STATE OF OHIO

ANNUAL WATER QUALITY REPORT

Submitted Pursuant to the Requirements of

Section 305(b)

Federal Water Pollution Control Act Amendments 1972

May , 1977

The Ohio Environmental Protection Agency
Columbus, Ohio 43215

1976 Water Year

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INTRODUCTION

This document is the third annual water quality report prepared by the Ohio Environmental Protection Agency (Ohio EPA).

1. Purpose of Report

Section 305 (b) of the 1972 Federal Water Pollution Control Act Amendments (Public Law 92-500) requires that each state submit an annual water quality report to the Administrator of the Federal Environmental Protection Agency. The report should include:

1) A description of the water quality during the preceding year of all navigable waters in the state (October through September);
2) An analysis of the extent to which all navigable waters of the state provide for the protection and propogation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water;
3) An analysis of the extent to which elimination of the discharge of pollutants will accomplish these objectives;
4) An estimate of the economic and social costs and benefits associated with the Act;
5) A description of the nature and extent of nonpoint sources of pollutants and recommendations for programs to control each category of sources, including an estimate of the costs of implementing such programs.

2. Organization

As requested by the U.S. EPA, this report concentrates on information and data obtained in water year 1976 (October through September). Earlier data was only included where significant trends have been noted. For

each water quality situation, a general sketch of the state of affairs in Ohio is presented.

In general, the comments given are developed from the data collected from each of the water quality monitoring stations. The sampling program from which the data is obtained is described in Section 3. A tabulation of the data collected in the Primary Water Quality Monitoring Network (PWQMN) is presented in Appendix 1. PWQMN data and the individual basin reports are the principal sources of information for the body of this report. Summary reports on field biological investigations and the Ohio Lakes Program are included. Funds required for the State of Ohio to meet Federal Water Quality Goals are presented.

3. Program of Water Quality Inventory

To sample Ohio waters, 91 primary water quality monitoring stations have been established throughout the state using several criteria, such as monitoring water quality upstream and downstream of major dischargers, or placement of monitoring stations where there may be any significant changes in water quality. Also, water quality in the upper reaches of a stream is measured as a reference for the natural stream conditions. High quality use areas are monitored. Measurements are also taken from streams entering from another state.

Particular placement of the 91 stations is left to the professional judgement of Ohio EPA district personnel. Specific criteria used are: availability of historical data at specific stream locations; ability to get a representative stream sample; and physical characteristics of the site.

In addition to the 91 primary stations, there are an additional 56 secondary water quality stations. These stations are located between

primary water quality stations where there is a specific data gap, and where additional data on relatively simple measured parameters can be collected. The purpose of each water quality station, whether it be primary or secondary, is to obtain indicator tests of water quality. By the original Ohio EPA guidelines, each primary station is sampled for 24 parameters on a monthly basis and for 23 additional parameters on a quarterly basis. Table 1 lists those parameters and their significance. Figure 1 shows the location of each of the primary stations, while Table 2 lists each primary station.

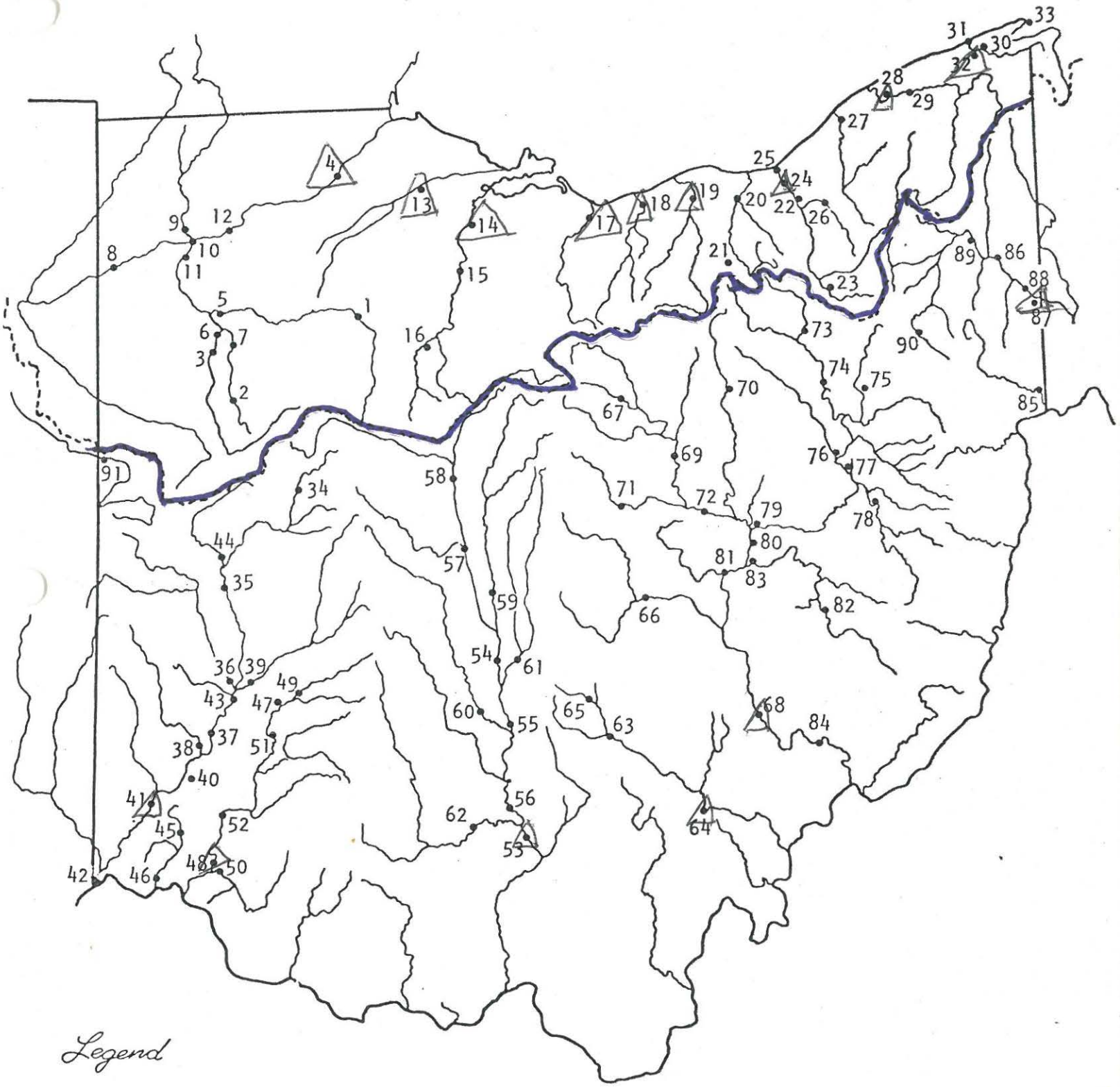
TABLE 1

Ohio EPA Primary Station Parameters

MONTLY	QUARTERLY
1. Flow (U.S.G.S.)	1. Alkalinity, Total, CaCO3
2. Water Temperature (field)	2. Acidity, Total, CaCO3
3. pH (field)	3. Hardness, Total, CaCO3
4. Dissolved Oxygen (field)	4. Sulfate, SO4
5. Conductivity (field)	5. Fluoride, Diss., F
6. Turbidity	6. Calcium, Total, Ca
7. Residue, Total Nflt. (Susp.)	7. Magnesium, Total, Mg
8. Residue, Total Flt. (Diss.)	8. Potassium, Total, K
9. Residue, Total	9. Sodium, Total, Na
10. Total Kjeldahl Nitrogen	10. Arsenic, Total As
11. Nitrogen, Ammonia, N	11. Barium, Total, Ba
12. Nitrite, N	12. Cadmium, Total, Cd
13. Nitrate, N	13. Chromium, Total, Cr
14. Phosphorus, Dissolved, P	14. Chromium, Hex, Cr
15. Phosphorus, Total, P	15. Copper, Total, Cu
16. Chloride, Cl	16. Iron, Total, Fe
17. BOD, 5 day	17. Lead, Total, Pb
18. COD	18. Manganese, Total, Mn
19. Carbon, Total Org., C	19. Mercury, Total, Hg
20. Cyanide	20. Selenium, Total, Se
21. MBAS	21. Silver, Total, Ag
22. Phenols	22. Zinc, Total, Zn
23. Fecal Coli, Total, MF	23. Oil-grease, Total
24. Fecal Strep, Total MF	

FIGURE 1

LOCATION OF PRIMARY WATER QUALITY MONITORING STATIONS
OHIO EPA WATER QUALITY INVENTORY PROGRAM



NOTE:
Data for minor tributaries of the Ohio River are furnished by the Ohio River Regional Commission

TABLE 2

Primary Water Quality Monitoring Stations

Maumee River Basin

1. Blanchard R. near Findlay
2. Ottawa River at Allentown
3. Auglaize R. near Fort Jennings
4. Maumee R. at Waterville
5. Blanchard R. above Dupont
6. Auglaize R. near Cloverdale
7. Ottawa R. at Kalida
8. Maumee R. at Antwerp
9. Tiffin R. in Defiance
10. Maumee R. at Defiance
11. Auglaize R. near Defiance
12. Maumee R. at Florida

Portage River Basin

12. Portage R. Woodville

Sandusky River Basin

14. Sandusky R. near Fremont
15. Sandusky R. near Mexico
16. Tymochtee Crk. at Crawford

Huron River Basin

17. Huron R. at below Milan

Vermilion River Basin

18. Vermilion R. near Vermilion

Black River Basin

19. Black R. at Elyria

Rocky River Basin

20. Rocky R. near Berea
21. W. Br. Rocky R. below Medina

Cuyahoga River Basin

22. Cuyahoga R. at Independence
23. L. Cuyahoga R. at Akron
24. Cuyahoga R. at Cleveland-Lower Harvard Avenue
25. Cuyahoga R. at Cleveland-3rd Street
26. Tinkers Crk. at Bedford

Chagrin River Basin

27. Chagrin R. at Willoughby

Grand River Basin

28. Grand R. at Painesville
29. Grand R. near Painesville

Ashtabula River Basin

30. Ashtabula R. at Ashtabula
31. Ashtabula R. at 6th Street
32. Fields Brook at 15th Street

Conneaut Creek Basin

33. Conneaut Crk. at Conneaut

Great Miami River Basin

34. Miami R. at Lakeview
35. Miami R. below Piqua
36. Stillwater R. at Dayton
37. Miami R. at Miamisburg
38. Twin Crk. near Franklin
39. Mad R. near Dayton
40. Dick's Crk. near Excello
41. Miami R. at Hamilton
42. Miami R. near Lawrenceburg
43. Miami R. at Dayton
44. Loramine Crk. near Lockington

Mill Creek Basin

45. Mill Crk. at Sharonville
46. Mill Crk. at Cincinnati

L. Miami River Basin

47. Beaver Creek near Alpha
48. L. Miami R. at Milford
49. L. Miami R. near Oldtown
50. E. Fork L. Miami near Milford
51. L. Miami R. near Spring Valley
52. L. Miami R. near Foster

Scioto River Basin

53. Scioto R. at Higby
54. Scioto R. at Shadeville
55. Scioto R. near Circleville
56. Scioto R. at Chillicothe
57. Mill Crk. at Bellpoint
58. Scioto R. near Prospect

Scioto River Basin (con't)

59. Olentangy R. near Worthington
60. Big Darby Crk. at Darbyville
61. Big Walnut Crk. at Rees
62. Paint Crk. near Bourneville

Hocking River Basin

63. Hocking R. at Enterprise
64. Hocking R. at Athens
65. Hocking R. at Lancaster

Muskingum River Basin

66. Licking R. below Newark
67. Rocky Fork Below Mansfield
68. Muskingum R. at McConnellsville
69. Mohican R. at Greer
70. Killbuck Crk. below Wooster
71. Kokosing R. below Mt. Vernon
72. Walhonding R. at Nellie
73. Tuscarawas R. at Clinton
74. Tuscarawas R. Massillon
75. Nimishillen Crk. at North Industry
76. Sugar Crk. above New Philadelphia
77. Tuscarawas R. below New Philadelphia
78. Stillwater Crk. below Dennison
79. Tuscarawas R. at Coshocton
80. Muskingum R. below Coshocton
81. Muskingum R. at Dresdon
82. Wills Crk. below Cambridge
83. Wills. Crk. near Conesville
84. Muskingum R. below Beverly

L. Beaver Creek Basin

85. L. Beaver Crk. near E. Liverpool

Mahoning River Basin

86. Mahoning R. at Niles
87. Mahoning R. at Lowellville
88. Mahoning R. at Struthers
89. Mahoning R. at Warren
90. Mahoning R. at Alliance

Wabash River Basin

91. Wabash R. at State Line

NONPOINT SOURCES OF POLLUTION

Nonpoint sources of pollution are diffuse in nature, entering waterways over a wide spatial range by dispersed pathways. Examples of nonpoint sources of pollution include mine drainage, agricultural runoff, urban stormwater runoff, streambank erosion, runoff from animal feedlots, and combined sewer overflows. Water quality problems associated with nonpoint sources of pollution are most severe following periods of high runoff (i.e., spring rains or after moderate to intense rainfall following a period of extended dryness or moderate rains following a period of drought). This section will discuss several types of nonpoint sources of pollution and will evaluate their impact on the water quality in Ohio.

1. Mine Drainage

A. Introduction

Coal mining in Ohio dates back to the early 1800's when coal was locally extracted for home heating. Most of this early mining was by shallow underground drift mining methods, although in scattered areas where coal seams were very close to the surface, surface mining methods were employed. Coal mining gained industrial status by the 1850's when statewide distribution of the product was achieved.

Since then, the Ohio coal industry has undergone fantastic growth. Today, Ohio is a major coal producing state, with 46.6 million tons being mined in 1975. Of this, 67% was produced by surface mining operations. The picks and shovels of early days have been replaced by electrically operated shovels and draglines, with bucket capacities sometimes greater than 220 cubic yards. This type of equipment and production has placed Ohio fifth in the nation in surface mine production in recent years.

The growth of the industry was not without serious long term liability. This liability today represents more than 370,000 acres of land requiring reclamation and over 1300 miles of Ohio streams continuously or intermittently affected by the discharge of 1,000,000 pounds of acid in water per day from inactive mining operations.

