtain	470,000	C1
C2	Warden Mine Area	13/VI-13	1,200	1,020	3 hydraulic seals	55,000	C2
C3	Adelaide Station	12/VI-10	4,980	6,040	2 hydraulic seals, grout curtain	245,000	C3
C4	Guffey Station	14/VI-16	130	2,200	8 hydraulic seals,	185,000	C4
<u>Casselman River</u>							
D1	Pen Mar Mines	51/VI-54	1,250	440	1 hydraulic seal	50,000	D1
D2	Goodtown Area	52/VI-57	1,350	390	5 hydraulic seals, 4 surface seals	152,000	D2
D3	Shober	53/VI-60	610	310	4 hydraulic seals,	120,000	D3
D4	Ponfeigh Mine Area	54/VI-62	4,240	490	2 hydraulic seals, surface water diversion	290,000	D4
D5	Wilson Creek	56/VI-70	1,290	50	3 hydraulic seals, backfill subsidence	175,000	D5
D6	Rockwood	57/VI-73	60	60	5 hydraulic seals, grout curtain	200,000	D6
D7	Shamrock	55/VI-65	1,130	140	8 hydraulic seals, 1 surface seal, strip mine & refuse pile reclaim	272,000	D7
<u>Jacobs Creek</u>							
E1	Stauffer Run	31/VI-40	810	140	6 hydraulic seals, 4 surface seals	130,000	E1

6. Preventive type recommended abatement works include: mine sealing, surface restoration, surface water diversion and blending favorable streams.

Neutralization treatment, entailing continuing operating costs, has been evaluated as an alternative to preventive works for certain discharges and should be used only where necessary after carrying out the recommended preventive works. As an exception, neutralization treatment is recommended for the Indian Creek flume discharge since sealing this discharge would likely cause leakage from the flume system that would endanger an existing water supply reservoir.

7. No sewage treatment plant or existing mine drainage treatment plant is sufficiently large or close to any of the polluting discharges from abandoned workings to justify combined treatment. Also, there is sufficient good quality water throughout the area such that treatment of mine drainage for water supply purposes is not believed necessary.
8. Geology of the watershed is discussed in Section IV. The five large syncline basins believed to contain large pools of mine water, should each be considered as a whole in evaluation of individual abatement works for discharges from pools.
9. Sulfate, although not in itself a definer of mine drainage pollutions, is a characteristic of acid mining drainage useful in tracing the source of such pollution. Sulfate load at the mouth of the Youghiogheny was found to be 253 tons/day at a concentration of 140 mg/l. Assuming 20 mg/l or 36 tons/day is natural background, not attributable to polluting mine drainage, the estimated maximum from mine drainage is about 217 tons/day. Of this, 171 tons/day or about 80% has been traced to the 59 sources listed on pg V-10.