

V STREAM QUALITY AND
POLLUTION SOURCES

An extensive stream survey including gauging, sampling and chemical analyses was conducted in May, June and October, 1969 and July 1970. Data collected, sampling location maps and analytical procedures are included in, Appendix B.

Survey data were used with data previously reported by State and Federal agencies to define extent, degree and sources of mine drainage pollution. Criteria used to determine whether a stream is polluted by mine drainage are:

- acid stream; acidity exceeding alkalinity and pH below 6.0, and

- iron stream; total iron higher than 1.5 mg/l

Table V-A lists the length of streams polluted by acid and iron. For information purposes, this table also includes streams containing over 250 mg/l of sulfate. Such sulfate content is not in itself a definer of polluted water but it does lessen the desirability for industrial or potable supply purposes and within the Youghiogheny basin it indicates that a stream is adversely affected by mine drainage.

Exhibits 2 through 7 follow Table V-A and show extent, sources and degree of mine drainage pollution.

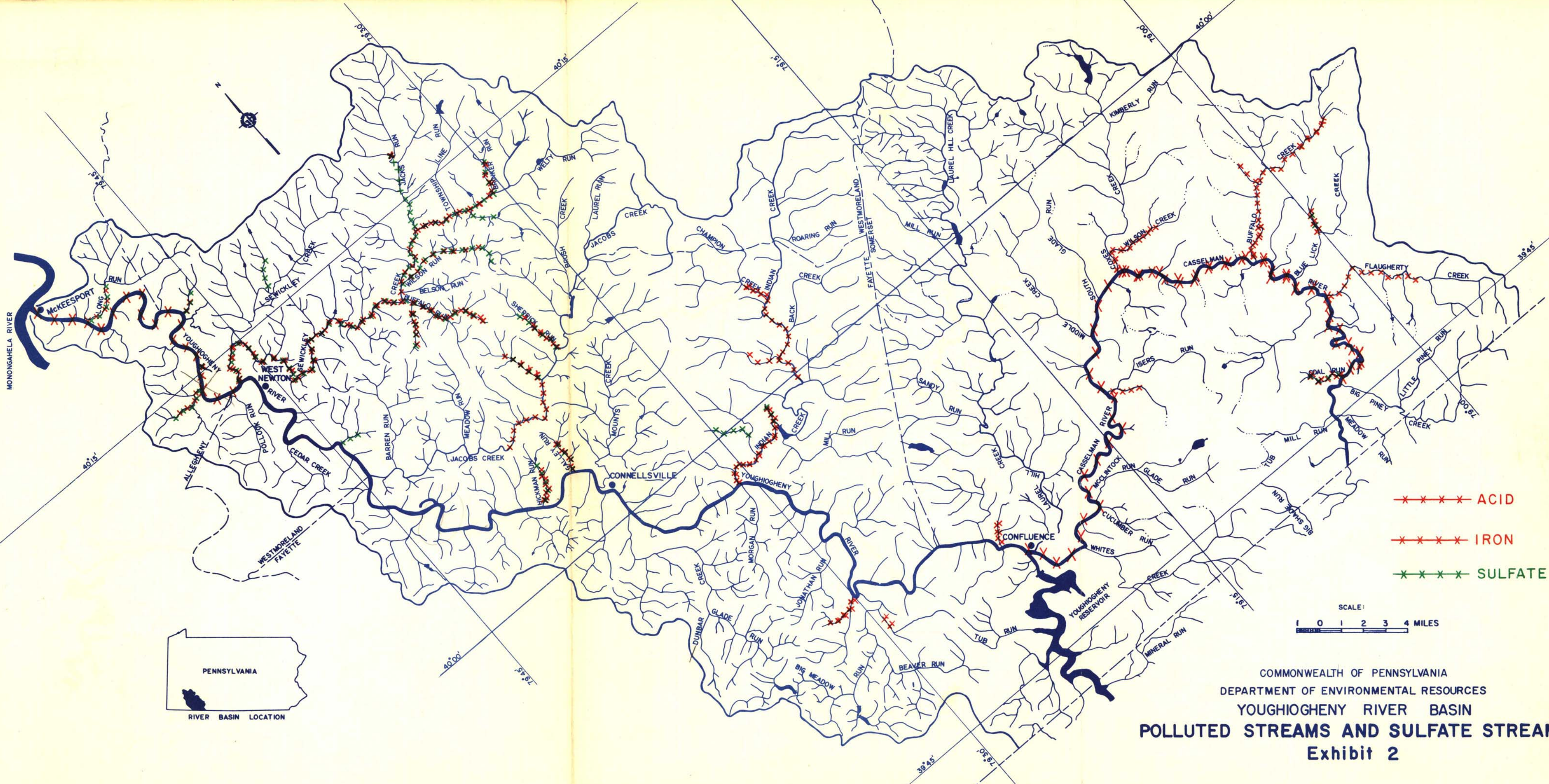
Exhibit 2 is a stream map showing location and extent of polluted streams and sulfate streams.

Exhibits 3,4, 5, and 6 are schematic materials balance diagrams showing respectively, acid, iron, sulfate and hardness loads in the river system and points of input. Flows and loads change seasonally and from day to day. These diagrams show typical loadings for a 1969 summer day and were developed from samples collected at different times. Because of such time differences the development of generalized balances required adjustment of data from fewer than 10% of the sampling stations. Adjusted data are listed in Appendix B.

Exhibit 7 shows concentration variations along stream lengths.

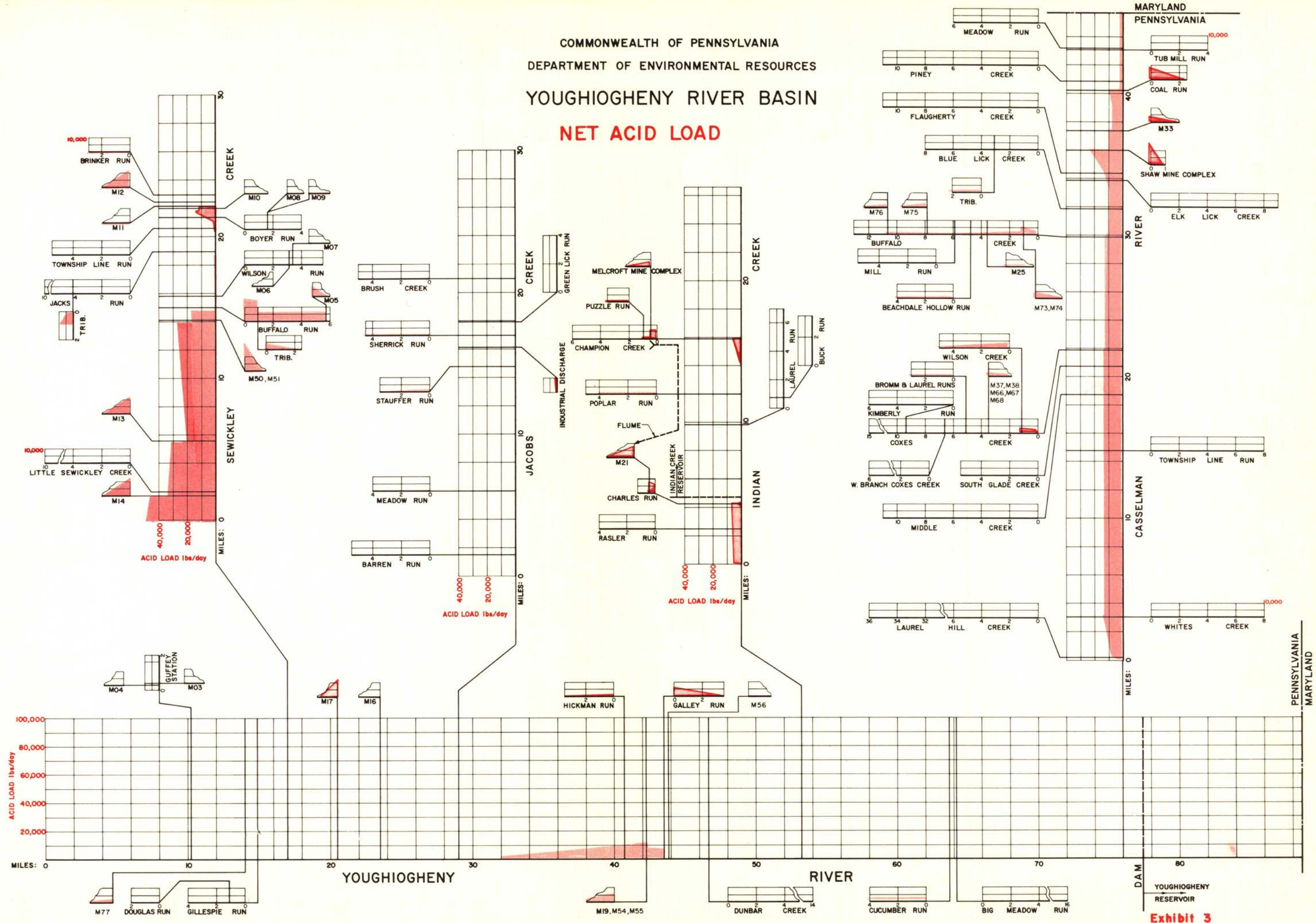
Table V-A, Polluted Streams and Sulfate Streams

	Polluted		
	<u>Acid, Miles</u>	<u>Iron, Miles</u>	<u>Sulfate, Miles</u>
YOUGHIOGHENY MAIN STEM	-	17	-
Long Run	-	2	2
Guffey Station	-	0.5	0.5
Unnamed Tributary	0.4	0.4	0.4
Gillespie Run	-	1.5	1.5
Hickman Run	2	2	2
Galley Run	2	2	2
Cucumber Run	1	1	-
Laurel Run	0.5	0.5	-
Unnamed Tributary	1	1	-
SEWICKLEY CREEK	19	23	23
Buffalo Run	7	7	7
Tributary to Buffalo Run	2	2	2
Wilson Run	-	4	4
Jacks Run	-	4	5.5
Trib to Jacks Run	0.5	0.5	0.5
Boyer Run	-	1	1
Brinker Run	1	1	1
JACOBS CREEK	-	4	-
Stauffer Run	2	2	2
Sherrick Run	2	2	2
INDIAN CREEK	4	9	-
Tributary to Rasler Run	-	-	2
Charles Run	0.5	0.5	0.5
Poplar Run	2	-	-
Champion Creek	1	1	-
Puzzle Run	0.1	0.1	-
CASSELMAN RIVER	41	30	-
Townshipline Run	-	2	-
Coxes Creek	1	1	-
Wilson Creek	3	3	-
Buffalo Creek	3	11	-
Beachdale Hollow Run	2	-	-
Tributary to Blue Lick Cr	1	1	-
Trib to Casselman	0.5	0.5	-
Flaugherty Creek	-	5	-
Coal Run	2	2	2
	TOTAL	<u>102</u>	<u>61</u>