The current situation is a result of these past factors: (1) poor mining practices, (2) limited technical development in the fields of mining engineering and reclamation science, (3) lack of general public concern, (4) lack of well enforced regulations relating to sources of coal mining pollution, and (5) natural phenomena associated with strip and deep mining.

Present mining operations can and generally are doing a respectable

job in the control of pollution. The Ohio strip mine law passed in 1972 is among the more stringent in the country. The technology to control most coal mining-related pollution is available and being used by some coal mining companies.

The spread of the mining pollution problem from active mines has greatly been reduced. However, pollution from the inactive areas is and will continue to be a major water quality problem in the mining regions of the state.

B. Affected Areas and Problems

Mine drainage significantly impacts water quality in the following drainage areas of the state:

1. Muskingum River Basin
2. Hocking River Basin
3. South Central Minor Tributaries of the Ohio River
4. Southeast Minor Tributaries of the Ohio River

The geographic area drained by these basins includes portions of 35 Ohio counties and covers over 12,000 square miles. The affected area is basically parallel to the Ohio River, which also serves as its eastern and southern boundaries. The Cleveland-Ashtabula, Youngstown area is the northern boundary while a line from Cleveland through Columbus to Portsmouth forms the western boundary.

Looking at the problem basin-by-basin, we find the following:

1) Within the Muskingum River Basin approximately 520 miles of stream are either continuously or intermittently polluted by mine drainage. Mine drainage contributes roughly 100 tons of sulfate per day to the Tuscarawas River between Massillon and Newcomerstown. In

addition to this, 8 tons of acidity per day enter the Muskingum River at the confluence of Moxahala Creek in Muskingum County just below Zanesville.

In the eastern portion of the basin, sulfates and dissolved solids are problem components especially in the Piedmont Lake area. Excessive concentrations of these components have rendered Piedmont Lake unsuitable as a source of potable water, although the recreational and fishery potentials of the lake have not been affected.

2) In the Hocking River Basin, most major tributaries are affected by mine drainage including Rush Creek, Sunday Creek, Monday Creek, and Federal Creek. The total length of affected stream is in excess of 220 miles in the above mentioned tributaries. Sunday and Monday Creeks are continuously acidic and contribute roughly 13 tons/day and 19 tons/day respectively of total acidity to the Hocking River. Rush Creek and Federal Creek are generally a neutral pH at the point of confluence. However, heavy rains in the upper portions of these watersheds can, and do result in 'slugs' of strongly acidic water entering the stream. This slugging has caused, and will continue to cause fish kills in these tributaries as well as in the Hocking River below their confluence. Water quality in the upper Rush Creek area is extremely poor. Iron, sulfates and manganese are currently causing water supply problems for the Perry County community of New Lexington.

3) The South Central minor tributaries of the Ohio River including Yellow Creek, Short Creek, Cross Creek, Wheeling Creek, McMahon Creek, Captina Creek, Sunfish Creek, and Duck Creek appear to be significantly degraded by mine drainage. The combined lengths and

drainage areas for these small watersheds are 270 miles and 1300 square miles respectively. In addition, the Little Muskingum River (length 67 miles, drainage area 314 square miles) is considered to be slightly to moderately degraded by mine drainage.

4) The portions of the Southeast Ohio River minor tributaries located between Marietta and Portsmouth are considered to be affected by mine drainage to various extents, ranging from insignificant to extremely severe. Total stream miles affected is approximately 700. Of this, significantly affected streams comprise 250 miles. Much of the affected area is owned by either the State of Ohio or the Federal Government and, apart from the pollution from inactive coal mines, is ideally suited for wildlife and recreational uses.

The most serious water quality problems are found in Raccoon Creek, which is not only the largest minor Ohio River tributary, but also the longest "creek" in the world. In this basin, acidity concentrations in excess of 1000 mg/l and pH readings of 2.2 have been recorded.

It is evident that mine drainage is a major water quality problem affecting the unglaciated portions of Eastern and Southeastern Ohio. It has caused the degradation of more than 1300 miles of some of the state's most beautiful streams. It has caused fish kills, and has made the water in some areas unsuitable for many uses.

Current legislation and regulations are an attempt to bring a reduction to the problem. The coal industry for the most part does comply with current reclamation and pollution control laws. The major problem remaining will be the control of the pollution emanating from the countless inactive mining operations throughout the area. The responsibility of this control necessarily rests to a large degree upon the Federal Government, since national energy demands are served by the coal producing states.

C. Formation of Mine Drainage

The removal of overburden often exposes pyritic materials (iron disulfide). As shown in equations 1 and 2, the exposure of this material to air and moisture results in the production of ferrous iron and sulfuric acid. The reaction then proceeds to form ferric hydroxide and more acid, as shown in equations 2 and 4.

$$2FeS_2 + 2H_2O + 7O_2 \rightarrow 2FeSO_4 + 2H_2SO_4 \quad (1)$$

(Pyrite) → (Ferrous Sulfate) + (Sulfuric Acid)

$$FeS_2 + 14Fe^{+3} + 8H_2O \rightarrow 15Fe^{+2} + 2SO_4^{-2} + 16H+ \quad (2)$$

(Pyrite) + (Ferric Iron) → (Ferrous Iron) + (Sulfate) + (Acid)

$$4FeSO_4 + O_2 + 2H_2SO_4 \rightarrow 2\ Fe_2\ (SO_4)_3 + 2H_2O \quad (3)$$

$$Fe_2\ (SO_4)_3 + 6H_2O \rightarrow 2Fe(OH)_3 + 3H_2SO_4 \quad (4)$$

As a result, the reaction of one molecule of pyrite ultimately leads to the release of four atoms of acid hydrogen.

Consequently, highly acidic water is often produced*. In such water, heavy metals such as iron, manganese, aluminum, and zinc are more soluble and enter into the solution to further pollute the water. Water of this type supports only limited water flora, such as acid-tolerant molds and algae; it will not support fish life; it destroys and corrodes metal piers, culverts, barges, etc; it increases the cost of water treatment for power plants and municipal water suppplies, and leaves the water unacceptable for recreation.

The amount and rate of acid formation, and the quality of water discharged depend on the amount and type of pyrite in the overburden and coal, time of exposure characteristics of the overburden,

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* pH is a common measure of acidity or alkalinity of water. A pH of 7.0 is neutral. A lower pH is acidic, higher is alkaline. For stream water a pH of 2.0 - 4.5 is very acid indeed.

and amount of available water. Crystalline forms of pyritic material are less subject to weathering and oxidation. Since oxidation is the primary reaction during early acid formation, less pyritic material exposed to air means less acid formation. Thus, an effective preventive method is to cover pyritic materials as soon as possible with earth, which serves as an oxygen barrier.

If the overburden also contains alkaline material such as limestone, acid water may not be discharged even though it is formed, because of inplace neutralization by the alkaline material. Discharges from this situation are usually high in sulfate. Enough water to satisfy equations 1, 2, and 4 is usually available in the overburden and coal material. Water also serves as the transport media that removes the oxidation products from the mining environment into streams.

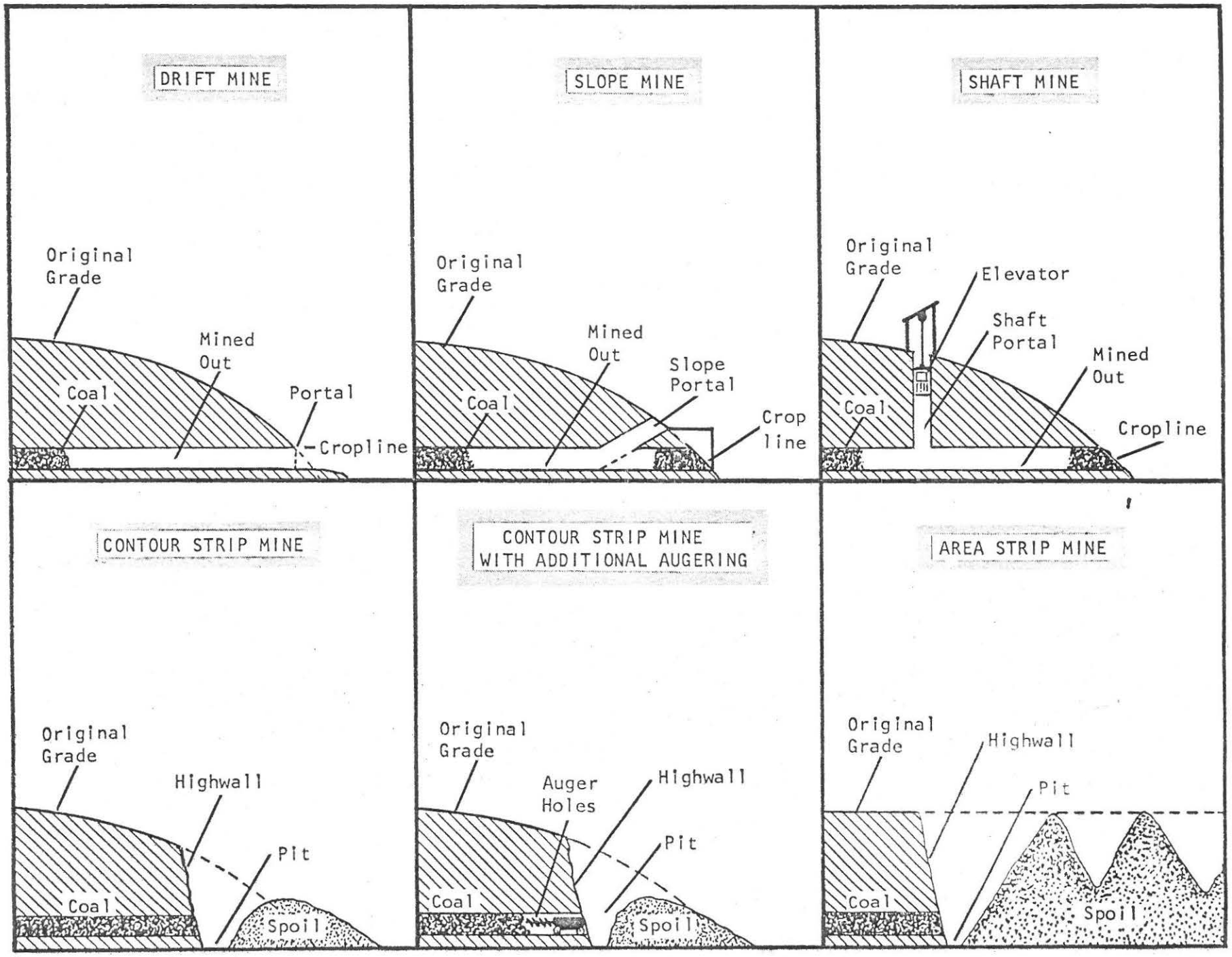
D. Discharge of Mine Drainage

The different types of mining operations is shown in Figure 2 . In underground mines, drift mines tend to produce a more highly acid water than do slope or shaft mines. This is because drift mine openings, being at the coal line, tend to allow any infiltration into the workings to drain out. Drift mines commonly yield mine water on a perpetual, yet unpredictable basis. Slope and shaft mines, because of the nature of the openings, tend to fill up more completely with water, thus sealing off oxygen and restricting acid production.

In surface mining operations, acid can be produced in the pit, on the face of the highwall, in any auger holes, and in the spoil. The requirements for acid production are the same as for underground operations, namely (1) pyrites, (2) oxygen, and (3) water.

FIGURE 2

TYPES OF COAL MINING OPERATIONS



Also, as in underground operations, control of the drainage is best affected by limiting one of these three primary constituents.

Acid water is also produced in coal refuse or gob piles. These piles are comprised of wastes from coal preparation and cleaning processes, the major objective of which is the removal of pyrites and other contaminants from the coal. The standard practice for many years has been to dispose of this refuse by dumping it along a stream bank or in a hollow which is close to the mining operation. Because of the loosely compacted nature of these piles, infiltration of both air and water is great and acid production extremely high.

Once produced, the acid may be either neutralized relatively rapidly, or may enter the stream virtually unaltered. The former case is the general rule where the spoil is predominantly of calcareous or limestone origin. In such cases, the acid is usually neutralized by the residual calcium carbonate according to the following reaction:

(Calcium Carbonate-Limestone) + (Sulfuric Acid) → (Gypsum) + (Water) + (Carbon Dioxide Gas)

The resultant discharge, while not acidic, generally contains high levels of hardness, total dissolved solids, and sulfate. These constituents, while they generally do not hurt aquatic life, do limit the consumptive (water supply, industrial, and agricultural) uses of the water.

Where limestone is not present, the residual soils are generally of a sandstone origin and are for the most part already acidic. In such cases, chemcial treatment of the acidic water is necessary to neutralize the acidity. The general principle is similar to the natural process discussed above with limestone or lime commonly used.

In limestone areas, the neutralization of the discharge causes

all or part of these dissolved metals to precipitate out as insoluble carbonates, sulfates, or hydroxides. This results in a sediment problem in the receivng stream, and can give the water a turbid appearance.

In sandstone areas, natural neutralization does not take place, so the dissolved components remain dissolved until the receiving stream's acidity is neutralized; usually at the confluence with a non-acid stream. In these cases, precipitation of the dissolved metals and associated sedimentation and turbidity problems are found below the confluence. This condition is present for example below the confluences of 1) Moxahala Creek and the Muskingum River, 2) Sunday and Monday Creeks and the Hocking River, 3) at the confluence of acidic minor Ohio tributaries and the Ohio River.

E. Control Alternatives, Needs, Costs

There are two distinct approaches to the control of mine drainage. One involves the collection and treatment of the mine drainage, while the other is oriented toward reclamation of the area to control the production and discharge of polluted water.

In the former case, conventional mine drainage treatment systems similar to those employed at active mining operations are used. Such systems are generally designed as follows:

1) Sandstone (acid) substrates

(collection) → (neutralization) → (aeration) → (clarification) → (discharge)

2) Limestone (non-acid) substrates

(collection) → (clarification) → (discharge)

Construction costs for these systems are moderate as earthen ponds

are commonly employed. Major construction costs are earthmoving, pumps, aerators, etc., while operational costs are predominately chemical (neutralization - usually slaked lime, crushed limestone, sodium hydroxide, or soda ash), power, and maintenance. The major drawback to the treatment oriented approach is the continual long-term cost of system operations and maintenance.

