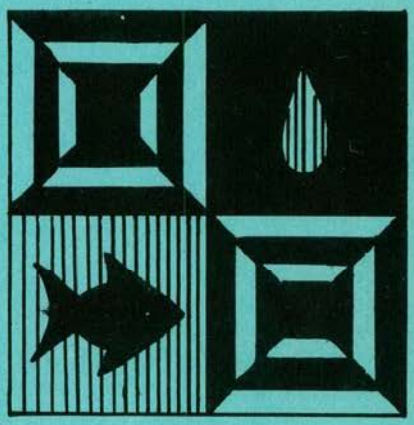
Water Quality Assessment for the

MONONGAHELA RIVER BASIN (West Virginia, Maryland, Pennsylvania)

WORK DOCUMENT NO. 48



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
WHEELING FIELD OFFICE
SURVEILLANCE & ANALYSIS DIVISION

Water Quality Assessment Report

Monongahela River Basin

by

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BASIN DESCRIPTION

The Monongahela River basin has a drainage area of 7,384 square miles, of which 4,225 square miles is in northern West Virginia, 2,736 square miles is in southwestern Pennsylvania, and 420 square miles is in northwestern Maryland.

The basin is bounded on the west by the Ohio River mainstem drainage, on the south by the Little Kanawha and Kanawha River drainage, on the east by the Potomac River drainage, and on the north by the Allegheny River drainage. The basin is about 75 miles wide from east to west and about 130 miles long from north to south.

The Monongahela River is formed by the confluence of the West Fork and the Tygart Valley Rivers at Fairmont, Marion County, West Virginia. The Monongahela flows generally northward and is joined by the Cheat River at Point Marion, Pennsylvania and the Youghiogheny River at McKeesport, Pennsylvania. The Monongahela flows 128 river miles from Fairmont, West Virginia to Pittsburgh, Pennsylvania where it joins the Allegheny River to form the Ohio River.

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INTRODUCTION

The purpose of this document is to provide answers to four questions: (1) what is the current water quality situation; (2) why does the situation exist; (3) what has been the trend in recent years; (4) what will the water quality be in years to come? In so doing, identification is made of (a) significant water bodies which, in 1973, met the 1983 goal of water quality adequate for swimming and for the protection and propagation of fish and wildlife and (b) water bodies which are expected to achieve the 1983 goal by 1977, 1983 or some later date.

The document is summary in nature and is not intended to provide a detailed analyses of the water quality of all the streams in the basin or to examine all the present or potential factors which act upon the water quality of a given stream. The information contained in the document is based on surveillance and monitoring activities carried out by the Wheeling Field Office, Surveillance and Analysis Division, plus appropriate data from cooperating State and Federal agencies.

The document should provide a starting point for the detailed examination of needs, priorities, standards, load limitations and other factors to meet the 1983 goal.

METHODOLOGY

Streams having a drainage area less than one hundred square miles are generally not included unless they have a significant impact on the receiving stream, have significant recreational value or include a potential reservoir site under active consideration by the Soil Conservation Service or the U. S. Army Corps of Engineers. The criteria for classifying the streams are listed in Table 1. "Put and take" trout stocking in a stream does not qualify it for classification under cold water fishery. The trout placed in such a stream may be able to live in the stream year round, but if the temperature and dissolved oxygen criteria are not suitable for trout propagation, the stream is classified for warm water fishery. In general, there is a lack of data available for evaluation of coliform content, taste and odor content and effects and total dissolved gases content with respect to the existing atmospheric conditions. For the purpose of this report, current data is considered as that collected from 1970 to present. For comparative purposes and for trends, pre-1970 data were also evaluated.

THE CURRENT WATER QUALITY SITUATION

The Stream Water Quality Table (Table II) includes a total of 1,556 miles of streams. Of that amount, 945 miles presently do not meet water quality standards for recreational uses. In addition, there are many miles of smaller tributary streams which are degraded but which are too small to be described in detail in this report.

The wide distribution of the larger degraded streams is illustrated on the maps of the basin which identify streams which meet standards for various recreational uses in past, at present, and projected to the years 1977 and 1983.

All streams in the basin are potentially suitable for warm water fish and wildlife as well as for primary water contact recreation. A few of the headwater tributaries have potential for a cold water fishery. Most streams are not cold enough year round to be suitable for cold water fish propagation, but may sustain put-and-take trout stocking.