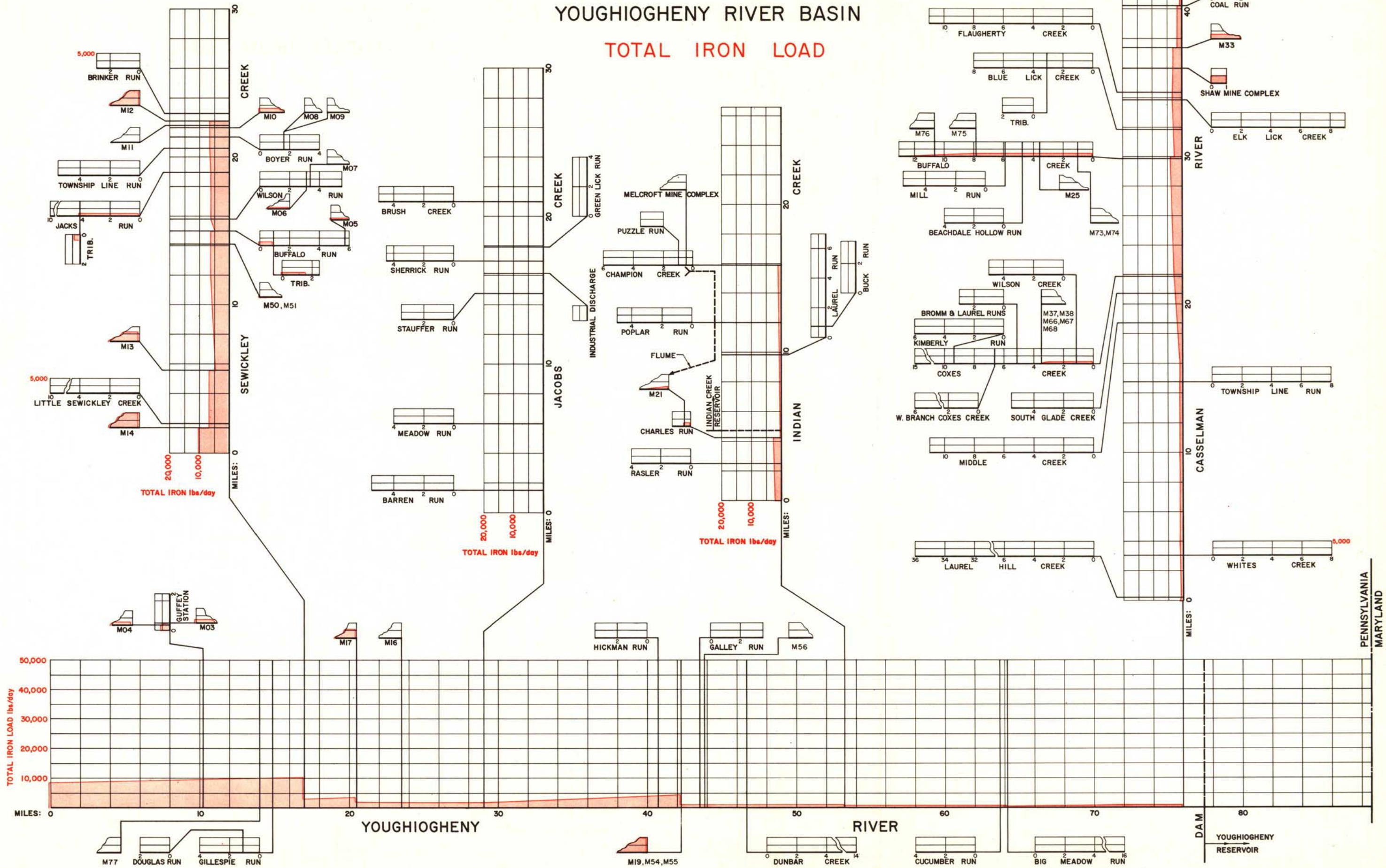


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 YOUGHIOGHENY RIVER BASIN
POLLUTED STREAMS AND SULFATE STREAMS
 Exhibit 2

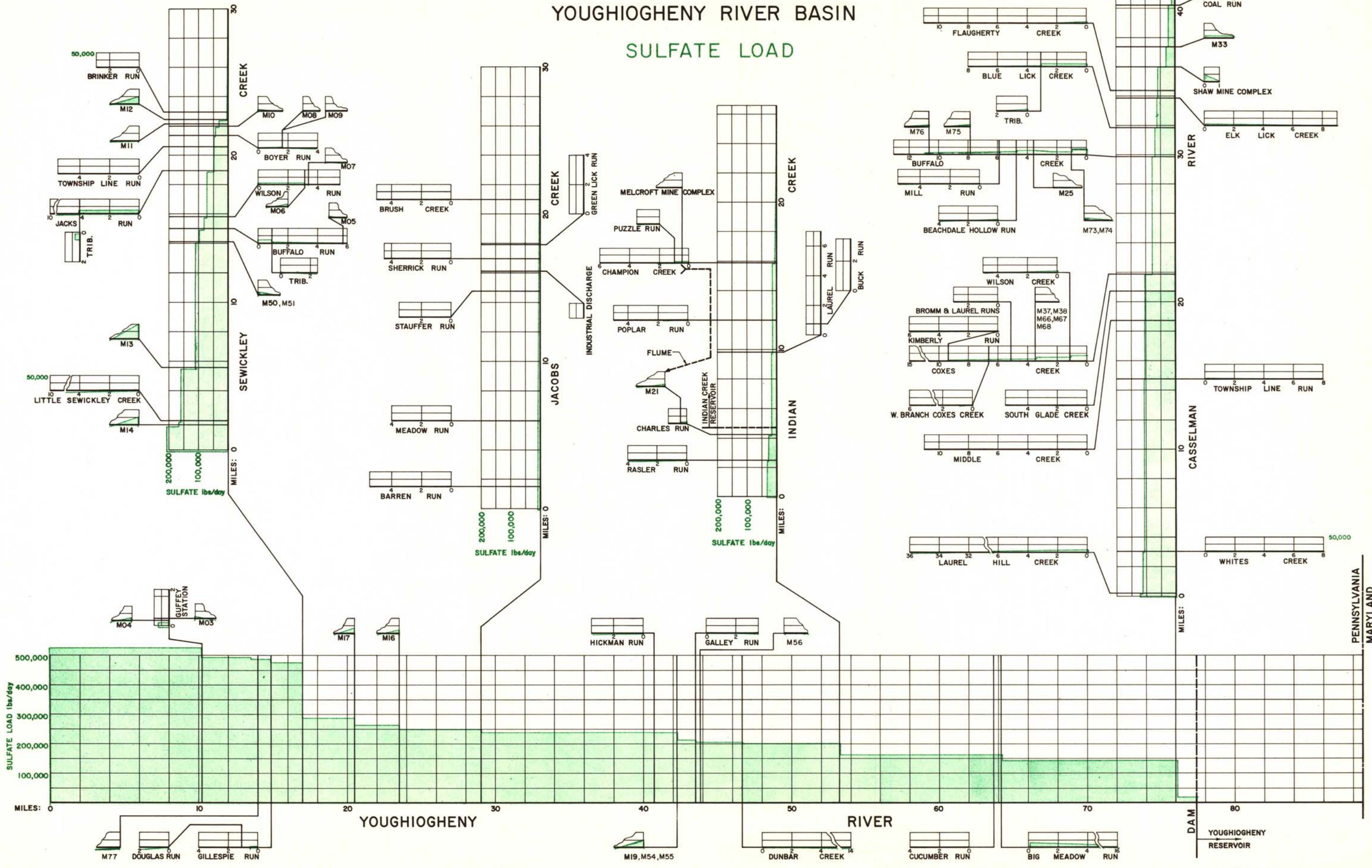
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 DEPARTMENT OF ENVIRONMENTAL RESOURCES
 YOUGHIOGHENY RIVER BASIN
NET ACID LOAD



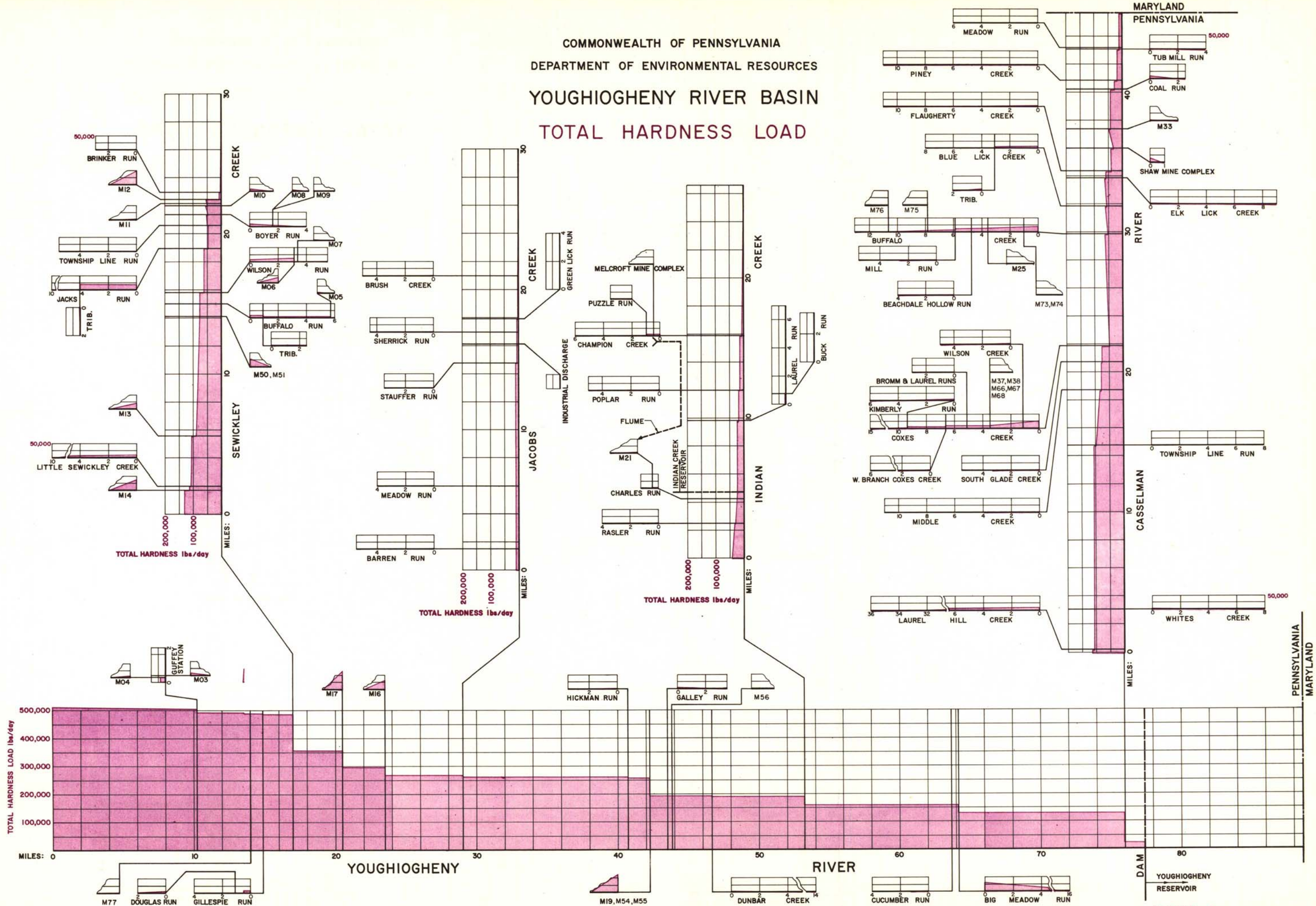
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 YOUGHIOGHENY RIVER BASIN
TOTAL IRON LOAD