In the reclamation-oriented approach, initial costs are generally higher, although in many cases circumstances on site can affect cost. For example, a site with an inactive and unreclaimed contour strip operation may have sizable recoverable coal reserves and thus, the value of the coal may augment the otherwise high reclamation costs. The main advantages to this approach are twofold: 1) The elimination of the long-term operational costs required by the treatment approach and 2) The restoration of the area for improved esthetics.

In 1972, Ohio passed one of the toughest surface mining laws in the United States. More recent legislation has provided that the 4 cent per ton severance tax be used by the Divison of Reclamation for the reclamation of inactive mine sites. Although current laws provide for such reclamation only on state-owned land, legislation introduced in this legislative session provides for such reclamation on private land as well.

F. Costs

The costs presented below were reported by the Ohio Board on Unreclaimed Strip Mine Lands in their 1972 report entitled 'Land Reborn'. The costs are based on 1972 dollars, and should generally be increased by a factor of 1.5 to reflect current costs. Also, cost values are subjective and actual dollar costs can be developed only by the actual experience acquired during reclamation.

Basin	Cost (Thousands of Dollars)	
	Surface Mine Reclamation	Underground Mine Reclamation
Hocking River	19,740	98,500
Muskingum River	102,152	201,700
Ohio River Tributaries South Central	50,853	80,000
Ohio River Tributaries Southeast	70,080	61,550
Totals	260,825	441,750

Summing up, the estimated cost for complete mine reclamation in 1972 dollars is over $700,000,000 state-wide; after allowances for inflation, the cost will probably be over $1 billion in 1977 dollars.

Such costs are staggering and it is apparent that at the current severance tax credit of roughly 3 million per year, reclamation of all sites will be in the distant future.

A possible relief could come through previously proposed Federal legislation relating to surface mining and unreclaimed mine lands. Federal assistance could relieve the otherwise awesome financial obligation of mine land reclamation. Such a program should definitely put the majority of the money in the hands of State programs such as Ohio's so that it could be spent where it is needed most.

As an off-shoot, the Ohio coal industry stands to benefit from a reaffection type of approach, since the severance tax paid by the coal operations would be returned to them as payment for reclamation of inactive and unreclaimed areas.

G. Summary

As has been shown, a significant percentage of total stream miles in Ohio is currently degraded by mine drainage. Portions of this percentage

will have to be considered as degraded from irretrievable man-induced conditions, at least with respect to the 1983 goals of the Act.

In other areas, improvements may be affected or accomplished through the Land Reborn Program of the Department of Natural Resources. Funds and legislative authority are currently limited, however, and not sufficient for large scale, short term projects.

Protection of these streams from further degradation by existing and future dischargers is of primary importance. The technology to control pollution from such sources is currently available. The past practices of reduction in pollution control requirements for dischargers to these streams must cease if pollution control is to be effective. Accordingly, it is strongly recommended that these streams be classified as warm water fisheries and as suitable for such a use designation in all respects with the exception of the discharge of pollutants from inactive mining operations in the basin.

2. Agricultural Runoff of Sediment

The runoff from Ohio's croplands is a major contributor to water quality problems in many of Ohio's river basins. Notable among these are Maumee, Portage, Sandusky, Huron, Vermillion, Ashtabula, Scioto, Little Miami, and Great Miami Basin. A study by the Great Lakes Basin Commission concluded that in the Maumee River Basin, sediment was the greatest single non-point source pollutant, by weight from streams in the Lake Erie basin. This study as well as research being undertaken by the Corps of Engineers (Buffalo District Office), Toledo Metropolitan Council of Governments, investigations by scientists at Heidelberg College and Ohio State University, the Ohio Agricultural Research and Development Center, and others have illustrated the magnitude and impact of this problem on Ohio's waterways and lakes.

The net result of soil erosion from cropland is an increased level of suspended solids. This increased level of suspended solids creates high levels of turbidity in the water as well as a brown discoloration of the stream which is bad because it reduces light for photosynthesis and prevents the growth of some animal and plant life on stream beds. Rural runoff is also very detrimental from another aspect; transporting phosphorus and nitrogen compounds, pesticides and herbicides, and heavy metal ions attached to the sediment and dissolved in the water.

The adsorbing and transporting characteristics of suspended solids give rise to costly problems. For example, it is more costly for a water treatment plant to purify raw water having a high suspended solids content because more chemicals must be added during the treatment process to coagulate and precipate this material prior to filtering. Also, the cost of maintenance dredging to remove sediment from reservoirs, harbors on Lake Erie, and drainage ditches

and small streams continues to increase. Presently dredging costs to maintain Toledo Harbor totaled $1,500,000 in 1976 (1.7 million cubic yards) as compared to about $381,000 (1.1 million cubic yards) in 1965 (cost are dependent on size of dredge used, yardaged dredged, and proximity to disposal area). Ohio Department of Natural Resources spends approximately $500,000 annually for maintenance dredging of state owned lakes.

The indirect, adverse effects of suspended solids are more difficult to cost out and in many cases, cost figures cannot be determined. In recent years, much concern has been expressed regarding the movement of phosphorus and nitrogen compounds from croplands to Lake Erie. Scientists now believe that it is these two nutrients which appear to be most responsible for algae blooms in streams and Lake Erie, and for the accelerated rate of eutrophication (enrichment) of Lake Erie. Deposition of suspended solids causes destruction of aquatic habitat which in turn has an adverse impact on game and commercial fish by destroying food supplies and spawning grounds. A study of the benthic macroinvertebrate populations of Sandusky Bay by Herdendorf and Lindsay[1] revealed that the benthic species composition in Sandusky Bay has experienced a significant change in recent years. Apparently, eroded sediment carried by the Sandusky River and deposited in the Bay, has effected this change. Thirty-five years ago, fly larvae (dipterans) were the predominant benthic species in the Bay. They required a sand and gravel or hard clay bottom for survival. Today, sludge worms have replaced dipterans as the predominant benthic species. Sludge worms prefer a mud and silt bottom habitat which the Bay now provides. In thirty-five years, fly larvae, indicative of an oligotrophic state, have been replaced by sludge worms, indicative of a highly eutrophic state.

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1 Lindsay, W.K. & Herdendorf, C.E., Benthic Invertebrate Populations In Sandusky Bay, in Proceedings of Sandusky River Basin Symposium, May 2-3, 1975, Tiffin, Ohio.

The sediment loads carried by streams can amount, in many cases, to thousands of tons in any given year. It has been estimated that Lake Erie receives 8 million tons per year of sediment from Ohio rivers and streams. Of this total, the Maumee River contributes between 20-25% of the load. The Great Lakes Basin Commission study estimates that the current normal gross erosion rate for the Maumee River Basin drainage area to be about 11.5 million tons per year or an average of 2.61 tons per acre per year. This same study calculated the yearly sediment yield in the Maumee Basin to be 1.27 million tons or 0.29 tons per acre per year. This is about 11% of the total gross erosion discharged as suspended sediment to Maumee Bay annually. The 1.27 million figure agrees well with the U.S. Geological Survey figure of 1.24 million tons of suspended sediment passing the Waterville gage annually. Table 3 gives a breakdown by subbasins of the estimated normal gross erosion in the Maumee River Basin drainage area. The data indicates that the St. Joseph, St. Mary's, and Tiffin Basins are experiencing erosion rates greater than the remainder of the basin. Steeper slopes or different soil types may explain the accelerated erosion rates found in these basins.

The river basins surrounding the Maumee Basin have similar soil types and land use patterns. Their sediment yield (tons/acre/year) to Lake Erie is likewise similar. The Portage, Sandusky, and Huron Basins had annual sediment yield rates of 0.19, 0.37 and 0.33 tons/acre/year respectively as measured at the U.S. Geological Survey monitoring stations at Woodville on the Portage, near Fremont on the Sandusky, and at Milan on the Huron. However, in terms of total annual sediment discharged to Lake Erie, these three basins combined contribute only about 34% of the total that the Maumee River discharges annually to Lake Erie. The extent of nonpoint souces of pollution is best illustrated by a finding of Baker and Kramer, that 75% of the total phosphorus

TABLE 3

ESTIMATED CURRENT NORMAL GROSS EROSION** IN MAUMEE BASIN*

(Total Area, Including Urban & Streambank)

Sub-Basin Name	Total Acres	Total Tons	Tons Per Acre Per Year
Upper Maumee	222,989	401,000	1.6
Lower Maumee	585,110	901,000	1.3
North of Bay	115,432	162,000	0.9
South of Bay	22,364	22,000	0.8
St. Joseph	636,874	2,658,000	3.8
St. Mary	462,961	1,776,000	3.3
Tiffin	464,375	1,549,000	3.1
Auglaize	969,619	2,786,000	2.6
Blanchard	452,028	1,283,000	2.6
Total	3,931,752	11,538,000	

* Maumee River Basin Level B Study; Erosion and Sedimentation Technical Paper, Great Lakes Basin Commission, August 1975.

** Gross Erosion - total amount of soil movement within the catchment, including all forms of wash and rill erosion from agricultural land, gully and streambank erosion, and erosion from non-agricultural sources such as highway construction; or building development (from Soil Conservation by Norman Hudson, published by Cornell University Press).

delivered to Lake Erie from the Sandusky Basin originates from nonpoint sources.

On a statewide basis, the major rivers are estimated to have a sediment delivery rate of 0.07 to 0.88 tons/acre/year. This fact has added significance when one considers that in a survey conducted by the U.S. Soil Conservation Service (SCS) in 1971, it was found that 48% or 8.2 million acres of the agricultural land considered susceptible to erosion, yields a value of 3.9 million tons of sediment that potentially is being discharged yearly to the Ohio River and Lake Erie by Ohio rivers and streams. This figure could be high because not all the agricultural land in Ohio is susceptible to erosion. In fact, 43% of the total cropland (12.5 million acres) in Ohio is considered to be receiving adequate conservation treatment. In spite of these conservation efforts, the SCS estimates that 35% of Ohio's cropland (4.375 million acres) is subject to soil erosion.

Although the above figures are significant, studies have shown that when compared to other nonpoint sources of sediment (i.e., streambank erosion or construction activities), cropland erosion does not yield the greatest amount of sediment per acre. In fact, other activities, such as construction, may produce anywhere from 10 to 100 times more sediment per acre than does cropland erosion. However, due to the extensive area involved (in Ohio, 66% of the land is used for agricultural purposes), erosion of soil from agricultural land in Ohio produces more total sediment than any other nonpoint source.

Agricultural runoff resulting in erosion of soil has its greatest impact on water quality during periods of high runoff and intense rainfall. The erosion of soil and generation of sediment are triggered by the impact of raindrops striking bare soil at a high velocity (upwards of 20 mph). The raindrops shatter soil granules and detach particles from the soil mass. Water flowing across the soil surface transports these detached particles

downslope. Agricultural scientists have identified five factors that influence soil erosion: (1) rainfall intensity and duration (R), (2) soil erodibility (K), (3) length and steepness of slope (LS), (4) soil management practices (C), and (5) the erosion control practice factor (P). The Universal Soil Loss Equation incorporates these five factors to allow for the computation of the average annual soil loss in tons per acre (A). The equation is given below.

$$A = R \cdot K \cdot LS \cdot C \cdot P$$

From the above discussion, it should be apparent that surface runoff is the mechanism by which sediment is carried to streams. Therefore, land treatment practices should be geared to items 3, 4, and 5 above. The idea is to develop a good vegetative cover which will increase infiltration of water and thereby reduce runoff. Other control practices such as contour cropping and contour strip cropping plus no-tillage planting have proven very effective. These techniques can reduce by up to 90% the sediment load resulting from planting done without attention to this method. Water diversions utilizing stabilized waterways will also help reduce sediment loading.

In summary, sediment from agricultural land should not be thought of as a waste material which has been carelessly discarded, but rather as a valuable natural resource which has found its way to a stream because of soil erosion. The responsibility to correct this problem clearly lies with the farmers of Ohio. Only they can implement proper farming procedures which can minimize soil erosion and at the same time conserve a valuable natural resource.

3. Other Sources

A. Streambank Erosion

The erosion of streambanks produces sediment. The extent and magnitude of this problem in Ohio has not yet been clearly determined. Estimates as to the extent of this problem in the Maumee Basin were presented in a report by the Great Lakes Basin Commission (GLBC). The report cites a study by the Soil Conservation Service (SCS) which found the Auglaize River had more total eroding bank miles than any other river in the Maumee River Basin. The SCS study estimated that 577 bank miles of the Auglaize were eroding at a rate of 84.3 tons per eroding bank mile per year which compares to an average rate of 52.7 tons per eroding bank mile per year for the entire Maumee River Basin. The SCS study found that 77% of the streambanks had received stabilization treatment, which at 1974 prices, was estimated to have cost $121.3 million. An additional 10% of the streambanks were judged to be in need of treatment, which at 1974 prices was estimated to cost 25.6 million.

In the Ohio River Basin, 37,420 streambank miles or 12.7% of the total streambank miles (295,600) are experiencing erosion. Of this total 11,520 miles or 3.9% have severe erosion. The total damage attributable to this problem is estimated to be $3 million annually, while treatment costs to correct this problem are put at $21 million annually.

Streambank erosion can be reduced by: 1) removal of obstructions such as fallen trees or other debris which restrict stream flow and decrease a stream's capacity thereby increasing the flood potential; 2) reshaping stream-banks by decreasing the steepness and at the same time lengthening the banks thereby allowing water to flow onto the bank rather than cut into it; 3) using riprap or other lining to deflect the flow of water particularly at a turn where great pressure is exerted.

B. Feedlot Runoff

Animal production is an important commercial enterprise in Ohio. Like other commercial endeavors, waste materials are generated and if not properly controlled, can have serious adverse effects on water quality. Table 4 tabulates on a yearly basis, starting with 1969, the number of wildlife in streams killed by farm operations. Water quality problems associated with this activity arise primarily from feedlot runoff. Factors influencing feedlot runoff include precipitation, surface material, land slope, depth of waste accumulation, feedlot layout and exposure, and ration composition.