Many of the streams in the eastern two-thirds of the basin have excessively low pH values because of acid mine drainage and the delicate chemical balance of the stream. Dissolved and suspended solids pollute many streams over the entire basin in areas where the land surface has been disturbed through mining, road construction or other activities. Wastes from steel mills, coke ovens, chemical plants, power plants and other industries degrade the Monongahela River from mile point 40 near Monessen, Pennsylvania to its mouth. Excessive coliform densities have been noted in streams throughout the basin except for a few unpopulated areas. These unpopulated areas are the only areas where stream water quality is presently suitable for recreation. These areas are: West Fork River upstream of Hackers Creek, the Middle Fork River, Shavers Fork, Dry Fork, Black Fork, the Blackwater River upstream of Beaver Creek, and Big Sandy Creek upstream of Little Sandy Creek.

FACTORS AFFECTING WATER QUALITY

The soils in much of the eastern two-thirds of the basin are lacking in alkaline material. Only a small amount of acidity or other pollutants can be added to the very soft water in these areas before the natural chemical balance of the stream is upset. The streams are especially easy to degrade. The Youghiogheny River basin, the Cheat River basin and the Tygart Valley River basin have streams of this type. The limestone deposits in the West Fork River basin and along the main stem of the Monongahela River provide a more stable chemical balance in the streams in that area.

Coal mining activities have been the most significant factor affecting water quality. Acid mine drainage is formed in many coal mines when minerals existing with the coal seam react with air and water to form a mixture of sulfuric acid, iron and other dissolved and undissolved minerals. This mixture, known as acid mine drainage, flows from the coal mine to streams where its acid kills plants and animals living in the stream. The minerals are changed by chemical reactions in the streams and usually produce a red-orange fluffy material known as yellow-boy. This material settles to the stream bed and smothers plant life or chokes fish life.

Untreated acid water from deep mines and acid water carrying sediment from surface mines and refuse piles continue to be the most significant sources of pollution in the entire Monongahela basin.

Many miles of stream channels have been filled with a mixture of coal refuse, iron floc (yellow-boy), and sediment from surface mines. Exeessive amounts of dissolved minerals in these streams cause problems for water users.

The Monongahela River Mine Drainage Remedial Project identified 7,002 mining sites in the Monongahela River basin. There were 3,045 sites which discharged mine drainage. There were 6,441 sites which were not active at the time of the inventory and 2,740 of those sites had a discharge of mine water.

Domestic sewage is the second most important factor affecting water quality. Untreated or poorly treated human waste discharges to the streams in the basin have long been masked or disinfected by acid mine drainage. As the sources of acid mine drainage are eliminated, the widespread problem of inadequate sewage treatment facilities becomes more apparent.

Industrial waste sources, other than those from coal mining activities, are located along the first 40 miles of the Monongahela River from Pittsburgh upstream. These heavy industries discharge taste and odor producing materials, oils, heat, solids and toxicants which have caused problems for water users for many years.

WATER QUALITY TRENDS

Most industries, including coal mining, have been making steady progress in reducing water pollution. A massive effort to seal abandoned mines and stop water pollution was carried out in the 1930's

but the effort did not give the needed reduction in pollution. In the 1940's the coke plants associated with the steel mills began to reduce the amount of chemical wastes they were discharging to the streams as a result of complaints from cities using the river for a water supply. Conservationists began to move against pollution from coal industry in the early 1950's. The "black water" discharges from coal washeries were the first mine discharges to be cleaned up. In the mid 1960's, mines began to install treatment facilities at the acid mine drainage discharges. Pennsylvania led the way in requiring active mines to treat all discharges that did not meet requirements. Treatment facilities were being operated by active mines at all their discharges requiring treatment in Pennsylvania by 1970. The active mines in West Virginia have been slowly installing treatment facilities at their acid mine discharges. A recent EPA survey of active mines discharges stimulated the construction of several more facilities in West Virginia. Other industries have made efforts to reduce water pollution in a time schedule similar to that for mines. The day is soon coming when active industries will be a minor source of most water pollution in the Monongahela River basin.

The fish populations of streams have been used to measure water quality. Fishery studies on the Monongahela River during the period from 1957 through 1970 reflect a definite improvement in water quality during that period. However, the present fish populations are still poor in both quality and quantity.

Water from abandoned mines is a continuing problem which is expected to remain the dominant factor affecting water quality for many years to come. The problems of inadequate sewage treatment will also remain for many years. Regional sewage treatment facilities are difficult to build because of the low income and intense provincialism of most residents.