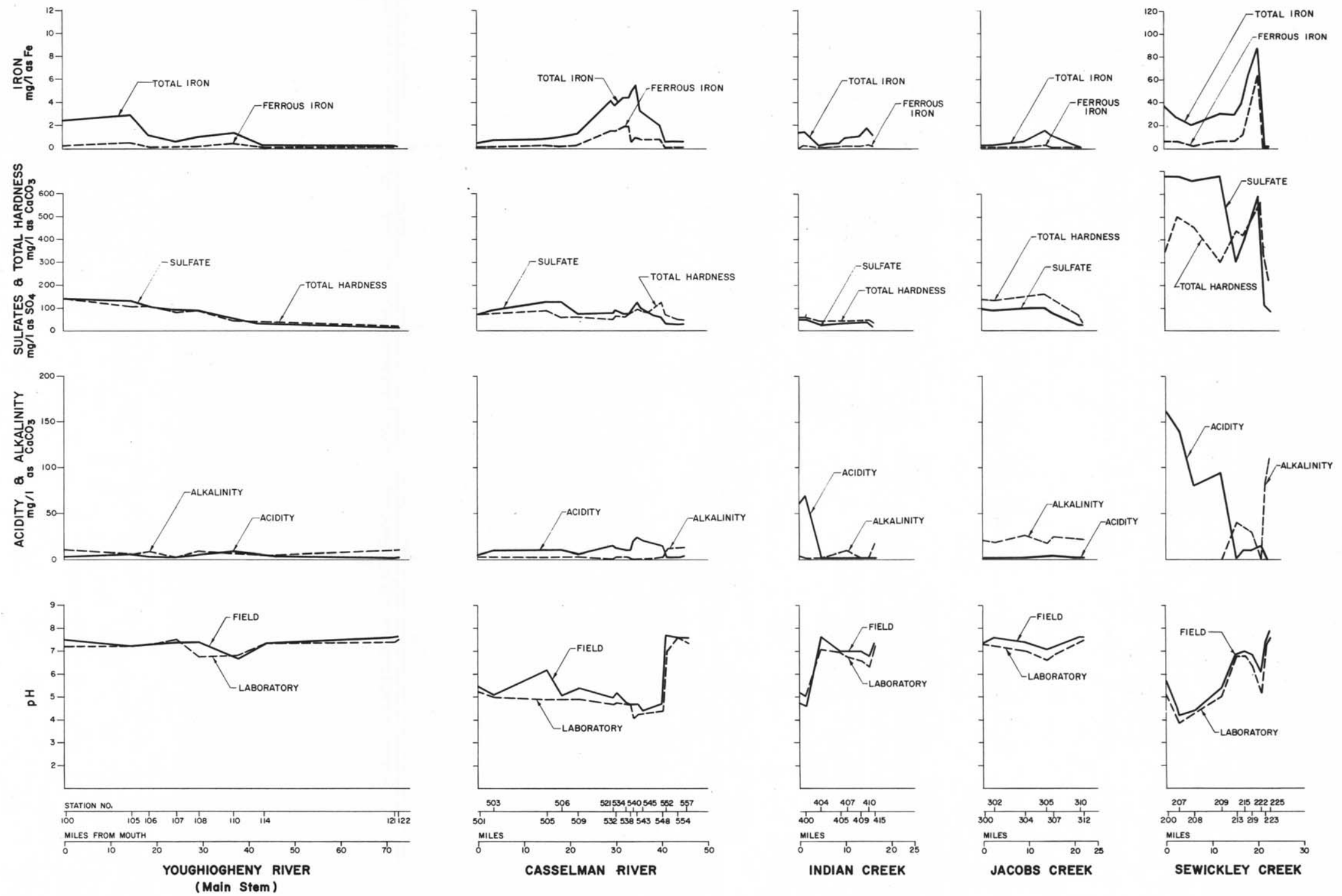


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 YOUGHIOGHENY RIVER BASIN
 SULFATE LOAD



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 YOUGHIOGHENY RIVER BASIN
 TOTAL HARDNESS LOAD





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 YOUGHIOGHENY RIVER BASIN
 CONCENTRATION PROFILES
 OF
 STREAM QUALITY

Reference numbers for stream sampling stations, mine discharges and pollution source areas are referred to and shown on exhibits. These were assigned as follows:

stream sample stations are 3 digit numbers starting downstream and with a separate series for each major sub-basin;

mine discharge sample stations are preceded by M; the numbering order corresponds to order of discovery during our field surveys; these are tabulated in Appendix A. for cross reference.

pollution source area numbers are 2 digit numbers starting from upstream and with a separate series for each sub-basin. Figures in Section VI are numbered to correspond with the areas covered.

physical feature inventory numbers are four digit numbers with the first 2 digits corresponding to the area numbers of the physical feature.

<u>Sub-basin</u>	<u>Areas</u>	<u>Stream Sample Stations</u>	<u>Physical Feature Inventory Numbers</u>
YoughioghenyR	11-14	100-123	1101-1413
Sewickley Cr	22-28	200-226	2201-2806
Jacobs Cr	31	300-312	3101-3116
Indian Cr	41-43	400-415	4101-4317
Casselman R	51-57	500-557	5101-5712

1. MINE DRAINAGE POLLUTION SOURCES

Pollution sources which were founded are listed in Table V-B. These are grouped by sub-basin and within each group the furthest upstream source is listed first.

Effects of the various sources on receiving streams are discussed in the following pages of Section V.

Abatement works for each source are discussed in Section VI.

Table V-B, Mine Drainage Pollution Sources

A.	Receiving Stream	Area		Mine Source	Load, lbs/day			Discharge No.	Related Geologic Structure
		Location	No.		Net Acid	Iron	Sulfate		
	<u>Youghiogheny Main Stem</u>								
	Youghiogheny	Galley Run	11	Henry Clay	390	180	4100	M56	Uniontown Syn
	Galley Run	Galley Run	11	Tip Top	270	50	400	M59	Uniontown Syn
	Galley Run	Galley Run	11	Tip Top	380	30	800	M58	Uniontown Syn
	Galley Run	Galley Run	11	Rist	400	50	500	M57	Uniontown Syn
	Galley Run	Galley Run	11	Henry Clay	5850	110	2500	M20	Uniontown Syn
	Youghiogheny	Adelaide Station	12	Adelaide	3700	5300	27,600	M19	Uniontown Syn
	Youghiogheny	Adelaide Station	12	Adelaide	540	540	4200	M54	Uniontown Syn
	Youghiogheny	Adelaide Station	12	Fort Hill	740	200	3000	M55	Uniontown Syn
	Youghiogheny	Banning	-	Banning #4	(-)1700	40	16,000	M16 (3)	Irwin Syn
	Youghiogheny	Banning	-	Banning #4	12,600	3000	24,100	M17	Irwin Syn
	Douglas Run	Warden	13	Warden	(-)450	20	300	M01	Pigeon Creek Syn
	Gillespie Run	Warden	13	Warden	(-)3000	800	10,000	M02	Pigeon Creek Syn
	Youghiogheny	Warden	13	Ocean #2	1200	200	5000	M77	Pigeon Creek Syn
	Unnamed Trib	Guffey Station	14	Shaner	130	1200	16,000	M03	Irwin Syn
	Unnamed Trib	Guffey Station	14	Guffey	(-)3200	1000	14,300	M04	Irwin Syn
				Sub-total	26,200	12,720	128,800		
B.	<u>Sewickley Creek</u>								
	Sewickley Creek	Brinkerton	22	Brinkerton	8400	6000	26,800	M12	Latrobe Syn
	Sewickley Creek	Brinkerton	22	Brinkerton	1640	140	2100	M11	Latrobe Syn
	Sewickley Creek	Brinkerton	22	Hecla #1	(-)3000	1600	7000	M10	Latrobe Syn
	Boyer Run	Brinkerton	22	Hecla #1	(-)1400	250	2800	M19	Latrobe Syn
	Boyer Run	Brinkerton	22	Hecla #1	200	40	500	M08	Latrobe Syn
	Trib to Jacks Run	Jacks Run	23	Greensburg #2	7200	1260	9500	M32	Greensburg Syn
	Wilson Run	Wilson Run	24	Stewart	(-)450	30	1600	M07	Latrobe Syn
	Wilson Run	Wilson Run	24	Central	(-)580	640	8400	M06	Latrobe Syn
	Buffalo Run	Buffalo Run	25	Southwest #3	6600	680	4300	M05	Latrobe Syn
	Buffalo Run	Fayette Anticline	26	Ella	40	20	50	M52	Fayette Anticline
	Sewickley Creek	Fayette Anticline	26	Greensburg #4	3500	480	6500	M51	Fayette Anticline
	Sewickley Creek	Fayette Anticline	26	Delmont	23,200	300	9900	M50	Fayette Anticline
	Sewickley Creek	Hutchinson	27	Hutchinson	11,000	2990	49,600	M13	Irwin Syn
	Sewickley Creek	Marchand	28	Marchand	12,000	5170	28,300	M14	Irwin Syn
				Sub-total	73,780	19,610	157,350		

Table V-B, Con't

C.	Receiving Stream	Area		Mine Source	Load, lbs/day			Discharge No.	Related Geologic Structure
		Location	No.		Net Acid	Iron	Sulfate		
	<u>Jacobs Creek</u>								
	Stauffer Run	Stauffer Run	31	Alverton	590	110	800	M62	Latrobe Syn
	Stauffer Run	Stauffer Run	31	Alverton	220	30	280	M63	Latrobe Syn
				Sub-total	810	140	1080		
D.	<u>Indian Creek</u>								
	L. Champion Creek	L. Champion Cr	41	Coffman	20	-	30	M60	Ligonier Syncline
	Champion Creek	Melcroft Complex	42	Melcorft #1	20	-	140	M48	Ligonier Syncline
	Champion Creek	Melcroft Complex	42	Melcroft #1	1000	100	1000	M47	Ligonier Syncline
	Champion Creek	Melcroft Complex	42	Melcroft #1	60	-	100	M43	Ligonier Syncline
	Champion Creek	Melcroft Complex	42	Melcroft #3	70	-	140	M46	Ligonier Syncline
	Champion Creek	Melcroft Complex	42	Melcroft #3	4000	60	500	M22	Ligonier Syncline
	Flume System	Melcroft Complex	42	Melcroft #3	100 (1)	20 (1)	40 (1)	M23	Ligonier Syncline
	Flume System	Melcroft Complex	42	Melcroft #3	20 (1)	50 (1)	20 (1)	M24	Ligonier Syncline
	Charles Run	Melcroft Complex	42	Flume Discharge	8200	1050	9900	M21	Ligonier Syncline
	Poplar Run	Poplar Run	43	Marston	140	20	200	M61	Ligonier Syncline
				Sub-total	13,510	1230	12,010		
E.	<u>Casselman River</u>								
	Casselman River	Coal Run (2)	-	Unknown	2700	550	3200	M30, M31	Berlin Syn
	Casselman River	Shaw Mines (2)	-	Unknown	4840	1100	4550	M33	Berlin Syn
	Casselman River	Shaw Mines (2)	-	Unknown	11,360	2980	19,120	M26	Berlin Syn
	Buffalo Creek	Pen Mar Mines	51	Pen Mar #2	1250	440	2300	M76	Berlin Syn
	Buffalo Creek	Goodtown	52	Several	1350	390	3900	M75	Berlin Syn
	Buffalo Creek	Shober	53	Shober, Mt. Valley #2	510	230	610	M25	Berlin Syn
	Buffalo Creek	Shober	53	Mt. Valley #2	100	80	770	M34	Berlin Syn
	Buffalo Creek	Ponfeigh Mines	54	Ponfeigh #1	4100	490	4200	M74	Berlin Syn
	Buffalo Creek	Ponfeigh Mines	54	Ponfeigh #1A	140	-	1900	M73	Berlin Syn
	Coxes Creek	Shamrock	55	MacGregor #1	50	10	160	M67	Negro Mt. Ant
	Coxes Creek	Shamrock	55	Ruth	110	20	100	M38	Negro Mt. Ant
	Coxes Creek	Shamrock	55	Ruth	970	110	890	M37	Negro Mt. Ant
	Coxes Creek	Shamrock	55	Mary Jeanne	-	No data	-	M66	Negro Mt. Ant
	Coxes Creek	Shamrock	55	Hocking	-	No data	-	M68	Negro Mt. Ant
	Wilson Creek	Wilson Creek	56	Atlantic #2	970	10	350	M70	Negro Mt. Ant
	Wilson Creek	Wilson Creek	56	Fogle	320	40	350	M69	Negro Mt. Ant
	Coxes Creek	Rockwood-Hays	57	Rockwood #1	50	20	230	M71	Centerville Dome
	Coxes Creek	Rockwood-Hays	57	Rockwood #1, Hays	10	40	730	M72	Centerville Dome
				Sub-total	28,830	6510	43,410		
				Total	143,130	40,210	342,650		

(1) Not added into total since loads are included in M21 total.

(2) These areas are not in the scope of this report.

(3) M16 is a discharge from a treatment plant and not a pollution source. It is included here to show sulfate load.

A. Youghiogheny Main Stem

Loads and relative locations of pollution inputs stem sub-basin are shown on Table V-C.

At station 122 upstream of Confluence, the main stem is alkaline and contains little iron. Additional alkalinity is contributed by Laurel Hill Creek (sta. 500) which is only partially offset by acid from the main Casselman R. flow (sta. 501). Below Confluence at sta. 121, the Youghiogheny was found to be alkaline but it could turn acid at times of high flush out from the Casselman.