Runoff from feedlots contributes organic and nutrient material to streams and lakes as well as bacterial contamination. These constituents produce high rates of oxygen demand, algae blooms, taste and odor problems, and because of high fecal coliform counts, render the water unsafe for primary contact recreational activities. Runoff from feedlots is also responsible for killing wildlife, especially fish. During water year 1976, a silage liquor spill in a tributary of Massie Creek (Little Miami River Basin) caused an estimated kill of 6,000 fish.

Methods to control feedlot runoff include dikes, diversions, curbs, drainage way relocation, settling areas, and grass filters. Care and adherence to agronomy guidelines in the application of manure to land will help reduce runoff from this source.

C. Urban Runoff & Combined Storm Sewer Overflow

Runoff from urban land can have a significant adverse impact on the water quality of the receiving stream. This type of runoff has been characterized as having many of the same constituents that are found in raw municipal sewage. Urban land runoff may, however, prove to be even worse than raw

TABLE 4

ANIMAL KILLS ATTRIBUTABLE TO FARM OPERATIONS, OHIO, 1969-74*

DATE	COUNTY	WATER	NUMBER	POLLUTANT
1969				
4/28	Fayette	Sugar Cr	27,260	Liquid Fertilizer
5/17	Greene	Anderson Fk	350	Hog Lot
5/31	Paulding	Flat Rock Cr	14	Chemicals
6/11	Morrow	Kokosing R	2,331	Cattle
6/27	Highland	White Oak Cr	29	Lot
7/07	Preble	Elk Cr	500	Lot
8/03	VanWert	Dog Cr	17,402	Herbicide
9/07	Hardin	Taylor Cr	647	Dairy lot, silo
10/6	Ross	Buckskin Cr	98	Silo
1970				
7/08	Montgomery	N. Br. Wolf Cr	11,297	Pesticides
7/13	Highland	Dodson Fk	12,335	Cattle lot, silo, spoiled grain
7/15	Miami	Brush Cr	6,413	Cattle
8/07	Butler	Indian Cr	3,610	Hog lot
8/13	Pickaway	Congo Cr	65	Hog lot
9/25	Morrow	Flat Run	336	Cattle, milk
1971				
4/21	Preble	Four Mile Cr	466	Liquid fertilizer
6/14	Warren	Ritters Cr	118	Silo, manure
7/02	Warren	Newmans Run	7,592	Hog lot
7/11	Pickaway	Scippo Cr	42,354	Hog lot
7/23	Seneca	Rock Cr	12	Dairy Barn
9/04	Tuscarawas	Pleasant Valley Cr	2,600	Silo
9/04	Shelby	Turtle Cr	148	Dairy
9/07	Greene	N. Br. Caesars Cr	1,549	Lot
9/08	Preble	Four Mile Cr	4,233	Silo
9/08	Fairfield	Sycamore Cr	118	Silo
9/09	Preble	Elk Cr	1,723	Hog and cattle
9/10	Huron	Vermilion R	9	Silo
9/11	Tuscarawas	Pleasant Valley Cr	2,588	Silo
9/13	Hardin	Taylor Cr	3,324	Silo
1972				
5/24	Lawrence	Ice Cr	9,797	Chicken
6/01	Stark	Tr Nimishellen Cr	6,437	Chicken
6/07	Warren	E Turtle Cr	193	Cattle
7/18	Madison	Sugar Cr	6	Hog

TABLE 4 (con't)

DATE	COUNTY	WATER	NUMBER	POLLUTANT
1972 (con't)				
7/20	Miami	Brush Cr	445	Cattle
7/26	Adams	Flat Run	62	Manure
8/02	Preble	McKelligan Ditch	75	Silo
9/08	Clinton	Andersons Fk	6,281	Silo
9/14	Miami	Brush Cr	30	Cow
1973				
5/07	Warren	Newman Run	278	Hog manure
5/27	Scioto	Lick Run Cr	602	Chicken manure
6/03	Champ.*	L. Darby Cr	200	Cow manure
6/20	Trumbull	Trib. Mosquito Cr	555	Herbicides
6/26	Wyandot	L. Tymochtee Cr	3	Unknown
7/18	Clinton	Turkey Run	221	Hog manure
7/21	Sandusky	L. Muddy Cr	113	Toxaphene
9/04	Preble	Garrison Br	496	Hog manure
9/17	Auglaize	Owl Cr	275	Dairy wastes
9/19	Ashland	Trib. Grand R	709	Silo liquors
9/22	Crawford	L. Scioto R	147	Silo liquors
9/29	Hancock	Eagle Cr	11,761	Silo liquors
10/4	Union	Rock Fk Cr	500	Silo liquors
10/4	Delaware	Trib. Mill Cr	138	Silo liquors
10/8	Hancock	Lye Cr	42	Silo liquors
10/15	Crawford	Lost Cr	3,802	Hog manure
10/26	Mahoning	Island Cr	197	Silo liquors
1974				
5/03	Preble	Trib.Periwinkle Run	75	Hog lot sewage
5/24	Pickaway	Clarks Run	600	Herbicides
7/17	Champaign	Anderson Cr	280	Farm waste/pesticides
8/13	Madison	Thompson Fk	637	Hog lot sewage
8/27	Marion	Ulsh Ditch	135	Silo liquors
9/08	Crawford	Trib. Sand R	1,104	Silo liquors
9/17	Miami	L. Lost Cr	591	Silo liquors
9/23	Crawford	Mile Run	427	Silo liquors
10/1	Medina	Reeds Run	145	Silo liquors
10/14	Holmes	Mohican River	276	Cattle feedlot manure
11/19	Hancock	Binkley Ditch	4,471	Silo liquors

* From Publication 7, Division of Wildlife, Ohio Department of Natural Resources

sewage because of the load of heavy metals it contains such as mercury and lead. A Durham, North Carolina study which compared urban runoff from a 1.67 square mile watershed found that on an annual basis, the urban runoff yield of chemical oxygen demand was equal to 91% of the raw sewage yield, the biochemical oxygen demand yield was equal to 67%, and the urban runoff suspended solids yield was 20 times that contained in raw municipal waste for the same area.[2]

When considering the impact of urban runoff on water quality, the estimated daily loadings or annual discharge from this source may not be as important as the initial first flush. In fact, urban runoff studies seem to indicate that the critical water quality period may not necessarily be a 10 year, 7-day low flow, but rather the first flush period after a rainfall preceded by a period of low flow. It is during this first flush period that the accumulated oil and grease, heavy metals, nutrients, sediment, salt, etc. are washed from the streets and carried to streams. This source of pollution can be of such significance in urban areas that failure to consider it and make provisions for its control could mean that water quality problems might continue to persist in an area even though adequate control of point sources has been provided. Of significance is the discovery that urban runoff may be a major contributor of heavy metals to Ohio streams. Research on a moderate size city showed that between 100,000 and 250,000 pounds of lead and between 6,000 and 30,000 pounds of mercury annually were carried by urban runoff to a stream.

As noted earlier, the dust and dirt which collects on streets or is washed from urban properties (i.e., lawn fertilizer) contain appreciable quantities of nutrients. Nitrogen yield from urban runoff ranges from

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2 Colston, N.V., 1974, Characterization and Treatment of Urban Land Runoff, U.S. EPA Publication No. 670/2-74-096.

1.9 to 7.8 lbs/acre/year, while the phosphorus yield is from 0.98 to 2.8 lbs/acre/year. These values suggest the potential importance that urban runoff may play in the eutrophication process of Ohio lakes. Urban runoff may also be partly responsible for algae blooms which occur in several Ohio streams.

A study by Earthview, Inc.[3] attempted to estimate the pollutional load from street debris for 19 selected catchments in Toledo using extrapolations of street litter characteristics for Chicago. Earthview estimated the yearly pollutional load from these catchments to be 45.7 tons of BOD and 2,286 tons of suspended solids. The study also estimated the effect of the "peak-flush shock-loading" of a storm event which produced 2 hours of runoff with a two week interval between storms. Such a storm event could result in a BOD runoff load that is as much as 240% of the raw sanitary load, and have a suspended solids concentration of 2300 mg/l.

The effect on water quality in the Sandusky River at Bucyrus, Ohio, from combined sewer overflow was the subject of a year long study. The results showed that any 20 minute rainfall greater than 0.05 inches would produce an overflow.[4] The changes in various parameters between dry and wet weather flow in the Sandusky River at the 1st bridge downstream from the wastewater plant are summarized in Table 5. The effect on various water quality constituents in the Sandusky River due to combined sewer overflows in Bucyrus is clearly illustrated by this data. Table 6 presents estimated annual pollutant loadings to the Sandusky River resulting

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3 Earthview, Inc., 1973, Combined Sewer Pollution City of Toledo, prepared for Voices for Environment, Inc.

4 Burgess & Niple, Ltd., 1969, A Study of Stream Pollution From Combined Sewer Overflows and Feasibility of Alternate Plans for Pollution Abatement in Bucyrus, Ohio, Water Pollution Control Series, No. DAST-32.

TABLE 5

SUMMARY OF DRY AND WET WEATHER RIVER ANALYSIS IN THE SANDUSKY RIVER

AT 1st BRIDGE DOWNSTREAM OF BUCYRUS WASTEWATER TREATMENT PLANT*

Parameter	Dry (Avg)	Wet (Avg)	Wet (Max)	% Change Dry vs Wet
BOD (mg/l)	6	14	51	+ 133
Suspended Solids (mg/l)	49	192	960	+ 292
Total Solids (mg/l)	506	746	1335	+ 47
Total Phosphate as PO_4 (mg/l)	1.6	3.3	10.0	+ 106
Nitrate Nitrogen as NO_3 (mg/l)	6.7	7.5	24.8	+ 12
Ammonia Nitrogen as N (mg/l)	1.5	2.4	6.6	+ 60
Organic Nitrogen as N (mg/l)	2.4	3.8	14.7	+ 58
COD (mg/l)	244	114	220	- 53
Chlorides (mg/l)	38	53	158	+ 39

TABLE 6

ESTIMATED ANNUAL LOADINGS AND YIELDS TO THE SANDUSY RIVER RESULTING FROM COMBINED SEWER OVERFLOWS IN BUCYRUS, OHIO*

Parameter	Annual Loading (tons/year)	Yield** (Lbs/acre/year)
BOD	175	150
Suspended Solids	700	598
Nitrate Nitrogen	6.1	5.2
Total Phosphate as PO_4	15	13

* Data From: A Study of Stream Pollution From Combined Sewer Overflows and Feasibility of Alternative Plans for Pollution Abatement in Bucyrus, Ohio, Burgess & Niple, Ltd., 1969.

** Based on an area of 2340 acres.

from combined sewer discharges at Bucyrus. The study concluded that the most economical method of providing a high degree of protection to the Sandusky River would be collecting the combined sewer overflows with a large interceptor and using an aerated lagoon system to treat the waste load from the overflows. Table 7 gives current and future waste loads from combined sewer overflows and urban runoff from metropolitan areas in northeast Ohio.

By extrapolation of yield values developed by Colston, it is possible to project potential annual pollutant yields from urban runoff in the state. Table 8 presents these values. It is important for the reader to understand that the values listed are derived from extrapolations based on research done by Colston in Durham, North Carolina. For this reason, the values may underestimate or overestimate by an appreciable margin the extent of urban runoff in Ohio. Also, the impact which these total gross annual loadings may have on water quality in Ohio is unknown. The values are presented for the purpose of providing general information as to the possible extent of urban runoff because of lack of actual urban runoff pollutant loading data for most of the state.

More emphasis needs to be placed on the evaluation and assessment of the extent and impact of urban runoff and combined sewer overflows on the water quality of Ohio streams. Water quality management planning must assess the total urban pollution load - not just the point sources - when developing strategy to upgrade or maintain receiving water quality. Without adequate assessment of the urban stormwater contribution and providing controls for it, the upgrading of municipal treatment plants to provide secondary or advance treatment may, as studies in Roanoke, Virginia, and Durham, North Carolina show, fail to achieve the anticipated upgrading of water quality.

TABLE 7

CURRENT AND FUTURE WASTE LOADS FROM COMBINED SEWER

OVERFLOWS AND URBAN STORM RUNOFF IN TONS/YEAR*

Parameter	Akron-Cleveland Area		Warren-Youngstown Area		NE Ohio Urban Area	
	Current	Future	Current	Future	Current	Future
Total Solids	391,000	870,000	18,500	91,500	563,000	1,585,500
Suspended Solids	181,500	404,500	14,500	42,500	262,000	737,500
Volatile Suspended Solids	40,500	71,000	5,000	9,000	55,500	121,000
BOD_5	14,200	18,400	2,500	3,050	17,500	27,450
COD	64,000	102,000	9,500	14,000	86,500	167,000
Ammonia nitrogen as N	890	1,100	170	190	1,155	1,625
Organic Nitrogen as N	535	755	85	115	705	1,175
Nitrate as N	205	405	20	45	285	710
Total Phosphate	1,210	2,285	35	100	1,605	2,835
Soluble Phosphate	925	1,100	175	200	1,190	1,570
Phenols	35	39	7	7.4	45	52

* Northeast Ohio Water Development Plan, Main Report, Ohio Department of Natural Resources, 1972.

TABLE 8
ESTIMATED ANNUAL YIELD OF POLLUTANTS

ATTRIBUTABLE TO URBAN RUNOFF IN OHIO*

Parameter	Annual Yield (tons/year)**
COD	1,294,258
TOC	258,024
Total Solids	10,624,506
Volatile Solids	2,011,757
Suspended Solids	9,232,282
Volatile Suspended Solids	1,099,705
Kjeldahl Nitrogen as N	8,417
Total Phosphorus as P	6,485
Aluminum	88,308
Calcium	71,750
Cobalt	2,622
Chromium	2,208
Copper	2,208
Iron	140,740
Magnesium	97,966
Manganese	6,761
Nickel	1,656
Lead	4,001
Zinc	2,760

* Obtained from extrapolation of values in study by Colton (Characterization and Treatment of Urban Land Runoff, U.S. EPA Publication No. 670/2-74-096, 1974) for Durham, North Carolina (refer to text for further discussion concerning these figures).