In predicting water quality in the years to come, as was done in Table II and maps accompanying this report, it was assumed that a great effort will be undertaken to improve water quality by 1983. Active and abandoned mine drainage sources will be reduced through government and citizens actions. Sewage treatment facilities will be built and well operated throughout the basin. Existing water quality will not be degraded. However, it should be noted that the time period for attainment of these goals may vary significantly in future years.

A partial list of the resources used in compiling this report and making projections is included in the bibliography.

Table 1

WATER QUALITY REQUIREMENTS FOR RECREATIONAL AND FISHERY USES

PRIMARY RECREATION & COLD WATER FISHERY - Swimming, diving, water skiing, wading and dabbling by children. Involves considerable risk of ingesting water in quantities sufficient to pose a significant health hazard. Protection and propagation of cold water fish species (Trout).

Fecal Coliform - geometric mean not over 200/100 ml

pH - 6.5 to 8.3 standard units

Dissolved Oxygen - minimum 6.0 mg/l daily average

Temperature - maximum of 68°F or 5°F rise over natural temperature.

Color and Turbidity - minimum to allow Secchi disc to be visible at one meter or maximum of ten (10) Jackson Turbidity Units.

Dissolved Solids - maximum of 500 mg/l or 1/3 above characteristics of natural conditions whichever is lesser.

Taste & Odor - none present in such amount which will interfere with water contact use or in amount which will impart taste to fish flesh.

Total Dissolved Gases - not to exceed 110 percent of existing atmospheric conditions.

PRIMARY RECREATION & WARM WATER FISHERY - Swimming, diving, water skiing, wading and dabbling by children. Involves considerable risk of ingesting water in quantities sufficient to pose a significant health hazard. Protection and propagation of warm water fish species, i.e. basses, catfish, etc.

Fecal Coliform - geometric mean not over 200/100 ml
pH - 6.5 to 8.3 standard units
Dissolved Oxygen - minimum 5.0 mg/l as daily average
minimum 4.0 mg/l

Temperature - maximum 90°F or 5°F rise over natural conditions.

Color and Turbidity - minimum to allow Secchi disc to be visible at one meter or maximum of (10) Jackson Turbidity Units.

Dissolved Solids - maximum of 500 mg/l or 1/3 above characteristics of natural conditions whichever is lesser.

Taste & Odor - none present in such amount which will interfere with water contact use, or in an amount which will impart taste to fish flesh.

Total Dissolved Gases - not to exceed 110 percent of existing atmospheric conditions.

SECONDARY RECREATION & COLD WATER FISHERY - All other recreational uses except for Primary Recreation. Protection and propagation of cold water fish species (Trout).

Total Coliform - maximum geometric mean of 10,000 per 100 ml.

pH - 6.0 to 9.0 standard units

Dissolved Oxygen - minimum of 6.0 mg/l daily average.

Temperature - maximum 68°F or 5°F rise over natural temperature.

Color and Turbidity - maximum of ten (10) Jackson Turbidity Units.

Dissolved Solids - 1/3 above characteristics of natural conditions.

Taste & Odor - none which will impart taste to fish flesh.

Total Dissolved Gases - not to exceed 110 percent of existing atmospheric conditions.

SECONDARY RECREATION & WARM WATER FISHERY - All other recreational uses except for Primary Recreation. Protection and propagation of warm water fish species i.e. basses, catfish, etc.

Total Coliform - maximum geometric mean of 10,000 per 100 ml.

pH - 6.0 to 9.0 standard units

Dissolved Oxygen - minimum 5.0 mg/l daily average.
minimum 4.0 mg/l

Temperature - maximum 90°F or no more than 5°F rise over natural conditions.

Color and Turbidity - maximum of fifty (50) Jackson Turbidity Units.

Dissolved Solids - 1/3 above characteristics of natural conditions.

Table 1 continued

Taste and Odor - none of which will impart taste to fish flesh.

Total Dissolved Gases - not to exceed 110 percent of existing atmospheric conditions.

KEY TO TABLE II

SYMBOL	
	Primary Recreation and Cold Water Fishery
	Primary Recreation and Warm Water Fishery
	Secondary Recreation and Cold Water Fishery
	Secondary Recreation and Warm Water Fishery
	Not suitable for recreation and/or Fishery

SYMBOL	
EPA	U. S. Environmental Protection Agency
WV	West Virginia Department of Natural Resources Division of Wildlife Resources
	Pennsylvania Fish Commission