Big Meadow Run (sta. 119) below Ohiopyle, is not a polluted stream but it adds a high sulfate load most of which originates at mine drainage treatment plants at both Kaiser and Harbinson clay mining operations on Laurel Run, a tributary to Big Meadow Run. Laurel Run above these treatment plants is a small stream polluted with iron and acid, the sources of which were not found.

Acid from Indian Creek (sta. 400) reduces the Youghiogheny alkalinity but does not turn it acid, (sta. 114).

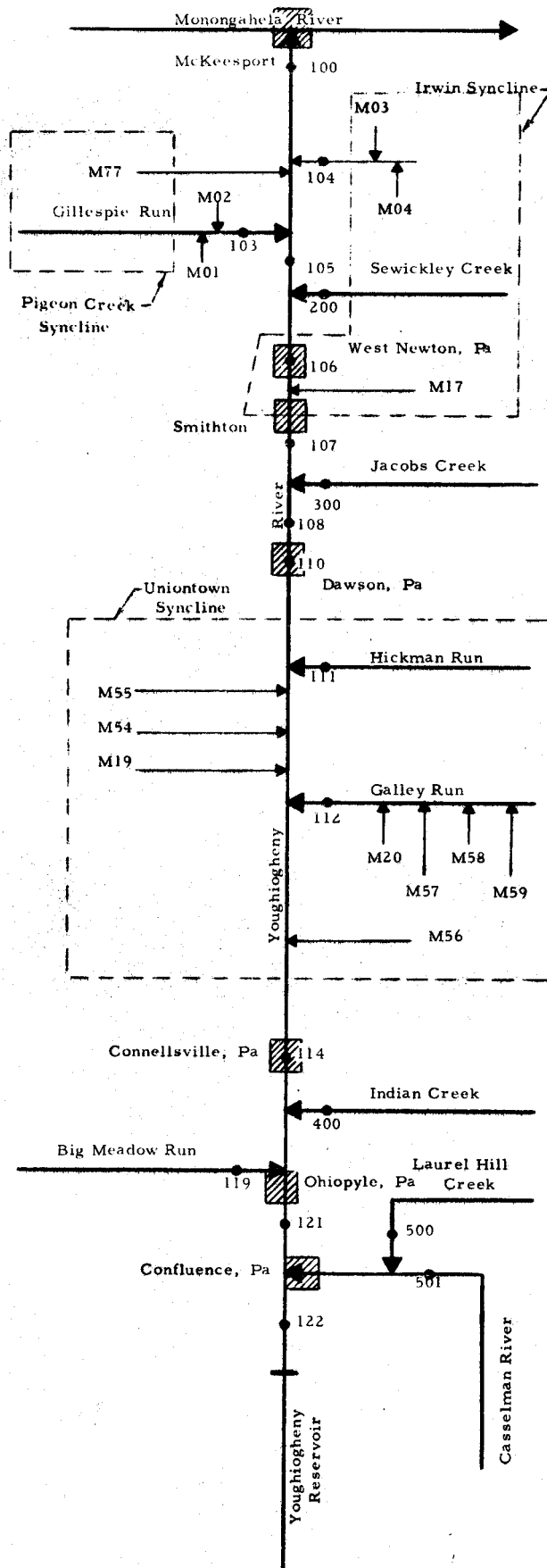
Below Connellsville, inputs from the Uniontown syncline basin add heavy acidity and iron loads sufficient to turn the main stem into an iron polluted stream with 1.5 mg/l iron at sta. 110. The pH at this station was 6.8 so it is not classified as an acid stream. Inputs from the Uniontown syncline are:

Galley Run and vicinity, area No. 11.
M20, M56 from the Henry Clay mine,
M57 from the Rist Mine, and
M58 and M59 from the Tip Top mine.

Adelaide Station, area No. 12;
M19, M54 and M55 from the Adelaide mine.
M19 the largest discharge found, is an artesian flow from a covered drift opening and believed to be the main overflow from a 20 mi long 3 mi wide suspected mine water pool.

Table V-C. Mine Drainage Inputs to the Youghiogheny Main Stem

G&H Station No.	Flow MGD	pH	Tons/day (mg/l)		
			Net Acid	Iron	Sulfate
100	440	7.2	5.5 (3)	4.5 (2.4)	253 (140)
M04	3.2	6.7	-1.6 (-118)	0.5 (38)	7.1 (725)
M03	1.5	6.2	<0.1 (10)	0.6 (95)	2.5 (1222)
104	5.1	6.3	0.2 (10)	1.1 (38)	16.7 (725)
M77	0.8	3.7	0.6 (170)	0.1 (35)	2.5 (740)
M02	1.7	6.6	-1.5 (-220)	0.4 (58)	5 (675)
M01	0.2	6.7	-0.2 (-320)	<0.1 (11)	0.1 (244)
103	2.9	7.4	-2.6 (-216)	0.2 (19)	6.2 (512)
105	430	7.2	0 (0)	5 (36)	228 (129)
200	33	5.0	25 (180)	5 (36)	91 (675)
106	400	7.3	-9 (-5)	2 (1.1)	183 (112)
M16	2.1	7.6	-0.9 (-100)	<0.1 (2.4)	8 (931)
M17	2.4	5.2	6.3 (640)	1.5 (150)	12 (1222)
107	390	7.5	0 (0)	1 (0.6)	154 (96)
300	12	7.2	-0.9 (-18)	<0.1 (0.2)	4.8 (96)
108	420	6.8	-5 (-3)	1.7 (1)	159 (91)
110	400	6.8	3.3 (2)	2.6 (1.4)	136 (82)
111	0.3	3.5	0.3 (280)	<0.1 (5.3)	0.7 (675)
M55	0.3	3.3	0.4 (275)	0.1 (75)	1.5 (1115)
M54	0.7	4.0	0.3 (100)	0.3 (100)	2.1 (775)
M19	5.6	6.2	1.8 (80)	2.6 (115)	13.8 (597)
M59	0.06	3.2	0.1 (500)	<0.1 (99)	0.2 (750)
M58	0.1	3.7	0.2 (350)	<0.1 (25)	0.4 (775)
M57	0.1	3.2	0.2 (500)	<0.1 (63)	0.2 (625)
M20	0.5	4.4	2.9 (1440)	<0.1 (28)	2.2 (612)
112	1.2	3.7	2.5 (500)	0.1 (18)	2.9 (581)
M56	0.4	5.0	0.2 (130)	0.1 (59)	2 (1352)
114	390	7.3	0 (0)	0.6 (0.4)	86 (54)
400	88	4.8	2.5 (69)	0.5 (1.5)	20 (54)
119	33	7.4	-1.3 (-10)	<0.1 (0.4)	10 (75)
121	390	6.7	11 (-7)	0.4 (0.3)	68 (42)
500	70	7.3	-3.2 (-11)	0.2 (0.8)	4.5 (16)
501	170	5.2	1.4 (2)	0.3 (0.5)	52 (75)
122	160	7.3	-6 (-9)	0.1 (0.2)	12 (18)



Galley Run at Broadford, is in effect a channel for polluted mine drainage with pH 3.7, 1,440 mg/l net acidity and 28 mg/l iron. Length of the polluted tributary is 2 mi and the pollution is from discharges M20, M57, M58 and M59 as discussed above.

Hickman Run downstream from the Uniontown syncline is a polluted tributary with both acid and iron. This is polluted for a length 2 mi from its mouth with pH 3.5, 280 mg/l acidity and 5.3 mg/l iron. A specific mine source was not found.

Station 110 at Dawson on the Youghiogheny main stem was found to have iron at 1.4 mg/l, pH 6.7 and net acidity was 2 mg/l. Quality of the main stem at this station reflects inputs from the Uniontown syncline and it probably turns acid and is polluted with iron at times of high flush outs.

At station 108, some 16 mi below 110, iron was 1 mg/l, net acidity (-)3mg/l and pH 6.8. an improvement over station 110. Improvements are attributed to dilution, pick up of alkalinity and fallout of iron.

Jacobs Creek, station 300, comes into the main stem about 8 mi below station 108. Jacobs Creek is alkaline and low in iron and improves the main stem. At station 300, iron was 0.17 mg/l, net acidity (-)18 mg/l and pH 7.2.

Station 107. 4 mi below Jacobs Creek. had 0.6 mg /l iron, 0 net acidity and pH 7. 5. This station should be better than 108 due to Jacobs Creek dilution. Acidity higher than that found at 108 is believed due to different sampling dates.

Below station 107, at Smithton, a small flow of seepage was found from gob piles near abandoned mines in the Dutch Hollow area. This seepage, station M18. was in evidence on only one of several inspections and it is believed present only after heavy rains. When sampled, flow was 0.05 MGD, iron 118 mg/l, net acidity 1,040 mg/l and pH 2.9. This is not listed or shown as a major source since it is believed only rarely present.

Discharges M16 and M17 (Euclid discharge) at Fitz Henry at the south tip of the Irwin syncline are from the active Republic Steel's Banning #4 mine. M16 is effluent from a mine drainage waste water treatment plant. At the time of sampling M17 was an untreated polluting discharge with net acidity 640 mg/l, pH 5.2 and iron 150 mg/l. The mining company had plans underway to treat M17 which should have been implemented by the time of this report. In any event, treatment of M17 is believed the responsibility of the mine operator.

Station 106, below M16 and M17, at West Newton was alkaline with iron 1.1 mg/l, pH 7.3, and net acidity (-)5 mg/l. Treatment of M17 would improve the Youghiogheny at station 106 and reduce its iron content.

Sewickley Creek, station 200, comes into the main stem at Gratztown, about 17 mi above the mouth. This tributary adds heavy acid and iron loads which make the Youghiogheny an iron polluted stream to its mouth and during higher flush outs may frequently turn it into an acid stream. Station 105, 2 mi below Sewickley Creek, had; pH 7.2., net acidity 0 and iron 2.9 mg/l.

Pigeon Creek syncline discharges to the Youghiogheny are:

via Gillespie Run;

M02, Warden Mine, area 13, and
M01. also from Warden. area 13, into
Douglas Run which feeds into Gillespie Run.

direct to Youghiogheny;

M77 from Ocean No. 2, area 13.

M01 is a small alkaline discharge 0.17 MOD, pH 6.7. net acidity (-)32.0 mg/l and iron 11 mg/l. This causes iron pollution of Douglas Run.

M02 is a larger alkaline discharge to Gillespie Run 0.6 mi below Douglas Run. This discharge at 1.7 MGD. pH 6.7. net acidity (-)2.20 mg/l and iron 58 mg/l, causes iron pollution of Gillespie Run. Station 103, on Gillespie Run, at 2.9 MGD had pH 7.4. net acidity (-)216 mg/l, iron 19 mg/l and sulfates 513 mg/l.

Discharge M77 into the Youghiogheny. 1 mi below Gillespie Run is also from the Pigeon Creek syncline but not from the same pool as M01 and M02 since M77 is acid. M77 is a polluting discharge at 0.82 MGD. pH 3.7. net acidity 170 mg/l, iron 35 mg/l and sulfate 740 mg/l.

Additional inputs to the Youghiogheny from the Irwin syncline area:

-seepage from the crop line, station 102. on the east bank
about 0.5 mi below M77 was 0.06 MGD at pH 4.7. net acidity
120 mg/l. iron 2.4 mg/l and sulfates 950 mg/l.

-Guffey Station discharges M03 and M04, area 14. from the Shaner
and Guffey mines come into the Youghiogheny
via an unnamed tributary. station 104, about 10 mi
above its mouth.

	<u>M03</u>	<u>M04</u>
MGD	1.6	3.2
pH	6.2	6.7
net acidity, mg/l	10	(-)118
iron, mg/l	95	38
sulfate, mg/l	1,223	725

These discharges account for almost all flow in the receiving tributary, cause it to be polluted with iron, 34 mg/l, and have coated the streambed with yellowboy. One bank of the Youghiogheny is also coated for 1 mi below the tributary.

Between Guffey Station and the Youghiogheny mouth, the only polluting input found was Long Run, station 101, a small alkaline tributary polluted with iron. Station 101 at 0.7 MGD had pH 7.6, net acidity (-)78 mg/l, iron 3.3 mg/l and sulfate 280 mg/l. No specific mine source was found.