** Assumes 2,759,612 acres of urban and built-up land based on 1971 CNIC report.

D. Pesticides

The Ohio Environmental Protection Agency manages a pesticide stream monitoring program including sample collection, laboratory analysis, and data handling of information derived from the residue analysis. The program includes a total of 26 sampling sites. Twelve of these sites are on Lake Erie tributaries, and the other fourteen are distributed statewide. Sites were chosen to monitor agricultural drainage and municipal industrial drainage into Ohio rivers and streams. The sampling sites are shown in Figure 3 and are listed in Table 9.

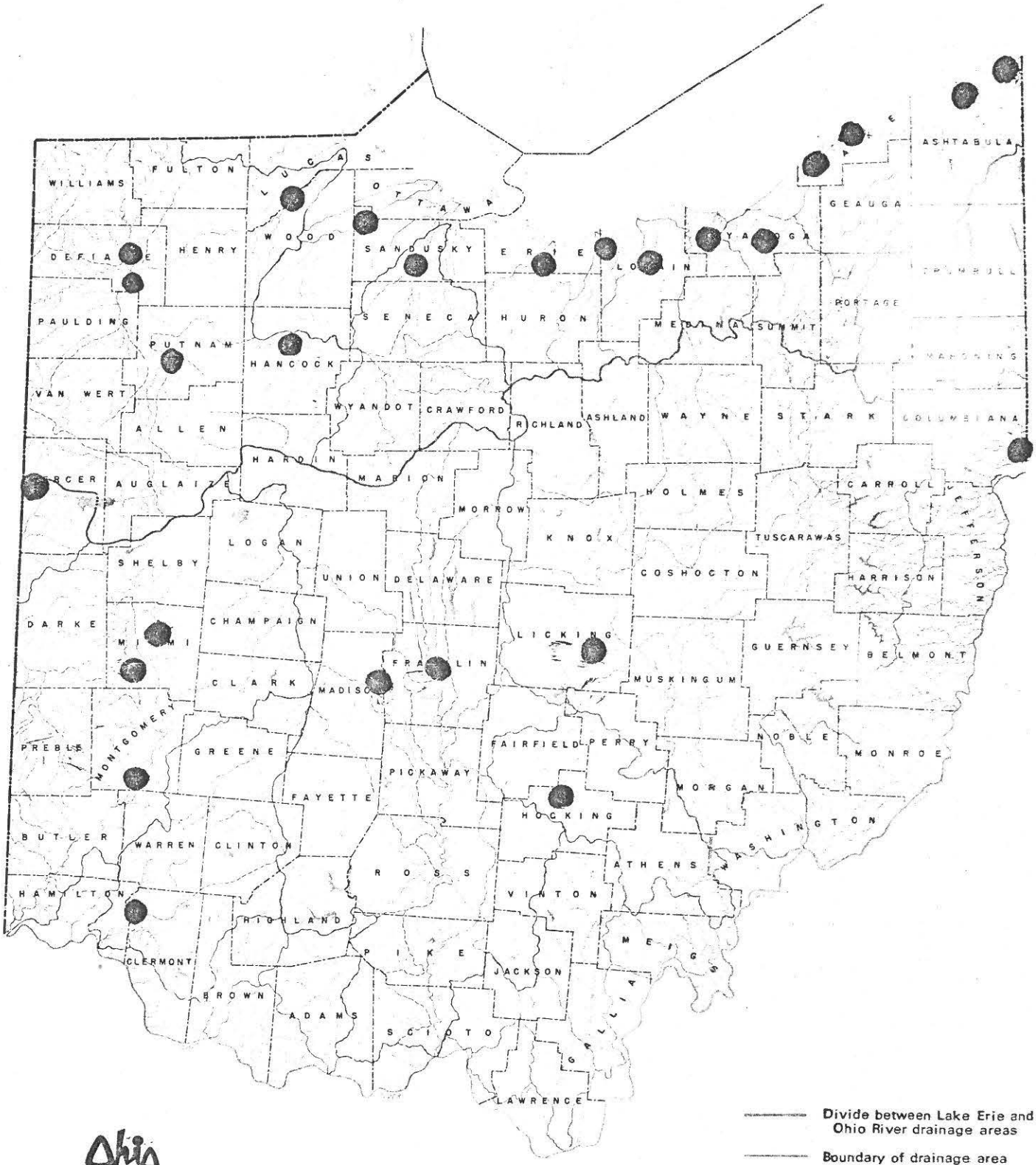
Pesticide contamination into these rivers can arise from home and garden use, industrial, commercial, and municipal sources, in the highly populated areas of southwest, central, and northeast Ohio. Agricultural sources are heaviest in the northwest. Due to social-economic conditions, pesticide usage in southeast Ohio is minimal.

The pesticide monitoring program includes monthly grab samples from twenty-six sites (See Figure 3) from April through November. Samples are analyzed by the Ohio Department of Health labs for the following pesticides: aldrin, lindane, chlordane, DDD, DDE, DDT, dieldrin, endrin, heptachlor, heptachlor-epoxide, methoxychlor, malathion, parathion, methylparathion, and BHC.

Data handling of the pesticide analysis sheet is done by the Division of Data and Systems, Ohio EPA, which enters information into the Federal STORET Water Quality Data System. Copies of the pesticide analysis sheet are maintained in the district office files and also in Columbus at the Hazardous Materials Office.

Pesticide residues in water samples from the 1975 sampling year totaled six detectable levels from a total of 80 samples taken. BHC,

FIGURE 3



STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

FY-76
Pesticide Monitoring Stations

PRINCIPAL STREAMS AND THEIR DRAINAGE AREAS

TABLE 9

Stations Monitored During Fiscal Year 1976 For Pesticide Parameters

Maumee R. at Waterville

Portage R. at Woodville

Sandusky R. near Fremont

Huron R. below Milan

Vermilion R. near Vermilion

Black R. at Elyria

Rocky R. near Bera

Cuyahoga R. at Cleveland

Chagrin R. at Willoughby

Grand R. at Painesville

Ashtabula R. at Ashtabula

Conneaut Crk. at Conneaut

Ottawa R. at Kalida

Blanchard R. near Findlay

Auglaize R. at Defiance

Tiffin R. near Defiance

Great Miami R. below Piqua

Great Miami at Miamisburg

Stillwater R. above West Milton

Little Miami R. at Milford

Scioto R. at Dublin Rd.

Hocking R. at Enterprise

Licking R. near Newark

Little Beaver Crk. near E. Liverpool

Big Darby Crk. below W. Jefferson

Wabash R. at State line

Lindane, and Heptachlor-Epoxide were each found twice at levels ranging from 0.003 ppb (parts per billion) to 0.45 ppb. These residues were found in the following rivers: BHC and Heptachlor-Epoxide were found in the Cuyahoga; Heptachlor-Epoxide was found in Mill Creek (Cincinnati area); and Lindane and BHC were found in the Licking River. The Cuyahoga River was sampled only twice and detectable levels were found on both occasions. The Licking River was sampled five times, and three of these samples contained detectable levels. Residues were found during the summer months when usage would be greatest.

Because these pesticide chemicals are relatively insoluble in water, detection of residues from grab samples indicates that in some areas of the state there may exist potential pesticide pollution problems. The data indicates that transport of these chemicals does occur through state surface waters. In recent years the most frequent pesticides detected in surface waters have been BHC and Lindane. The levels at which these residues occur do not pose any immediate health hazard; long range effects would be difficult to predict. More intensive sampling would have to be done to better define potential problems as well as to illustrate more statistically sound trends.

POINT SOURCES OF POLLUTION

Point sources of pollution are direct discharges of wastewater to a stream such as by a pipe, outfall, or ditch. Examples of point sources would be a municipal wastewater treatment plant or an industrial facility. Point sources differ from nonpoint sources in two ways: 1) point sources discharge, relatively speaking, a constant load to a receiving stream; this means that concentrations in the stream due to point sources decrease with increasing stream flow (become diluted as flow increases), 2) point sources have their greatest impact on streams during low flow periods (in some instances, point sources may be the sole source of flow in a stream during critical low flow periods). This section will examine the impact on water quality of industrial and municipal point sources. To facilitate the discussion, the state has been divided into 5 major river drainage regions: northwest, northeast, southeast, southwest and central. Figure 4 shows the location of these regions.

FIGURE 4

Major River Drainage Regions in Ohio

1. Southwest Region

This region is heavily populated, particularly the area between Cincinnati and Dayton. Continued population growth for the remainder of the century is expected here. Fecal coliform, low dissolved oxygen (DO) heavy metals, combined sewer overflows, and thermal pollution are the major water quality problems occurring in the region. The major drainage basins in the region are the Great Miami, Little Miami, Mill Creek, and the minor southwest tributaries to the Ohio River.

A. Great Miami River Basin

It is easier to discuss water quality in the Great Miami Basin by dividing it into four subbasins: 1) the upper Great Miami Subbasin which encompasses the area tributary to the Great Miami mainstem above Dayton, 2) the Mad River Subbasin, 3) the Stillwater River Subbasin, 4) and the lower Great Miami Subbasin which includes all the area within the Great Miami Basin from Dayton (mile 82.6) to the mouth and not covered by nos. 1, 2, and 3.

(1) Upper Great Miami River Subbasin

Water quality standards generally are being met in this subbasin. Nonetheless, some problem areas do exist. Even though water quality standards may not be violated, high concentrations of certain parameters are indicative of potential problems. The Peterson Road station on the Great Miami below Piqua had an average ammonia concentration during the water year of 0.66 mg/l with a maximum reading of 1.72 mg/l (a water quality standard violation), while total phosphorus averaged 0.52 mg/l.

The problem of larger point source dischargers to small receiving streams creates localized problems in this subbasin. Two examples of

this are Possum Run and Blue Jacket Creek downstream of the city of Bellefontaine, and Clay Run downstream of the village of Anna. In the case of Bellefontaine, discharges from the wastewater treatment plant are believed responsible for high concentrations of phosphorus, lead, nickel, and zinc found in the two streams. Figure 5 details the specifics of this operation. The village of Anna's wastewater treatment plant (WWTP) discharges to Clay Creek near its headwaters. Until January 31, 1977, Richardson Electroplating discharged heavy metals both to the WWTP and to Clay Creek via a storm sewer. Figure 6 documents the heavy metals in Clay Creek resulting from these two point source discharges. Since Richardson has ceased operations, improvement in the water quality of Clay Creek with respect to heavy metals is anticipated. Ammonia and heavy metals problems have been documented downstream of Sidney's WWTP which discharges to the Great Miami River mainstem.

Several changes have been made which should improve water quality in this subbasin. In terms of municipal point sources, one discharge was eliminated, while one plant expanded its capacity and a new plant came on-line. Industrial dischargers spent a total $235,000 for improvements (K&S Circuits in Phillipsburg and Copeland Corp. in Sidney). Two industries formerly having discharges have either eliminated these discharges or improved on their quality (Farmview Meats in St. Paris and Logan Finishing in Lakeview), while another industry ceased operations (Richardson Electroplating in Anna).

(2) Stillwater River Subbasin

Good to high quality water is found in this subbasin, particularly in the upper segments near the headwaters. Although water quality

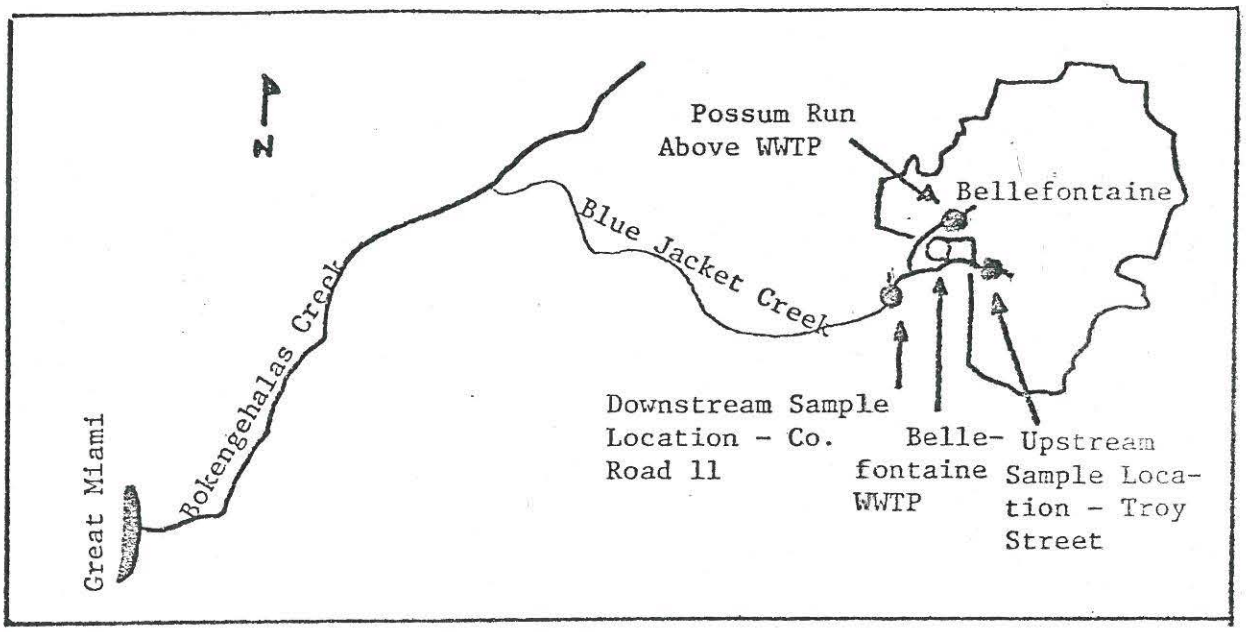


Figure 5 Possum Run Area
Stream - Possum Run - Blue Jacket Creek
Source - Bellefontaine WWTP (2.4 MGD)

Selected Problem Parameters

	GREAT MIAMI 303 Survey-7/7/76			
	PR* Above Bellefontaine WWTP	BJC** @ Troy St.	Bellefontaine WWTP Effluent	BJC @ Co. Rd. 11
1. BOD_5 (mg/1)	2.5	1.0	5.0	9.4
2. Dissolved Oxygen (mg/1)	9.4	13.9	8.0	9.8
3. Ammonia (mg/1)	0.19	0.21	0.93	0.35
4. Phosphorus (Total) (mg/1)	0.05	0.05	2.24	1.75
5. Lead (ug/1)	31	10	1400	390
6. Nickel (ug/1)	100	100	800	400
7. Zinc (ug/1)	30	30	90	40

Comments:

1. Possum Run and Blue Jacket Creek have critical low flows of zero; therefore, summertime stream flows consist primarily of Bellefontaine WWTP effluent.