Table II

Stream Water Quality Table

STREAM	DRAINAGE AREA (Sq. Mi)	LENGTH (Miles)	MEETING STANDARDS FOR RECREATIONAL USES				TODAYS PROBLEMS AND COMMENTS
			Pre-1970	Present	1977	1983	
Monongahela River Mainstem							
from mouth to Monessen		40	-	-	-	●	Temp., Coliform,Taste & Odor from steel, power & chemical plants.
			U.of Pgh & EPA	EPA*			
from Monessen to Cheat R.		50	-EPA	-EPA*	-	●	pH, acidity, temperature
from Cheat R. to Fairmont		39	-EPA	-EPA*	-	●	pH, acidity,Coliform,T & O, temp. from industry (coal & coke) & munici
Turtle Creek	147	21	-EPA	● *EPA & Pa. Fish	▲ Commission	▲	pH, iron, some industrial wastes nea mouth. Trout stocked near headwaters warmwater classification.
Youghiogheny River Mainstem							
from mouth to Confluence		73	-EPA	▲*EPA & Pa. Fish	▲ Commission	▲	pH, temp., turbidity, acidity (aband ed mines) (coldwater classification from Confluence to Indian Creek).
from Confluence to head-water	434	60	- EPA	- EPA* & Pa. Fish	▲ Commission	▲	pH & temp. only problemsa no buffer for acidity of abandoned mines (site of demonstration project).
Sewickley Creek	168	28	- EPA	- *EPA	-	●	AMD, temp* (active now, abandoned later)(coldwater classification from Jacks Run to source) site of ARC demonstration project.

*Estimated

Table II

Stream Water Quality Table (continued)

STREAM	DRAINAGE AREA (Sq. Mi)	LENGTH (Miles)	MEETING STANDARDS FOR RECREATIONAL USES				PROBLEMS AND COMMENTS
			Pre-1970	Present	1977	1983	
Jacobs Creek	95	31	– EPA	*EPA & Pa. Fish Commission	▲	▲	pH, Coliform, temp* (abandoned mine) trout stocking in areas.
Indian Creek	126	29	– EPA	*EPA	★	★	pH, acidity (abandoned mines) cold-water classification
Laurel Hill Creek	125	34	– EPA	★ *EPA & Pa. Fish Commission	★	★	minor pH problem-no buffer acid from abandoned mines. Coldwater class.
Casselman River (Mon tribs)	465	68	– EPA	– *EPA	–	–	AMD, temp* (abandoned mines)warm-water classification
Peters Creek	52	16	– EPA	– EPA*	●	●	pH, Coliform, temp., trout stocking in headwaters.
Pigeon Creek	59	20	– EPA Pa. Fish	● *EPA& Commission	●	●	Coliform, temp.(slight) trout stocking in headwaters.
Redstone Creek	109	29	– EPA	– *EPA	–	●	pH, acid, fecal Coliform, temp.(slight) abandoned AMD.
Tenmile Creek (Pa.)	138	36	– EPA	● *EPA Pa. Fish Commission	▲	▲	AMD,(Marianna Mine active now treating discharge)trout stocking in places. Occasional oil spills.
South Fork Tenmile	200	38	– EPA	– *EPA	–	●	Coliform, warmwater classification. Occasional oil spills
Whitely Creek	55	23	– EPA	● *EPA & Pa. Fish Commission	▲	▲	AMD, temp. (abandoned mines) Occasional oil spills.

*Estimated

Table II

Stream Water Quality Table (continued)

STREAM	DRAINAGE AREA (Sq. Mi)	LENGTH (Miles)	MEETING STANDARDS FOR RECREATIONAL USES				PROBLEMS AND COMMENTS
			Pre-1970	Present	1977	1983	
Georges Creek	66	17	– EPA	● *EPA	▲	▲	AMD (abandoned mines).
				Pa. Fish Commission			
Dunkard Creek	234	47	– EPA	● *EPA	●	▲	AMD from active mines in past now
				Pa.&WVa Fish Commissions			being treated, warmwater class.
							Frequent oil spills.
Cheat River Mainstem							
from mouth to Pringle Run		37	– EPA	– *	–	–	AMD, temp from active & abandoned
				EPA & W. Va.			mines.
from Pringle Run to Parsons		41	▲ *EPA	▲ *	▲	▲	Temp. slight, occasional AMD.
				EPA & W. Va.			
(tribs. to Cheat River)							
Big Sandy Creek upstream of	116	15	★ *	★ *	★	★	Stocked with trout.
Little Sandy Creek			EPA & WV	EPA & WV			
Big Sandy Creek downstream	96	30	– EPA	– * EPA & WV	–	–	AMD, temp* abandoned surface mines &
of Little Sandy Creek							Coliform from Brandonville.
Muddy Creek	34	16	– EPA	– EPA* &	–	–	AMD temp* (abandoned mines).
				WV			
Shavers Fork	215	83	– EPA	● *	●	●	AMD at times, Coliform, temp (active
				EPA & WV			and abandoned mines).
Black Fork		4	● EPA	● EPA*	●	★	AMD from Blackwater River.
				& WV			