The Youghiogheny at McKeesport, station 100, was found to be alkaline but polluted with iron. Also, alkalinity is marginal and it could turn acid at times of high flush from Sewickley Creek.

B. Sewickley Creek Sub-basin

Loads and relative locations of pollution sources are shown in Table V-D. This is the most polluted of the Youghiogheny system sub-basins and its inputs of acid and iron into the Youghiogheny River are greater than from any other tributary.

The main stream, Sewickley Creek is 30 mi long. At station 225, some 23.6 mi from the mouth, the stream is alkaline and has acceptable iron content.

Brinker Run, polluted with iron and acid (sta. 224), deteriorates the main stream but not to polluted levels (sta. 223). Brinker Run pollution is from seepages at the crop line near the Mutual mine, area 22.

At the Brinkerton Overflow area where Sewickley Creek cuts through the Pittsburgh seam crop line, discharges M11 and M12 turn the main stream acid and raise iron content to polluted levels. Discharge M10 an artesian spring believed draining Hecla #1, further increases iron content. M11 and M12 are also artesian flows believed draining the Brinkerton, United, Mammoth and Calumet mines. Sources of all discharges are discussed in Section VI under area 22. M11 is thought to be the discharge described by S. A. Braley in 1962 as, "This free flowing discharge is at the crop line and is drainage from a series of abandoned Frick mines and is known as the Brinkerton Overflow".

Station 222, about 22 mi from the mouth, was acid and polluted with iron from M10, M11 and M12.

Boyer Run also cuts the crop line and is polluted with iron from discharges MOB and M09 which are artesian springs believed from Hecla #1. These sources are discussed under area 22.

Township Line Run is alkaline with low iron and improves Sewickley Creek. Station 219 below this tributary and 20.3 mi from the mouth, had pH 6.4 but was polluted with iron at 65 mg/l.

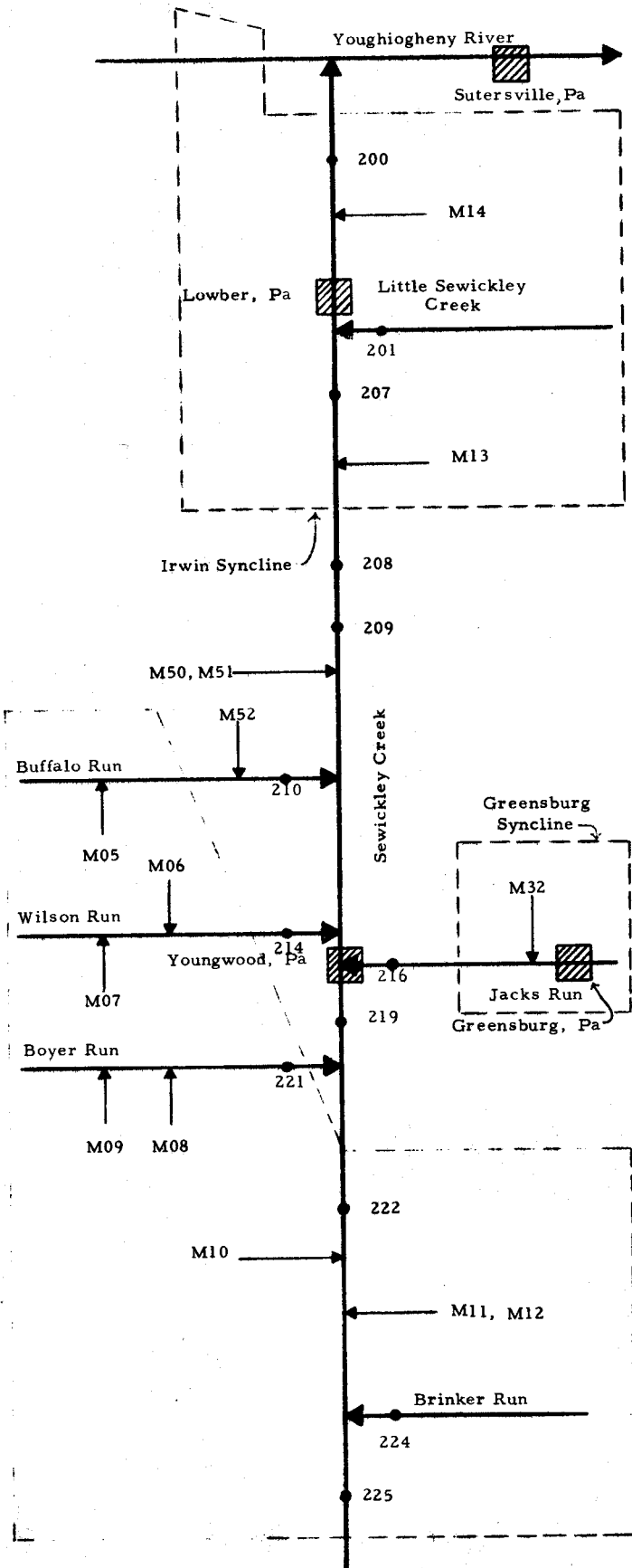
Jacks Run is polluted with iron by discharge M32 from a drift opening to Greensburg #2 mine. M32, the only large discharge found from the Greensburg syncline, is discussed under area 23. M32 has a high acid load 3.5 TPD, but alkalinity from upstream Jacks Run and from its tributary Slade Creek, neutralizes the acid. Jacks Run at its mouth, station 216, was found to be alkaline but polluted with iron.

Wilson Run cuts the Pittsburgh seam cropline of the Latrobe syncline and is polluted with iron by discharges;

-M06 from drift opening to the Central mine, area 24, and -
M07 an artesian spring believed related to strip mining of
the barrier between the Central and Standard mines area 24

Table V-D, Mine Drainage Inputs to Sewickley Creek

G&H Station No.	Flow MGD	pH	Tons/day (mg/l)		
			Net Acid	Iron	Sulfate
200	33	5.0	25	5	91
M14	4.5	5.4	(180)	(36)	(675)
201	2.3	7.7	6	2.5	14
207	27	4.0	(320)	(138)	(750)
M13	4.1	5.0	-	<0.1	1.5
208	23	4.3	(-1)	(0.5)	(144)
209	23	4.9	16	3	77
M50	.03	3.0	(140)	(26)	(675)
M51	0.4	2.9	(320)	(88)	(1450)
210	1.8	3.0	8	2	63
M52	.003	-	(80)	(22)	(656)
M05	0.7	3.1	(100)	(80)	(675)
214	1.6	7.6	11	0.1	5
M06	1.4	6.0	(86,000)	(1087)	(36,625)
M07	0.4	7.7	2	0.2	3
216	7	7.1	(1005)	(139)	(1866)
M32	1.6	3.6	9	0.6	4
219	11	6.4	(1150)	(89)	(569)
221	2	6.4	-0.1	<0.1	<0.1
M08	0.1	3.6	(1640)	(610)	(2000)
M09	0.9	6.6	3	0.3	2
222	9	5.2	(110)	(115)	(725)
M10	1.6	6.7	(-80)	(12)	(598)
M11	0.3	3.1	(-50)	(56)	(725)
M12	4.6	6.2	(-154)	(8.8)	(569)
224	0.2	3.7	-1.7	0.5	9
225	1.5	7.6	(-58)	(16)	(310)
			(550)	(96)	(700)
			-1	3.1	23
			(-20)	(65)	(494)
			(-144)	(22)	(263)
			0.1	<0.1	0.2
			(240)	(51)	(575)
			(-0.7)	0.1	1.4
			(-198)	(36)	(394)
			1	3.3	23
			(25)	(88)	(613)
			(-1.5)	0.7	3.5
			(-231)	(121)	(538)
			0.5	<0.1	1
			(780)	(66)	(1000)
			4.2	3	13
			(220)	(156)	(700)
			0.2	<0.1	0.4
			(340)	(8)	(569)
			(-0.7)	<0.1	0.5
			(-110)	(0.3)	(88)



Latrobe Syncline

M06 and M07 are alkaline but polluted with iron which causes iron pollution of Wilson Run.

Buffalo Run cuts across the Pittsburgh crop line at the SW tip of the Latrobe syncline. It is polluted with acid and iron by discharges:

- M05 believed an overflow from mine water pool in Southwest #3 mine within the Latrobe basin, area 25, and
- M52 a smaller combined discharge from drift openings and seepages from Upper Freeport crop line, outside the Latrobe basin. M52 is from the Ella mine, area 26.
- Also, an unnamed tributary located 0.3 mi upstream from Buffalo Run's mouth, station 211, has a flow consisting mainly of a discharge polluted with acid and iron from the active Delmont Mine of Eastern Associated Coal Corp whose workings are in the Upper Freeport coal seam. Eastern should have implemented treatment for this discharge by the time of this report.

About 1.4 mi below Buffalo Run discharges M50 and M51 combine into one stream entering Sewickley Creek at 14.2 mi. above the mouth:

- M50 was found to be drainage from the active Delmont mine preparation plant refuse piles. This highly concentrated discharge had the highest acid load, 11 TPD, of any single source found. The operator, Eastern Associated Coal Corp., claimed to be planning treatment for this source which should also be implemented by the time of this report.
- M51 is from a borehole in the Greensburg #4 mine in the Upper Freeport seam, area 26.

Sewickley Creek, station 209, immediately below M50 and M51 and 14 mi from the mouth was found to be polluted with acid and iron. Treatment of M50 would be expected to improve the receiving stream at station 209 to a non-acid condition.

Discharge M13, 5.4 mi from the mouth at Hutchinson, is water pumped from abandoned workings in the Irwin basin to permit mining the active Hutchinson mine. At the time of sampling, one pump was discharging 4.1 MGD. Four pumps are installed. Hall and Rozance, 1959, reported that at times, all four units are barely adequate and that annual pumping averaged 40 machine hrs/day, or about 1.5 units. As shown on Table V-D, acid and iron

from M13 worsened the already polluted Sewickley Creek. This source is further discussed in Section VI under area 27.

Little Sewickley Creek, a non-polluted stream, joins Sewickley Creek 2.4 mi from the mouth and improves the main stream slightly by dilution. Little Sewickley was at one time polluted due to pumping from the now abandoned portions of Hutchinson Mine. This pumping has stopped and the stream is alkaline.

Below Little Sewickley at Lowber, 2 mi from the mouth, discharge M14 adds more iron and acid to the main stream. M14 is overflow from the Irwin basin pool through a slope entry to the Marchand mine. This pool extends through the Marchand, Keystone and Ocean mines and leaks into the lower elevation Hutchinson mine. Leakage from this pool into Hutchinson makes up part of the water pumped from Hutchinson at M13. Discharge M14 is further discussed in Section VI under area 28.

Sewickley Creek at the mouth was found polluted with acid and iron.

C. Jacobs Creek Sub-basin

This is the smallest of five sub-basins and it was found the least effected by mine drainage.

The main stream, 29 mi long, is alkaline with low iron throughout its length. Triburaries found polluted were:

- Stauffer Run, station 306, is polluted by acid and iron from discharges M62 and M63 from the Alverton mine at the NW tip of the Latrobe syncline basin, area 31. Stauffer Run is polluted for its entire 2 mi length.