2. Blue Jacket Creek has excellent in-stream aeration capabilities due to its steep slope (23 feet per mile) and its rocky bottom.

*PR-Possum Run; **BJC-Blue Jacket Creek

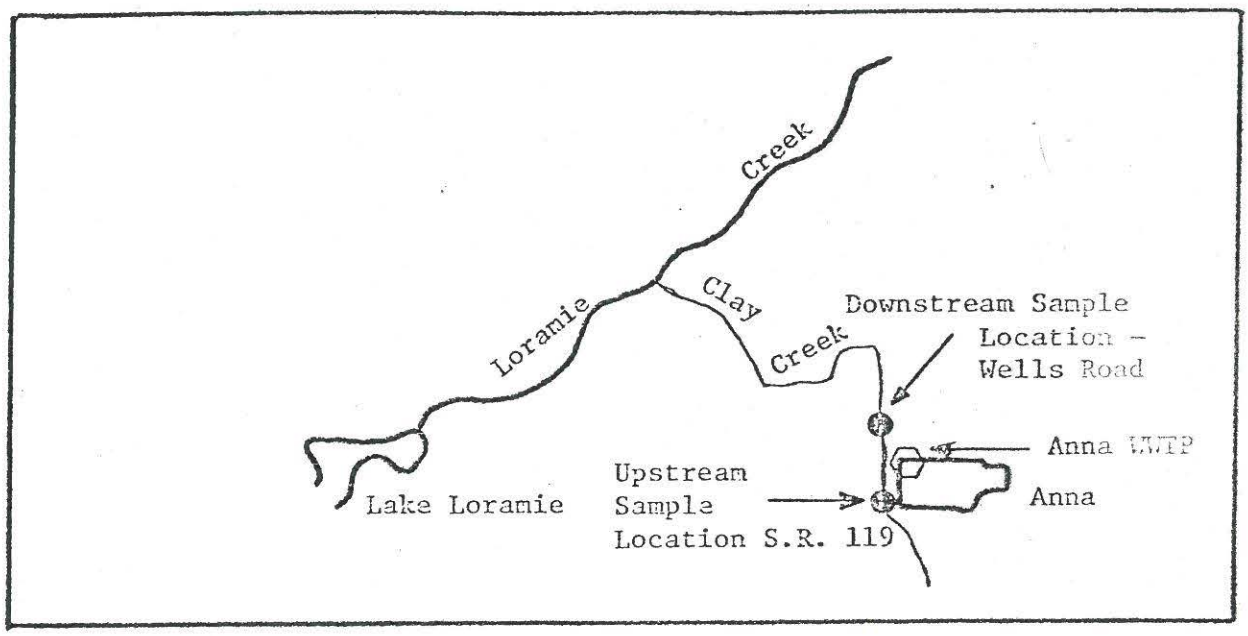


Figure 6 Clay Creek Area
Stream - Clay Creek
Source - Anna WWTP (0.14 MGD)

Selected Problem Parameters

GREAT MIAMI 303 SURVEY - 7/8/76

		Clay Creek R. 119	Anna WWTP Effluent	Clay Cr. Wells Rd.
1.	BOD_5 (mg/l)	8.4	10.8	1.8
2.	Dissolved Oxygen (mg/l)	5.9	3.4	7.0
3.	Ammonia (mg/l)	0.23	4.26	0.15
4.	Phosphorus (Total) (mg/l)	0.43	4.41	0.63
5.	Total Chromium (ug/l)	1290.	540.	30.
6.	Hex. Chromium (ug/l)	790.	380.	<30.
7.	Nickel (ug/l)	7600.	3000.	200.

Comments:

1. This stream has a critical low flow of zero; therefore, summertime flows consist primarily of Anna WWTP effluent and Richardson Electroplating effluent.
2. Just above the upstream sample location is a storm sever which drains the town. It contains waste water from Richardson Electroplating.
3. Richardson Electroplating ceased all operations as of 1/31/77, eliminating the load to Clay Creek and the Anna WWTP.

standards are being met in this subbasin, elevated nutrient levels may signal potential problems in the future. For evaluation purposes, the federally recommended maximum level for phosphorus of 0.1 mg/l is used. With this value in mind, two potential problem areas are noted. One is Greenville Creek downstream of the Greenville WWTP where the phosphorus concentration averaged 0.31 mg/l, and the other is the mainstem near its mouth in Dayton where the phosphorus concentration averaged 0.32 mg/l. Sand and gravel operations and nonpoint source pollution have caused high turbidity readings in the lower segment of the mainstem. This problem should improve since Woodville Concrete has eliminated its discharge to the river. Rapid urban growth in the lower portions of this basin may impair future water quality. Objections by some basin residents caused Ohio Department of Natural Resources to remove scenic river status designation for this basin.

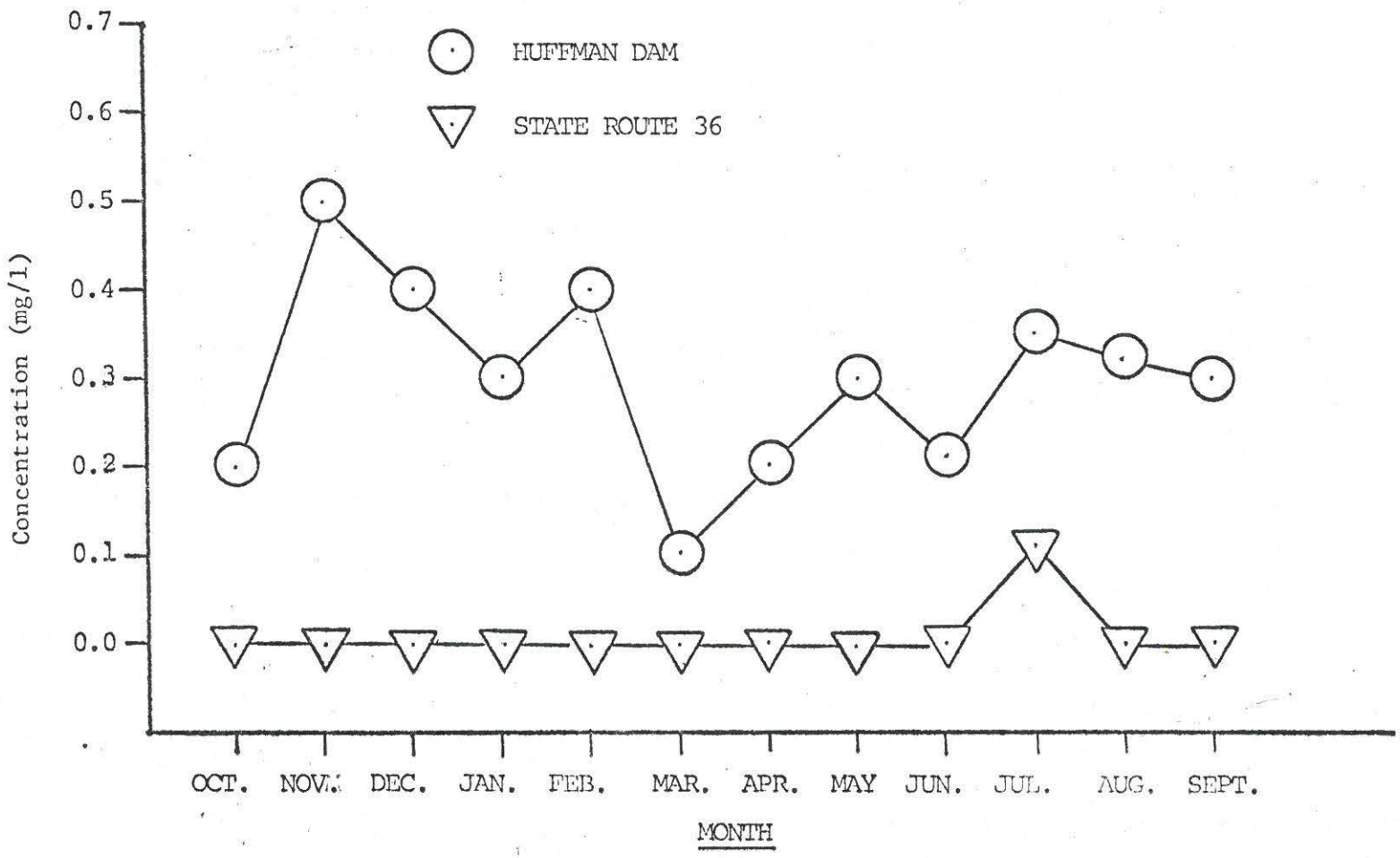
(3) Mad River Subbasin

Like the Stillwater River Subbasin, the Mad River Subbasin is characterized by having good to high quality water. This is particularly true of the headwaters and its tributaries which are spring fed, clear, cold and have good volume. Two areas of persistent degradation do exist in the upper segments. These include Dugan's Run which is affected by municipal and industrial discharges and the Mad River mainstem downstream of the Urbana WWTP.

The lower segment (from Springfield to the mouth) shows the effects of point source discharges. Figure 7 depicts seasonal concentrations of total phosphorus in the lower segment (Huffman Dam) compared to the nearly phosphorus free upper segment (S.R. 26). A few major point

FIG. 7

1976 SEASONAL TOTAL PHOSPHORUS CONCENTRATIONS
FOR THE MAD RIVER AT HUFFMAN DAM
(RIVER MILE 5.2) AND S.R. 36 (RIVER MILE 40.3)



sources known to affect general water quality in the lower segment include: 1) intermittent point sources on Buck Creek, 2) the Ohio Edison Power Plant in Springfield (thermal load), 3) the Springfield WWTP, and 4) the Park Layne WWTP (high concentrations of ammonia and total phosphorus).

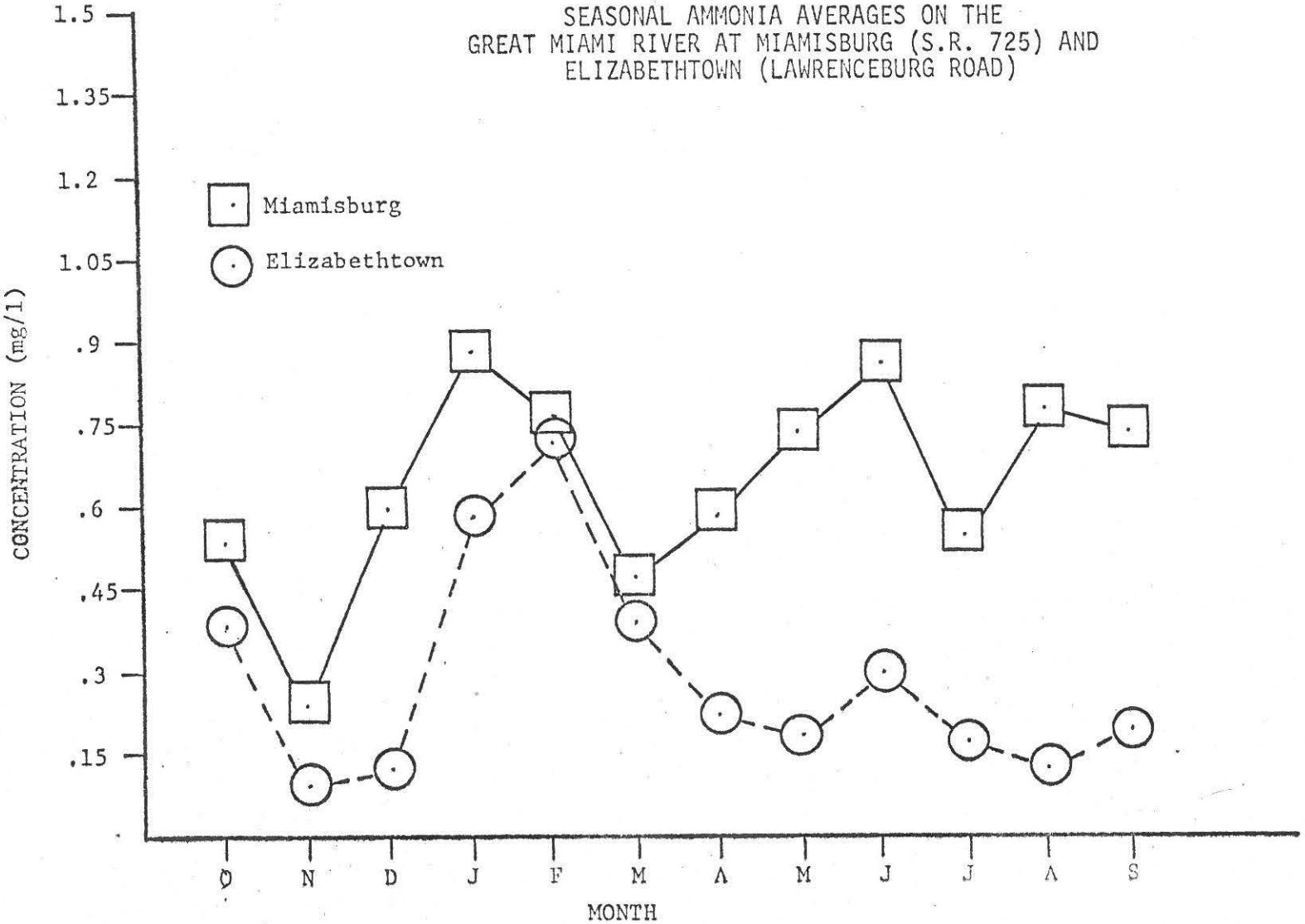
(4) Lower Great Miami River Subbasin

Extensive urbanization best characterizes the lower subbasin. The cumulative effect of industrial and municipal wastewater discharges has a pronounced negative influence on water quality throughout the entire lower mainstem. Paper mills discharge dyes and suspended solids which are aesthetically displeasing, steel mills discharge toxic materials such as cyanide and phenol, and municipal wastewater treatment plants discharge large organic loadings which depress dissolved oxygen levels. Due to a combination of lower stream flows along with discharges from industrial and municipal sources, water quality in this subbasin deteriorated during water year 1976 when compared to 1975.