*Estimated

Table II

Stream Water Quality Table (continued)

STREAM	DRAINAGE AREA (Sq. Mi)	LENGTH (Miles)	MEETING STANDARDS FOR RECREATIONAL USES				PROBLEMS AND COMMENTS
			Pre-1970	Present	1977	1983	
Blackwater River downstream of Beaver Creek (including)	66	26	- EPA	- *EPA & WV	●	▲	AMD, temp (abandoned mines).
Blackwater River upstream of Beaver Creek	74	21	★ *WV	★ *WV	★	★	Stocked with trout.
Dry Fork	345	36	★ *WV	★ *WV	★	★	Stocked with trout.
Robinson Run	7	5	-EPA	-EPA	-	▲	AMD - active mines.
Scotts Run	15	6	-EPA	-EPA	-	●	AMD - active mines, bacteria.
Dents Run	14	9	-EPA	-EPA	-	●	AMD - Coliform, site of demonstration project (active mine problem).
Deckers Creek	65	24	-EPA	-EPA	-	●	AMD - Coliform, suspended solids (inactive mine problem).
Booths Creek	22	9	-EPA	-EPA	-	●	AMD (inactive mine problem).
Indian Creek	21	8	-EPA	-EPA	-	●	AMD (active mine problem).
Buffalo Creek	134	29	-EPA	-EPA*	-	●	Coliform, temp, poorly treated sewage. Occasional oil spills.
West Fork River mainstem from mouth thru Hackers Creek		57	-EPA	-EPA*	●	●	Coliform, moderate pH & temp mostly inadequate sewage treatment. Frequent oil spills.
from Hackers Creek to Roanoke		25	-EPA	● EPA*	●	●	Minor acid & temp. problems.
from Roanoke to headwater	44	16	▲ EPA*	▲ EPA*	▲	▲	Temp too warm for trout reproduction
Simpson Creek	75	28	-EPA	-EPA*	-	-	AMD (abandoned sources).

*Estimated

Table II

Stream Water Quality Table (continued)

STREAM	DRAINAGE AREA (Sq. Mi)	LENGTH (Miles)	MEETING STANDARDS FOR RECREATIONAL USES				PROBLEMS AND COMMENTS
			Pre-1970	Present	1977	1983	
Tenmile Creek (W. Va.)	125	30	-EPA	-EPA*	-	●	AMD, Coliform* Frequent oil spills.
Elk Creek	121	32	-EPA	-EPA*	●	●	AMD, (inactive sources) demonstration area, Coliform*, some parts stocked with trout for put & take fishing.
Tygart Valley River mainstem from mouth thru Roaring Creek		69	-EPA	-EPA*	-	●	AMD (abandoned sources) Coliform temp* (slight)
from Roaring Cr. to headwaters (tribs to Tygart Valley River).	324	61	-EPA	-EPA*	●	●	Coliform, temp* (slight) meets warmwater fish requirements.
Threefork Creek	106	26	-EPA*	-EPA*	-	-	AMD (abandoned sources).
Sandy Creek	52	14	-EPA	-EPA*	-	-	AMD (abandoned sources).
Buckhannon River	309	61	-EPA	-EPA*	-	●	AMD (mines closing) Coliform* stocked with put & take trout near headwaters.
Middle Fork River	151	39	★ *EPA WV	★ *EPA WV	★	★	Moderate acid difficulties at times but stocked with trout.

*Estimated

PAGE NOT

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B I B L I O G R A P H Y

1. "CONFERENCE in the Matter of Pollution of the Interstate Waters of the MONONGAHELA RIVER AND ITS TRIBUTARIES," Dec. 17, 1963.

2. "Summary Report, MONONGAHELA RIVER MINE DRAINAGE REMEDIAL PROJECT", 1971.

3. "The Status of Active Deep Mines In The Monongahela River Basin", January 1973.

4. Stream water quality data from State and Federal studies available from STORET.

5. Report in preparation by the Pennsylvania Fish Commission.

6. Report in preparation by the West Virginia Department of Natural Resources, Division of Fish and Wildlife.

7. Unpublished data from special enforcement surveys of plants in the basin.