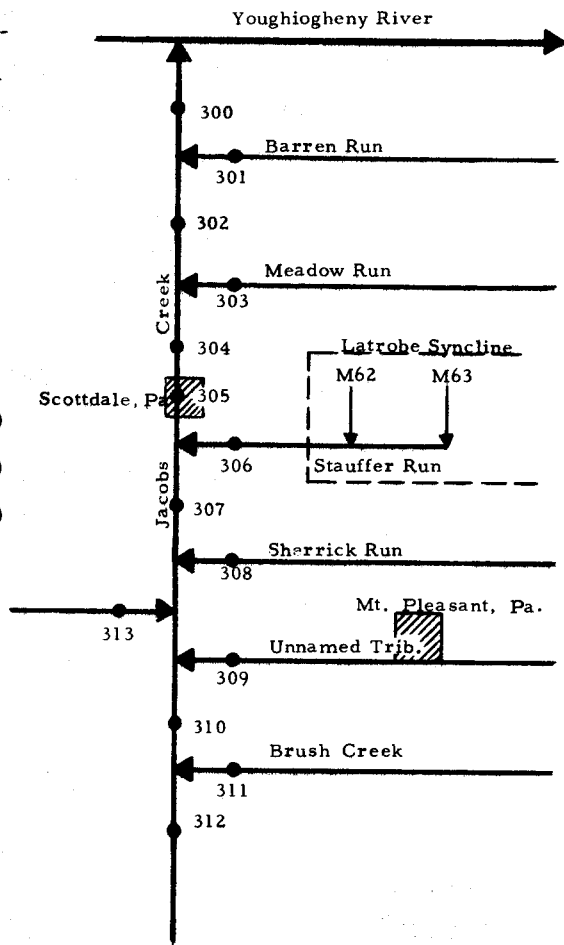
- Sherrick Run, station 308, is a smaller stream believed to exist only in wet weather. It was found polluted with acid and iron throughout its 2 mi length. Pollutants are possibly from refuse piles along the stream.

Station 313, was a polluting discharge from a pipe in the vicinity of Screw and Bolt Inc off Legislative Route 64256. This discharge to Jacobs Creek about 0.25 mi above Sherrick Run, had the largest acid load found in the sub-basin, 0.5 tons/day. Its low sulfate content and high temperature were not indicative of mine water. Station 313 is mentioned herein for information only.

Relative locations and loads are shown in Table V-E.

Table V-E, Mine Drainage Inputs to Jacobs Creek

G&H Station No.	MGD	pH	Tons/day (mg/l)		
			Net Acidity	Iron	Sulfate
300	12.1	7.2	-0.9 (-18)	0.1 (.17)	4.8 (96)
301	0.8	7.3	-0.2 (-66)	0.1 (.15)	0.1 (38)
302	11.9	7.2	-0.8 (-16)	0.1 (.24)	4.6 (93)
303	0.5	7.4	-0.1 (-34)	0.1 (.23)	0.1 (29)
304	8.8	7.0	-0.9 (-24)	0.1 (.54)	3.6 (98)
305	8	6.6	-0.5 (-14)	0.1 (1.6)	3.3 (101)
306	0.28	3.4	0.5 (440)	0.1 (18)	1.2 (1066)
M62*	0.04	2.4	0.3 (1710)	0.1 (312)	0.4 (2340)
M63*	0.02	2.5	0.1 (1200)	0.1 (186)	0.1 (1716)
307	6.7	6.8	-0.5 (-21)	0.1 (1.1)	2.1 (75)
308	0.09	3.3	0.1 (440)	0.1 (5)	0.2 (581)
313	0.16	2.6	0.5 (840)	0.1 (39)	<0.1 (24)
309	1.1	7.1	-0.06 (-13)	0.1 (8)	0.3 (76)
310	6.3	7.2	-0.5 (-20)	0.1 (.26)	0.7 (26)
311	0.59	7.7	-0.1 (-94)	0.1 (1.4)	0.1 (61)
312	5.7	7.3	-0.5 (-20)	0.1 (.21)	0.6 (27)



D. Indian Creek Sub-basin

This sub-basin covers 125 sq mi and the main stream is 27 mi long.

The Ligonier syncline generally parallels Indian Creek through the center of the basin with strong anticlines on each side.

Predominant surface strata are the Conemaugh and the Allegheny groups. The Allegheny outcrops where stream valleys have cut through the Conemaugh. The Monongahela group has been completely eroded away. Lower Kittanning Coal of the Allegheny group was extensively mined from the early 1900's until 1966 and all known mine drainage pollution sources are believed associated with abandoned mines in this seam.

An existing flume system was built in the 1920's to collect drainage from mines along the Creek and carry it to Charles Run below the Indian Creek Reservoir and thereby protect the reservoir from pollution. As now functioning, this system keeps much pollution out of the mid-reaches of the main stream and the reservoir, but it pollutes Charles Run and the lower reaches of Indian Creek.

The Melcroft complex at the upper end of the flume is only partially drained by the flume system. Other drainage from this complex pollutes Champion Creek and Puzzle Run and deteriorates water quality in upper Indian Creek.

Poplar Run joins the main stream about midway between Champion Creek and the reservoir and it is polluted by drainage from abandoned workings not related to the flume.

Figure 42 B, back pocket, shows the flume and associated mines. Campbell #2, Firestone, Indian Creek #2, Sparks, Puro, Big Chief, Kimmel, Little Squaw and Melcroft #1 & 2 were originally connected. Revisions have included abandonment of wood box flume branch connections to Melcroft #2, Kimmel, Big Chief and Puro. The flume system as now believed to be functioning is as follows:

- Collection begins in Melcroft #1 which partially drains to the flume system through the Kalp Opening at coal el 1470. Coal seam in this mine slopes up, westward, from el 1425 at outcrop near the mouth of Champion Creek, to higher than el 1600. Drainage relief at the Kalp Opening causes pooling of water over about 130 acres within the outcrop boundary lying below el 1470. This pool is believed the source of seepages along Route 711 (Fig 42, Section VI).

Drains from Melcroft #3, both gravity lines from refuse piles and a pumped line from a tunnel seal, come into the pool area of #1 and possibly increase drainage through Kalp by displacement.

- Seepages from the southeast corner cropline of Melcroft # 1 (inventory No's 4203 thru 4209 Fig 42) are believed responsible for the reported pollution of water; supply wells of residences along Route 711. A pump sump installed near inventory #4204 was intended for pumping drainage to the flume through Melcroft # 1. This plan was never implemented due to a resident's refusal to grant easement.
- Melcroft #2 is not now connected to the flume but may be draining via underground into #3. No stream pollution was traced directly to #2.
- Melcroft #3 is sealed but leakage from the seal is pumped to Melcroft #1 (discharge M23 Fig 42). Coal seam in #3 dips away from Champion Creek so that #3 is presumed flooded. Polluting artesian discharge, inventory No. 4224 (Fig 42), into Puzzle Run is also believed from Melcroft #3.
- Little Squaw, Kimmel, Big Chief and Puro no longer connect with the flume. These are under one side of steep Fowl Hill and cover about 700 acres. Coal contours indicate that about half of the mine area, Puro and Big Chief, is flooded and that drainages M41 and M42 are overflows from this pool. M41, is believed overflow from an air seal on Puro and M42 is from an air seal on Big Chief. The effect of these two discharges is not significant on quality of Indian Creek.
- From the Kalp Opening, drainage from Melcroft #1 flows through a 24" pipe and the Mathews tunnel into the Sparks mine tunnel network.
- A discharging drift opening, inventory No. 4201, Fig 42, was found immediately below the 24" flume pipe, on the outcrop and some 200 ft from the Kalp Opening.. When observed in June, 1970, flow was about 50,000 gpd with high iron and acidity. This is believed a drift opening connection to Melcroft #1, not leakage from the flume.

- Flume flow courses some 9,000 ft through Sparks and exists at the Gallentine Opening at el 1370. Coal contour pattern, is such that all except a small portion of the 800 acre Sparks mine is drained by the flume. No other separate discharges were found related to Sparks.
- A 30" pipe and tunnel runs from the Gallentine Opening to tunnel works of Firestone and Campbell #2. Details on these mines were not located and other separate drains were not found related to these mines.
- The terminal portion of the flume system is a rock tunnel which discharges to Charles Run at el 1290, discharge M21. This pollutes Charles Run and the lower portion of Indian Creek.

Relative locations and loads of polluting discharges in the Indian Creek sub-basin are shown in Table V-F.

Station 415 on Indian Creek, 17 mi from the mouth and above Champion Creek, was found unpolluted.

Discharge M60 to Little Champion Creek is drainage from drift opening (inventory No. 4101) of the abandoned Coffman mine. FWQA measurements were 3 gpm with 620 mg/l acidity and 151 mg/l iron.

Puzzle Run, sta 412, is polluted for 0.1 mi with iron and acid by an artesian discharge (inventory No. 4224, Fig 42) from Melcroft #3.

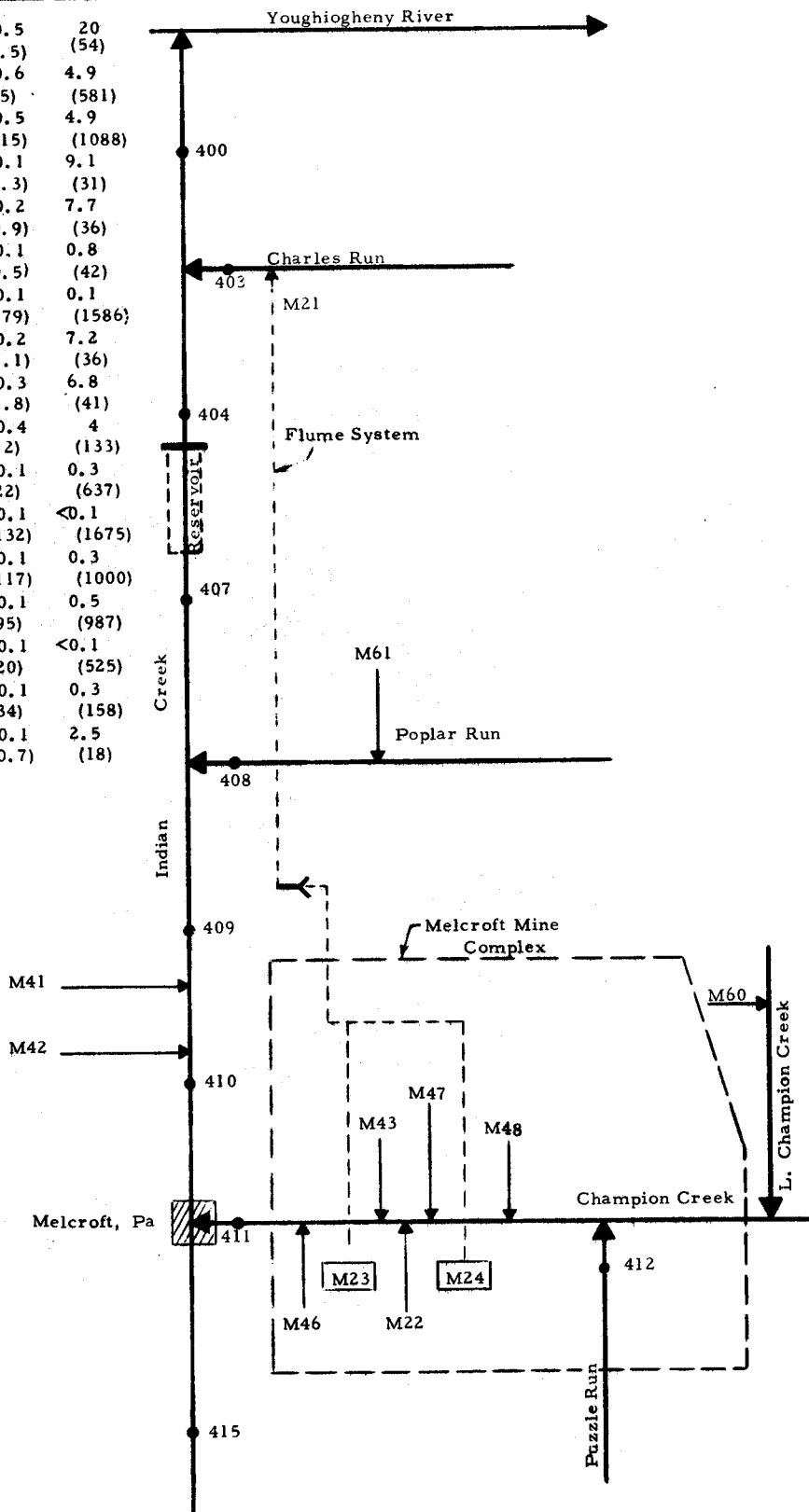
Champion Creek, sta 411, was found polluted with acid and iron from Puzzle Run to the mouth 2 mi. Discharges are:

- M43, M47 & M48 and inventory No's 4228 & 4229 (Fig 42) are from Melcroft #1 into Champion Creek at the crop line.
- M46 is from a drain from the SW corner of Melcroft #3 into Champion Creek.
- M22 is refuse pile drainage from Melcroft #3 to Champion Creek. M24 is drainage from refuse piles at Melcroft #3 which is piped to Melcroft #1 for entrance to the flume.