Figures 8 and 9 illustrate examples of water quality problems that characterize much of this lower subbasin. Figure 10 shows the effect that the Eaton WWTP has on Seven Mile Creek. Undesirable stream conditions for 1 to 2 miles below the WWTP result from chemical, biological, and aesthetic degradation. Stream recovery occurs about 5 miles below the WWTP, and at the mouth water quality is again good. Figure 11 illustrates the effects of an industrial discharge on water quality in Dick's Creek. A good portion of the flow of Dick's Creek is made up of the effluent from Armco Steel Corporation's four wastewater outfalls. The stream below these outfalls is usually orange or brown in color and frequently has a surface oil film. Sludge banks

FIGURE 8
1976

SEASONAL AMMONIA AVERAGES ON THE
GREAT MIAMI RIVER AT MIAMISBURG (S.R. 725) AND
ELIZABETHTOWN (LAWRENCEBURG ROAD)



I CONVENTIONS:

NAPA	1/26 - 2/2/79
OCA	2/6 - 13/79
ARTBA	2/18 - 21/79
AGC	3/16 - 21/79
NUCA	4/25 - 29/79

II Original Short Course Schedule:

1/23 - 25/79		3 days
2/19 - 21/79	(conflict w ARTBA)	3 days
3/1 - 2/79		2 days
3/5 - 7/79		3 days
3/26 - 28/79		3days

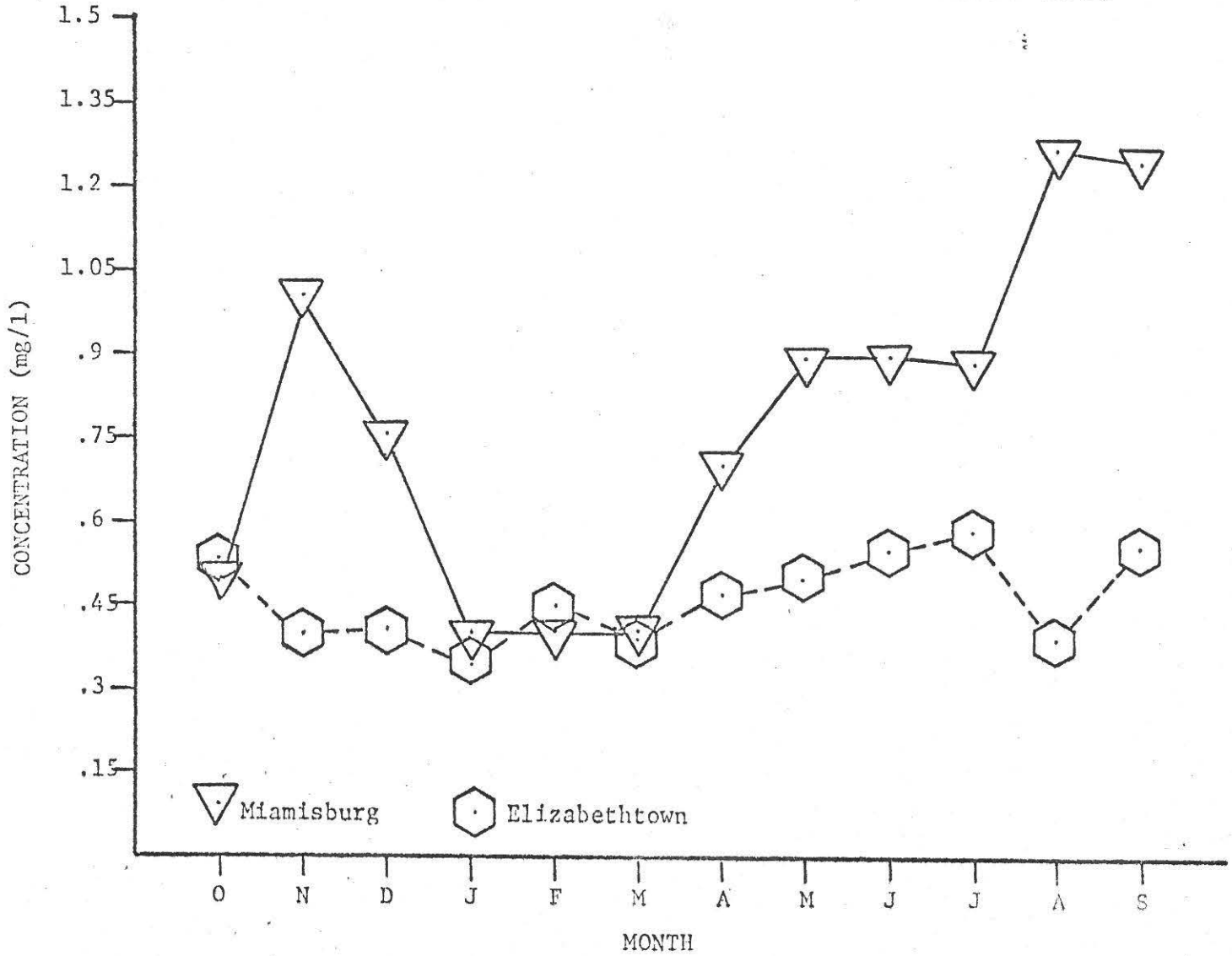
GEM

Aside from problem w conflict, I'm not sure if this is the right number and/or length of dates. I could probably get additional one day shots within this two month period if you desire.

Don

FIGURE 9
1976

SEASONAL TOTAL PHOSPHORUS AVERAGES ON THE GREAT MIAMI RIVER AT MIAMISBURG (S.R. 725) AND ELIZABETHTOWN (LAWRENCEBURG ROAD)



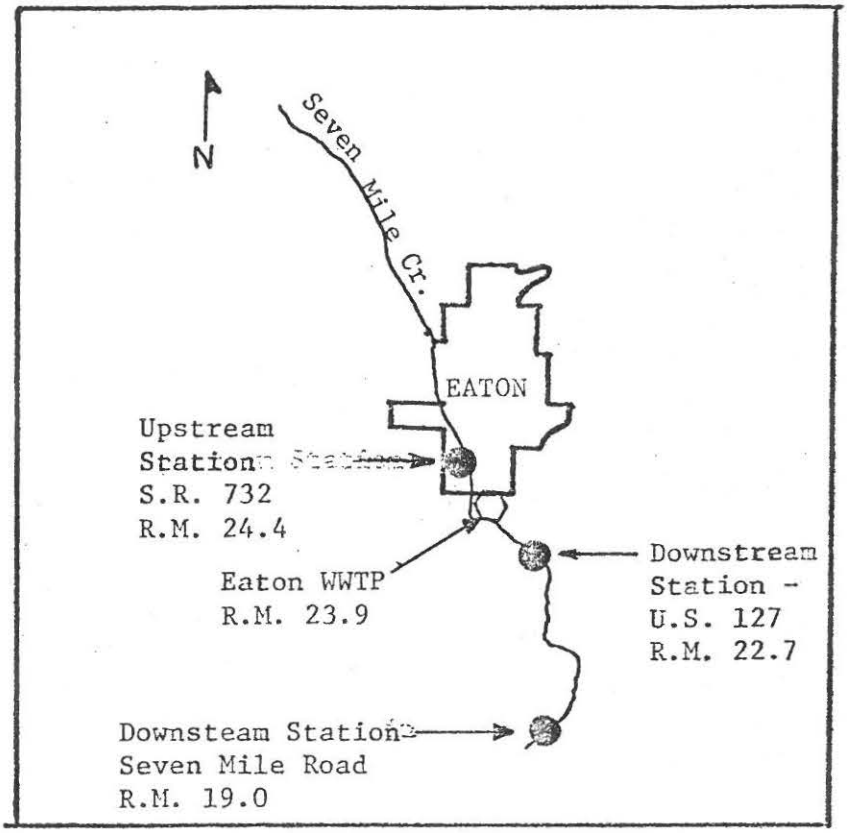


Figure 10 Seven Mile Creek Area
Stream - Seven Mile Creek
Source - Eaton WWTP

	Selected Problem Parameters					
	S.R. 732		U.S. 127		Seven Mile Rd	
	1975	1976	1975	1976	1975	1976
1. BOD5 (mg/l)	4.4	4.8	9.0	7.2	2.4	--
2. Dissolved Oxygen (mg/l)	8.5	10.2	7.5	9.5	8.9	--
3. Fecal Coliforms (/100 ml)	6115	1114	10,062	6464	950	--
4. Ammonia (mg/l)	0.5	--	6.0	--	0.49	--
5. Phosphorus (mg/l)	0.05	--	3.3	--	0.89	--

Comments:

1. Continuation of stream network - Four Mile Creek, Great Miami River.

2. An intensive summer survey performed in 1975, but not reported until 1976, shows severe biological and chemical degradation 1-2 miles below the Eaton WWTP. Some recovery is observed approximately 4 miles below the plant.

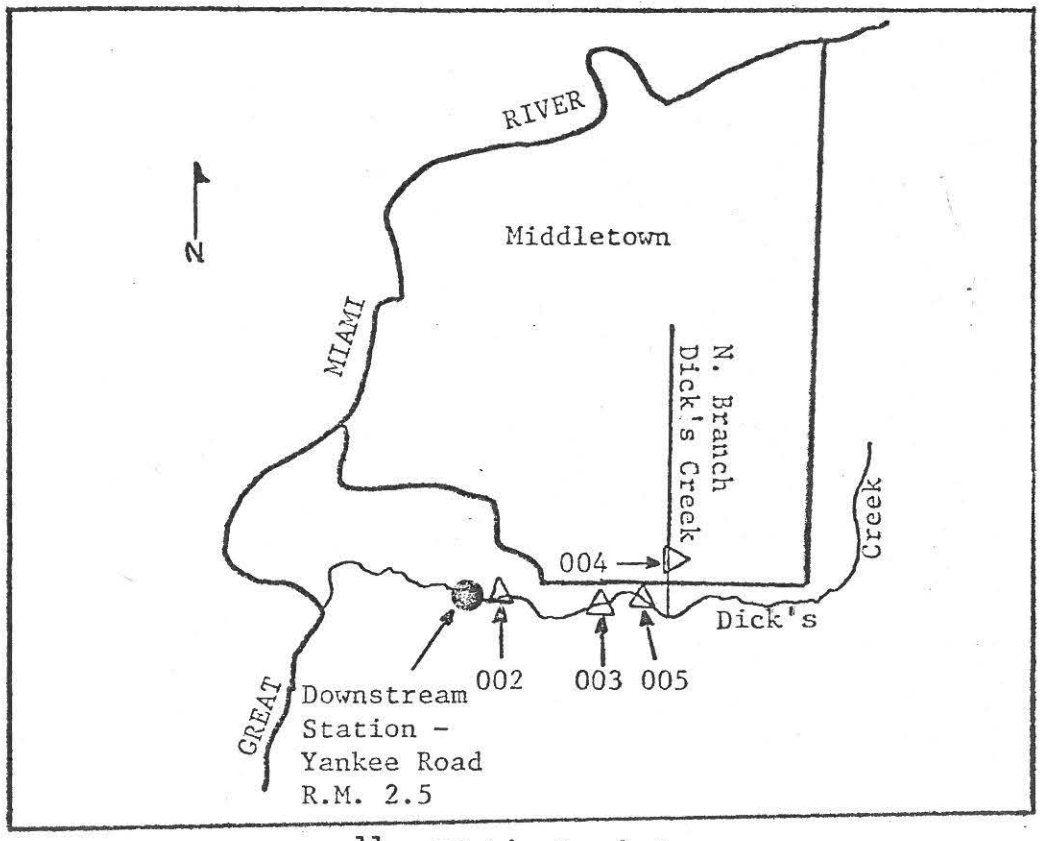


Figure 11 Dick's Creek Area
Stream - Dick's Creek
Source - Armco Steel Corporation (Four Dischargers)

Selected Problem Parameters

		Average Concentration 1975	1976
1.	BOD (mg/l)	21	3.8
2.	Temperature (oC)	17.7	16.3
3.	Ammonia (mg/l)	0.57	0.55
4.	Cadmium (ug/l)	16	4.4
5.	Iron (ug/l)	1770	6114
6.	Lead (ug/l)	39	59
7.	Zinc (ug/l)	5979	3831
8.	Suspended Solids (mg/l)	64	235
9.	Oil & Grease (mg/l)	1.6	0.86
10.	Conductivity (micromhos)	969	1048
11.	Phenols (ug/l)	36	18
12.	Fluoride (mg/l)	4.5	4.7
13.	Total Phosphorus (mg/l)	0.17	0.58

Comments:

1. Continuation of stream network-Dick's Creek, Great Miami River.
2. Armco outfalls comprise all the flow in the summertime.
3. Aesthetic quality of the stream is very poor, as sludge banks are quite evident throughout the lower three miles of the stream. Biotic index is virtually 0.

also occur downstream of the outfalls. Heavy metal contamination is quite evident at the Yankee Road sampling station. Other localized problem areas include Four Mile Creek below Oxford, Gregory Creek below the Butler County Hycrest Acres WWTP, and throughout much of the Taylor Creek (Hamilton County) drainage basin. In these areas, loading from numerous septic tanks plus discharge from semi-public package plants create high concentrations of ammonia, total phosphorus, depressed dissolved oxygen levels, and aesthetic degradation in the form of sludge deposits and non-degradable sewage debris.

Thermal pollution in this subbasin is found below power plant discharges. A special thermal study entitled "Thermal Investigations of the Great Miami River near Dayton Power and Light Plant" released in September 1975 by the Southwest District Ohio EPA indicated the following: "Temperature Measurements in the Great Miami River during the Dayton Power and Light (DP&L) Tait Station Thermal Investigation" revealed violations of water quality standards for allowable mixing zone cross-sectional area and widths. Furthermore, it is most probable that violations of mixing zone length could have been found if temperatures were measured further downstream from this survey. Thermal discharge loads for DP&L Tait Station were found to be in excess of allowable loadings calculated for critical low flow periods and for the flow during the specific survey data. Given upstream ambient river temperatures above 25°C, it is likely that river temperatures greater then 32.2°C would occur outside the mixing zone below the DP&L Tait Station. Such warm water would be above general thermal requirements of OAC 3745-1 during June, July, August, and September and would not be conducive to a healthy aquatic environment.