Indian Creek at sta 410 was polluted with iron and had lower alkalinity due to inputs from Champion Creek and direct discharges from Melcroft #1.

Table V-F, Mine Drainage Inputs to Indian Creek

G&H Station No.	Flow MGD	pH	Tons/day (mg/l)		
			Net Acid	Iron	Sulfate
400	88	4.8	2.5 (69)	0.5 (1.5)	20 (54)
403	2.2	2.8	2.7 (325)	0.6 (65)	4.9 (581)
M21	1.1	2.8	4.1 (900)	0.5 (115)	4.9 (1088)
404	72	7.1	0 (0)	0.1 (0.3)	9.1 (31)
407	52	6.8	-1.3 (-8)	0.2 (0.9)	7.7 (36)
408	4.5	4.0	<0.1 (4)	<0.1 (0.5)	0.8 (42)
M61	.01	3.0	<0.1 (1228)	<0.1 (179)	0.1 (1586)
409	48	6.6	-0.3 (-1.5)	0.2 (1.1)	7.2 (36)
410	40	6.4	-0.2 (-27)	0.3 (1.8)	6.8 (41)
411	7.2	3.7	2.7 (92)	0.4 (12)	4 (133)
M46	.03	3.7	0.2 (320)	<0.1 (22)	0.3 (637)
M43	.01	3.0	<0.1 (1100)	<0.1 (132)	<0.1 (1675)
M22	.07	2.5	2 (7500)	<0.1 (117)	0.3 (1000)
M47	.11	2.8	0.5 (1000)	<0.1 (95)	0.5 (987)
M48	.03	3.9	<0.1 (80)	<0.1 (20)	<0.1 (525)
412	0.5	3.5	0.2 (100)	<0.1 (34)	0.3 (158)
415	33	7.2	-2 (-15)	0.1 (0.7)	2.5 (18)



Poplar Run was found polluted with iron and acid for 1 mi due to drainage from the abandoned Marston strip and drift operations. This source is discussed in Section VI, area 43.

Charles Run for 0.5 mi, and the lower end of Indian Creek for 4 mi, are polluted with acid and iron from the flume discharge.

As a matter of interest it is noted that an old study, the Ware Plan by the American Water Works Association proposed a large dam on Indian Creek for development of water supply. This would flood most of the mine drainage pollution sources in the sub-basin and thereby reduce the formation of pollutants.

The proposed dam site is on Indian Creek 1.4 mi below the existing dam. Height to crest would be about 300 ft and the crest would be some 400 ft long. This would inundate the existing dam and greatly enlarge the reservoir.

Water surface at elevation 1460 ft would cause flooding of coal seams in all mines associated with the flume system except Melcroft #2 and most of Melcroft # 1. The flume system exit at elev 1290 ft would be within the impoundment and it would not be necessary to block the flume.

E. Casselman River Sub-basin

This is the largest sub-basin, 475 sq mi, of the Youghiogheny system and has more polluted stream miles than any of the other sub-basins.

The Casselman River itself was found polluted with acid for 41 mi from Coal Run to the mouth and polluted with iron for 20 mi from Coal Run to Coxes Creek at Rockwood. As shown on Exhibits 3 and 4, pp V-5 and V-6, the major pollution sources are in three general locations as follows:

- Along the upstream reaches of the Casselman discharges M30 and M31 to Coal Run and M26 and M33 to the Casselman are all associated with the Shaw mines complex being investigated by others and not within the scope of this report.
- Buffalo Creek, and
- Coxes Creek

Buffalo and Coxes Creeks are major source areas discussed in the following pages. Areas with smaller pollution loads for which no specific mine sources were found are:

- Flaugherty Creek, sta 542, App B, pg I, was found polluted with iron for 5 mi, but alkaline. Its iron load, 370 lbs/day is small compared to 6,510 lbs/day traced to specific sources in the Casselman sub-basin.
- Blue Lick Creek receives inputs from a small tributary sta 536, App B, pg I, polluted with acid, 528 lbs/day, and iron, 89 lbs/day. This tributary is polluted for about 1 mi. Pollutants are neutralized and diluted on joining Blue Lick Creek.

(1) Buffalo Creek

Coal deposits, geologic structure and mine drainage discharge locations are shown in Fig 8, pg IV-20. Pollution sources are:

<u>Discharge No.</u>	<u>Mine or Area</u>	<u>Coal Seam</u>	<u>Tons/day</u>		<u>Refer Area No.</u>
			<u>Net</u>	<u>Acid Iron</u>	
M76	Pen Mar 2	LK	0.6	0.2	51
M75	Goodtown	Pgh	0.7	0.2	52
M34	Mt. Valley 2	UK	0.05	0.04	53
M25	Shober	UK	0.2	0.1	53
M74	Ponfeigh 1	UK	2	0.2	54
M73	Ponfeigh 1A	UK	0.07	-	54

Relative locations and pollution loads are shown in Table V-G. The main stream is about 13 mi long and was polluted with iron for 11 mi, from M76 downstream. It was polluted with acid for 1.5 mi below M76 and another 1.5 mi from M74 to the mouth. Beachdale Hollow Run was also polluted with acid for 2 mi for which a specific source was not found. Buffalo Creek worsens the already polluted Casselman which it joins at Garrett, Pa.

Discharge M76 is from a shaft opening (inventory 5106, Fig 51) of Pen Mar #2. This was the only discharge found in the 1,900 acre area encompassing Pen Mar #2,3,4, and 5 mines in the Lower Kittanning seam. Fig 51A shows that this seam dips from el 2,360' to below 1,540'. The discharging shaft penetrates the seam at el 1,740' and its top is el 2,113. It is believed that some 1,800 acres of the seam below 2,113' are flooded.

Discharge M75 is a collection of drainage from several small mines in the Goodtown area on the Berlin syncline axis where Sewickley, Redstone and Pittsburgh coal has been mined. There is still active drift and strip operations in this area but these are not believed directly related to the pollution problem. Discharges contributing to M75, shown in Fig 52 and 52A, are:

- drains from drift openings 5211 and 5215 and seepage 5213 believed from Quality Mine #1 and Gambert #2, and
- drains from drift opening 5221 and seepage 5210 and 5212 from Pine Hill Mine # 1.

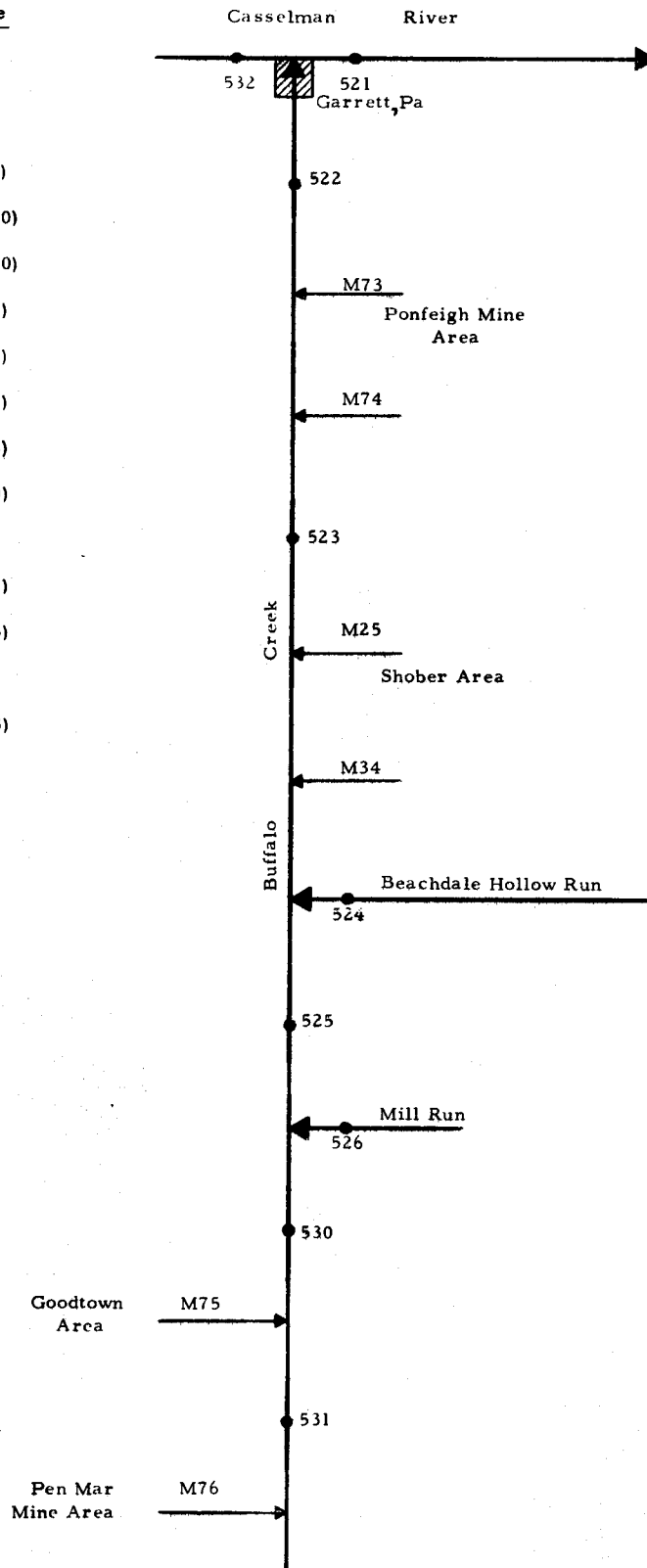
Additional mine drains, below and not included in M75, are drift opening 5202 from Wills #1 and seepage 5207. Surface Features and related working are shown in Fig 52 and 52A.

Discharges M34 and M25 are in the Shober area where Upper Kittanning coal has been extensively mined and where there is still active stripping. Surface features are shown in Fig 53 and deep mine workings on Fig 54A.

- M34 is from an abandoned deep pump discharge shaft from Mt Valley #2 at coal seam el 1,880' and which exits at surface el 1,950'.
- M25 is a collection of drains including: a second deep well pl.ump shaft from Mt. Valley #2 which also extends from coal el 1,880' to surface el 1,950' (inventory 5307, Fig 53) drift opening from the Shober mine (inventory 5305, Fig 53); and seepage from a gob pile at coal preparation plant serving active strip mines.

Table V-G, Mine Drainage Inputs to Buffalo Creek

G&H Station No.	Flow MGD	pH	Tons/day (mg/l)		
			Net Acid	Iron	Sulfate
521	125	4.7	7.6 (15)	2.2 (4.2)	42 (81)
532	104	4.8	5.1 (10)	1.6 (3.9)	37 (87)
522	16.2	5.8	0.6 (7)	0.5 (7.5)	10 (147)
M73	0.2	5.2	< 0.1 (85)	< 0.1 (25)	2 (1200)
M74	0.3	3.4	2 (1900)	0.2 (225)	2.1 (1950)
523	15.5	6.5	-0.1 (-1)	0.5 (7.3)	9 (138)
M25	0.6	3.0	0.2 (110)	0.1 (50)	0.3 (131)
M34	0.1	3.5	< 0.1 (100)	< 0.1 (79)	0.4 (787)
524	3.5	5.2	< 0.1 (4)	< 0.1 (0.2)	2.5 (168)
525	11.6	6.6	-0.5 (-10)	0.4 (8.8)	5.8 (120)
526	3.2	7.4	-0.2 (-16)	< 0.1 (0.2)	1 (76)
530	6.1	6.4	-0.3 (-117)	0.5 (18)	3.3 (131)
M75	0.7	3.6	0.7 (250)	0.2 (72)	2 (725)
531	5.1	4.8	0.9 (42)	0.5 (23)	1.9 (89)
M76	0.8	5.3	0.6 (190)	0.2 (67)	1.1 (423)



Mt Valley #2 is interconnected with Ponfeigh 1 and 1A in a complex of more than 2,000 acres. Mt. Valley #2 and the Ponfeigh mines are shown in Fig 54A.

Discharges M73 and M74 are shown in Figs 54 and 54A.

-M73 is drainage from drift opening of Ponfeigh #IA at surface el 2,000'.

-M74 is pipe discharge at surface el 2,000' believed from Ponfeigh #1 coal el 1,880'.

FWQA investigations in 1966 reported another pipe drainage discharge between the Mt Valley and Ponfeigh sections from coal ell, 810' discharging at surface el 1970'. This discharge was not found in our investigations in 1969 and 1970.

Within the Mt Valley-Ponfeigh complex, the UK seam rises from approximately, ell, 600' to el 2,300'. Some 50% of the seam below el 1,950 -2,000' is believed flooded. Drainage outlet elevations are approximately:

	<u>Coal</u>	<u>Surface</u>
M25	1,880	1,950
M34	1,880	1,950
FWQA'66	1,810	1,970
M73	2,000	2,040
M74	1,880	2,000

Surface uphill to the northwest from M73 rises at only a slightly greater rate than the coal seam. It would be necessary to go 3,000 ft in from M73 to reach a point in the workings at which the overburden would be 100 ft thick.

A series of strip mines in the Ponfeigh area from Beachdale to Garrett were found in various stages of activity and reclamation in 1970. This group of mines, shown as inventory No. 5401 in Fig 54, was at that time the source of small volume polluting seepages, inventory No's. 5402 thru 5407. Stripping covered about 800 acres southeast from M73 along the UK crop line west of Buffalo Creek, (Refer, Fig 8, pg IV -20). This stripping might also contribute to water inflows to the Mt. Valley -Ponfeigh pool.

(2) Coxes Creek

Coal deposits and pollution source locations are shown in Fig 8, pg IV-20. Sources are:

<u>Discharge</u> <u>No.</u>	<u>Mine</u> <u>or Area</u>	<u>Coal</u> <u>Seam</u>	<u>Tons/day</u>		<u>Refer</u> <u>Area</u>
			<u>Net</u>	<u>Acid Iron</u>	
M70	Atlantic #2	Br	0.5	0.005	56
M69	Fogle	Br	0.15	0.02	56
M67	MacGregor	LK	0.025	0.005	55
M38	Ruth	LK	0.05	0.01	55
M37	Betsy Slope	Br	0.5	0.05	55
M66	Mary Jeanne	LK	No data		55
M68	Hocking	LK	No data		55
M71	Rockwood #1	LF	0.025	0.01	57
M72	Rockwood-Hays	LF	0.005	0.02	57

Relative locations and pollution loads are shown in Table V-H. Coxes Creek is about 15 mi long and it was found polluted with acid and iron for 1 mi, from Wilson Creek to the mouth, due to pollutants from Wilson Creek as well as discharges M71 and M72 directly to Coxes Creek.

Wilson Creek is about 5 mi long and was found polluted for 3 mi with acid and iron from discharges M70 and M69.

Bromm Run a small tributary, which joins Coxes Creek 5 mi above the mouth, was polluted with acid for which a specific mine source was not found.

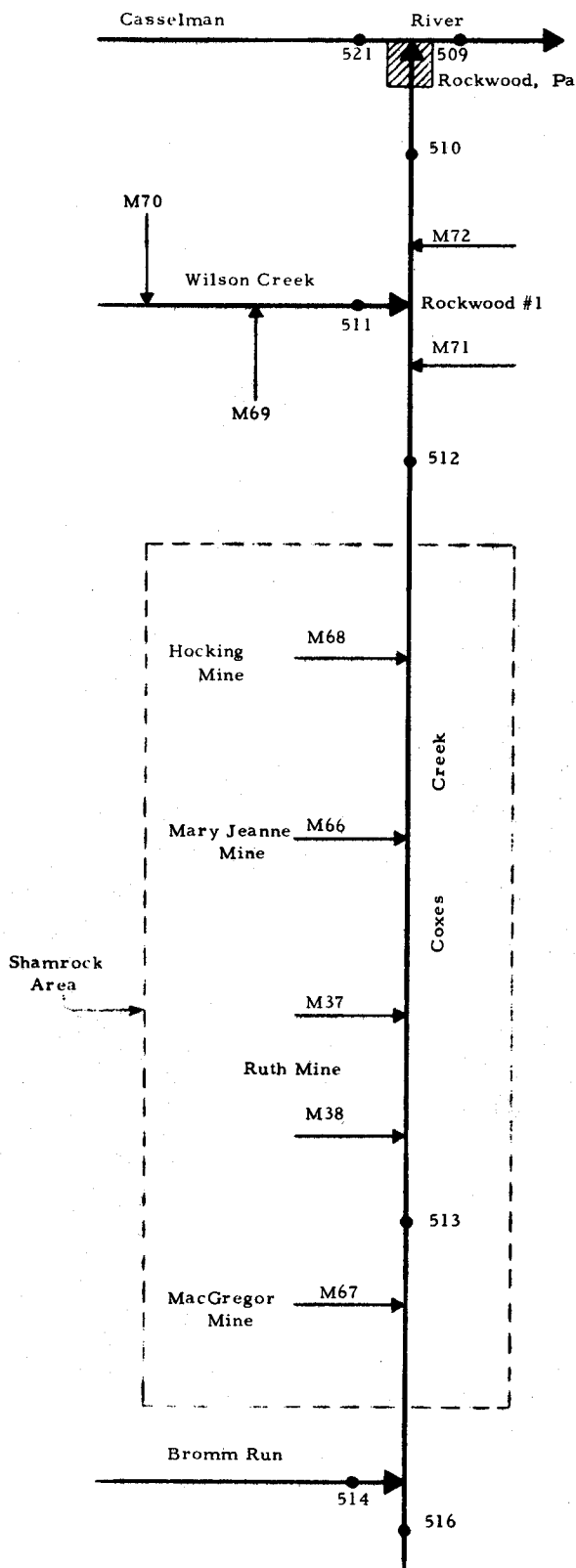
Coxes Creek at sta 516, 6 mi from the mouth, was alkaline and with low iron. Sta 513, 4 mi from the mouth and sta 512, 1.5 mi from the mouth, were also not polluted but lower alkalinity and higher iron reflect inputs from Bromm Run and the Shamrock area.

Coxes Creek at the mouth sta 510 was polluted but this was found to have little effect on the already polluted Casselman.

Discharge M67 at the MacGregor #1 in the LK seam is from the west drift opening, inventory 5520, Figs 55 & 55A. Surface and coal rise to the east from the drift opening el 1910'. Seepage 5519, Fig 55, was a small seasonal stream, 1 gpm, from gob pile, inventory 5521, at the MacGregor mine.

Table V-H: Mine Drainage Inputs to Coxes Creek

G&H Station No.	Flow MGD	pH	Tons/day (mg/l)		
			Net Acid	Iron	Sulfate
509	175	4.9	7.3 (10)	1 (1.3)	55 (76)
521	125	4.7	7.7 (15)	2.1 (4.2)	42 (81)
510	49	5.1	0.9 (4)	0.3 (1.8)	13 (65)
M72	0.2	6.5	< 0.1 (3)	< 0.1 (26)	0.4 (450)
511	10.4	3.5	2.0 (45)	0.2 (4.5)	3.3 (78)
M69	0.08	2.8	0.2 (480)	< 0.1 (59)	0.3 (546)
M70	0.5	3.3	0.5 (248)	< 0.1 (3)	0.2 (88)
M71	.07		< 0.1 (100)	< 0.1 (28)	0.1 (430)
512	36	5.8	-0.6 (-4)	0.1 (0.9)	9.2 (62)
M37	.06	2.7	0.5 (2000)	< 0.1 (235)	0.4 (1831)
M38	.03	2.9	< 0.1 (500)	< 0.1 (102)	0.1 (437)
513	31.5	6.5	-1.3 (-10)	0.1 (0.4)	6.5 (49)
M67	.03		< 0.1 (205)	0.1 (34)	0.1 (600)
514	.07	4.6	0.2 (10)	< 0.1 (0.2)	0.6 (24)
516	17	7.1	-1 (-15)	< 0.1 (0.8)	5.1 (72)



Discharges M37 & M3 were from the abandoned Ruth -Betsy Slope mine complex covering 350 acres at Shamrock off route T501. Ruth is a drift mine of the Black Beauty Goal Go in the LK seam and Betsy a slope mine, below Ruth, in the Brookville seam. Surface features are shown in Fig 55, Ruth mine in Fig 55A; Betsy and Ruth mines in Fig 55B and; a generalized profile of the two mines in Fig 55G.

Ruth rises from 3 drift openings (inventory No's 5509, 5512 and 5522) at el 1920-1950' to above el 2040' well into the mine. Betsy also rises parallel but about 40' below Ruth. Surface rises to the SE from el 1920-1950' to a plateau el 2100, at LR 55038, and then slopes down toward Wilson Greek.

Ruth mine underground workings were to the rise toward the south-east and, were stopped as the overburden became progressively thinner. Near the southeast end, the LK seam was strip mined, shown in Fig 55, inventory No. 5517.

It is believed that the lower Betsy Slope mine is flooded and is overflowing a caved airway (inventory 5510). It is also assumed that there is drainage communication between Betsy and Ruth.

Surface features shown in Fig 55 include:

- | | |
|-------------|--|
| 5509 & 5512 | -Drift openings discharging from Ruth and which make up 70% of M37 drift opening 5509 at el 1919' and 5512 at el 1921'. |
| 5522 | -Drift opening to Ruth at el 1950' and the source of M38. |
| 5510 | -Seepage from caved airway from Betsy Slope coal el 1875' at surface el 1890-1900'. This flows makes up 30% of M37. |
| 5517 | -Strip mine with exposed highwall in LK seam near Southeast end of Ruth mine. |
| 5518 | -Drift opening at strip mine highwall, said to be portal to small mine connecting to Ruth. Water inflows through this opening and it is believed this contributes to M37 or M38. |

Discharges M66 and M68, are from the Mary Jeanne and Hocking mines, respectively. Both are from covered drift openings from mines in the LK seam shown in Fig 55A.

M66 was observed at about 0.015 MGD and M68 at 0.15 MGD.

It is noted that Coxes Creek between sta's 513 and 512, a distance of 2.5 mi, increased in sulfate load by 2.7 tons/day. Of this 0.5 tons/day were traced to M37 & M38; much of the unaccounted for 2.2 tons/day is believed from M66 & M68.

Discharges M71 and M72 in the Rockwood area (Area 57) involve the Hays and Rockwood #1 mines in the Lower Freeport seam as shown in Figs 57 and 57A.

Rockwood #1 contributes to both M71 and M72 and it is the more important pollution maker of the two mines in this area. It is an abandoned drift operation covering some 100 acres. The seam rises gradually N & NW from the main portals at el 19201 to above 1950' some 1,000' into the mine. Discharges from Rockwood #1 are:

M71 collection of seepages, inventory No's. 5709-5712, at the crop line near route T428 at el 19351. These are believed from a now covered ventilation opening.

M72 is the larger discharge in the area and is primarily from sources 5705-5708 at the main entry at coal el19221. The seam outcrops at this point and there are 2 visible drift openings, both draining.

The Hays mine, south of Rockwood #1 includes strip and drift workings covering 75 acres. The only drainage from this mine is seepage 5702 from the exposed highwall of strip mine 5703. This makes up about 10% of discharge M72.

Discharges M69 and M70 to Wilson Creek (Area 56) are from abandoned Fogle and Atlantic #2 mines, both in the Brookville seam.

M69 was made up of artesian discharges 5601 and 5602 believed to be from covered drift openings of the Fogle mine north of Wilson Creek at the outcrop el about 2150'. Strip mines in the Fogle area north of M69 were in the starting stages during 1970 and are not believed contributing to M69 which the FWQA reported on in 1966.

M70 is drainage from drift opening 5611 of Atlantic #2 at coal el 2380'.