A significant number of new plants or pollution reduction efforts

are underway in the lower Great Miami Subbasin which should result in the upgrading of water quality in this region. Total industrial improvement costs are estimated at $2,940,000. Table 10 itemizes these industrial and municipal improvements.

Overall, water quality in the Great Miami River Basin during water year 1976 seems to have declined when compared to 1975. Lower flows during the 1976 water year may be largely responsible for the decline in water quality. Water quality violations were found for dissolved oxygen, various heavy metals, ammonia, oil and grease, phenols, fluoride, chloride, and cyanide. The Mad River System is considered to have the best water quality in the basin, while the lower Great Miami has the worst water quality. Improvements in industrial and municipal wastewater treatment systems are being made throughout the basin. Industrial improvements at a cost of $3,175,000 are underway in the basin. These improvements should help improve water quality.

B. Little Miami River Basin

The upper segment of this basin (headwaters to confluence with Caesar Creek) is characterized by clean, spring fed tributaries which produce good to high quality waters. Water quality standards violations of ammonia and heavy metals did occur in this region at two stations. There was one hexavalent chromium violation noted on the Little Miami mainstem at Roxanna-New Burlington Road. Eight of ten ammonia samples taken on Beaver Creek at Factory Road violated standards (highest being 5.27 mg/l) and on Little Beaver Creek at Factory Road, all 10 samples collected violated water quality standards (highest being 4.97 mg/l). The latter stations also had an average total phosphorus concentration

TABLE 10

Summary of Municipal and Industrial Discharge Improvements in the Lower Great Miami Subbasin

A. Municipals

County	Facility	Affected Stream	Status/Description
Butler	Fairfield WWTP	Great Miami River	Upgrading and expansion
Butler	LeSourdsville Regional WWTP	Great Miami River	Under construction; will eliminate several package plants in the Gregory Creek drainage basin.
Hamilton	West Hills WWTP	Taylor Creek	Plant enlarge and upgraded
Montgomery	Western Regional WWTP	Great Miami River	Under construction
Preble	Lakegren WWTP	Sugar Run (Seven Mile Creek drainage basin)	New Plant

B. Industrials

Butler	Armco Steel/ New Miami	Great Miami River	Construction started on facilities for outfalls 001 and 002 (Cost-$1,220,000)
Butler	Cincinnati Gas & Electric Co./Monroe	Dick's Creek	Oil interceptor (Cost-$38,000)
Butler	Crystal Tissue/ Middletown	Great Miami River	In-plant treatment (Cost $38,000)
Butler	Champion International/ Hamilton	Great Miami River	Construction started on tie-in to Hamilton WWTP
Butler	Chessie System/ Hamilton	Great Miami River	Oil-water separator installed (Cost-$35,000)
Butler	Pillsbury/ Hamilton	Two Mile Creek	Drainage from unloading area connected to Hamilton WWTP

TABLE 10 (cont'd)

County	Facility	Affected Stream	Status/Description
Butler	Sorg Paper/ Middletown	Middletown Hydraulic Canal	Tie-in to Middletown WWTP completed
Hamilton	Mobil Chemical/ Fernald	Paddy's Run	pH control (Cost-$40,000)
Montogmery	Bergstrom Paper/Moraine	Great Miami River	Major wastewater system-modifications (Cost-$525,000)
Montgomery	Continental Can	Holes Creek	Eliminated cutting oil discharge
Montogmery	GMC-Frigidaire Plt. #2/Moraine	Great Miami River	Upgraded (Cost-$50,000)
Montogmery	GMC-Frigidaire Plt. #3/Moraine	Great Miami River	Upgraded (Cost-$500,000)
Montogmery	Interstate Folding Box/ Miamisburg	Great Miami River	Upgraded (Cost-$125,000)
Montgomery	Miami Paper/ West Carrollton	Owl Creek	Upgraded (Cost-$40,000)
Montgomery	Pepsi Cola/ Dayton	Great Miami River	Eliminated discharge
Montgomery	West Carrollton Parchment/ West Carrollton	Owl Creek	Upgraded (Cost-$12,000)
Preble	Lewisburg Container Corporation/ Lewisburg	Twin Creek	Eliminated discharge
Warren	Phillips Petroleum/Franklin	Great Miami River	Oil-water separator (Cost-$30,000)

of 3.51 mg/l. Discharges from the Montgomery County Eastern Regional WWTP, Beaver Creek WWTP, and numerous semi-public dischargers are the probable causes of water quality degradation in these streams. Further water quality degradation occurs below Massie Creek due to urbanization patterns from nearby Xenia, Greene County and Southeastern Dayton. Nutrient values and biochemical oxygen demanding (BOD) wastes show a twofold increase in this area when compared to a headwater station.

The Little Beaver Creek and Beaver Creek Basins deserve special mention. The major point source in these two basins is the 10 million gallon a day Montgomery County Eastern Regional WWTP. Figure 12 shows significant components of this basin area. Beginning at river mile 5.1 above the Eastern Regional WWTP, water quality is good. However, at Grange Hall Road (river mile 3.5), the water quality standards for ammonia are violated continuously at a yearly average of 5.82 mg/l. Although water quality shows improvement at the mouth (Factory Road), high concentrations of total phosphorus and BOD_5 are still evident, and the ammonia concentration is still in violation of water quality standards at an average concentration of 3.55 mg/l.

Moving downstream, the middle segment (river mile 49.2 to 11.1) of the Little Miami has generally good water quality as the stream is beginning to recover from upstream loads. Localized water quality problems exist on Muddy Creek, Turtle Creek, and Sycamore Creek. However, the major problem occurs on Lytle Creek below the Wilmington WWTP and Randall Company (metal finishing) outfalls. Figure 13 summarizes the water quality occurring in this area. Here, BOD_5, ammonia, phosphorus, lead, and zinc concentrations are high.

Water quality in this segment should improve with the expansion

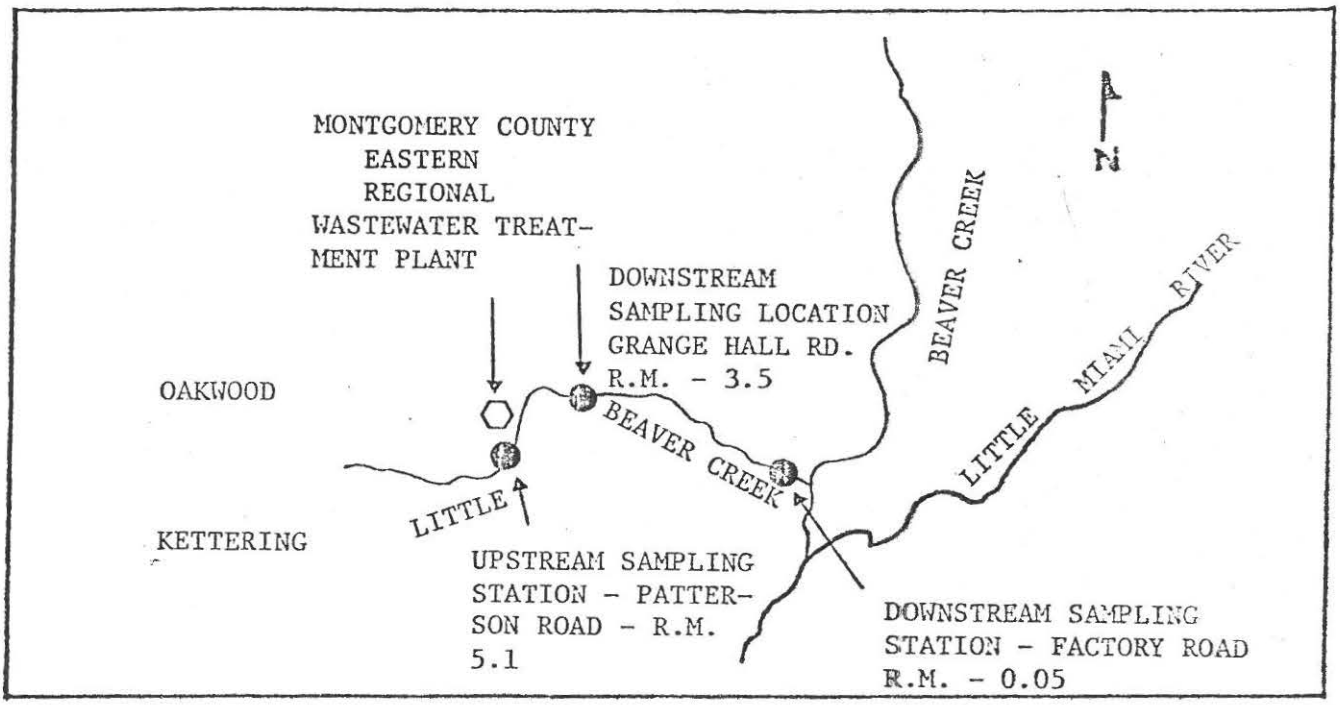


FIGURE 12 Little Beaver Creek Area
Stream - Little Beaver Creek
Source - Montgomery County Eastern Regional WWTP (10 mgd)

Selected Problem Parameters

Parameter	Average Concentration		
	Upstream (5.1)	Downstream (3.5)	Downstream (0.05)
1. Flow (CFS)	8.5	21.5	25.4
2. BOD_5 (mg/1)	1.35	21.3	9.9
3. Ammonia (mg/1)	.07	5.82	3.55
4. Phosphorus (mg/1)	.44	4.46	3.51
5. Dissolved oxygen (mg/1)	7.6	5.4	7.5

Comments:

1. Average concentrations are a summary of 1975 and 1976 data collected near Grange Hall Road (river mile 3.5), Patterson Road (river mile 5.1), and Factory Road (river mile 0.05).

2. Stream flows in Little Beaver Creek consist primarily of WWTP effluent from the Montgomery County Eastern Regional WWTP.

3. Biological surveys show that only very tolerant (Class III) organisms are able to survive in the polluted zones of this stream (Urban, 1974).

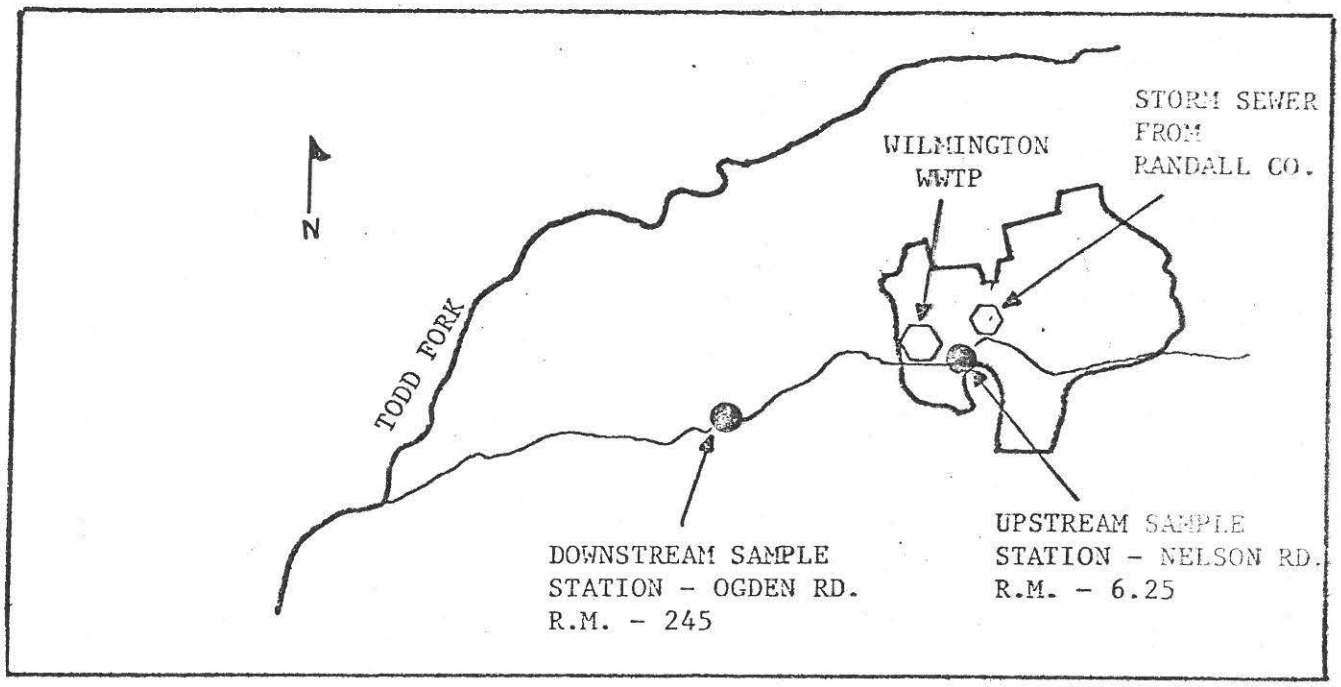


FIGURE 13 Lytle Creek Area
Map of Little Miami Basin Major Problem Area
Stream - Lytle Creek
Sources - Wilmington WWTP
Randall Company

Selected Problem Parameters

Parameter	Average Concentration Upstream 1972-1975	Upstream 1976	Downstream 1972-1975	Downstream 1976
1. BOD_5 - mg/l	2.3	4.1	4.3	4.9
2. Ammonia - mg/l	0.2	.56	9.3	5.17
3. Total Phosphorus - mg/l	0.1	.26	6.4	5.12
4. Zinc - ug/l	0.0	183	107.5	155
5. Lead - ug/l	0.0	28	13.8	5

Further Comments:

1. Wilmington WWTP located at river mile 6.2 receives industrial wastewater from community industries: the Randall Corp. is the primary in-
2. Flows gaged at downstream stations consisted of approximately 50% WWTP effluent.
3. Biological samples show that aquatic stream life is severely stressed and only pollution tolerant organisms survive below the WWTP.
4. A special survey of shock loads of lead and zinc entering the WWTP

	Raw Influent	Final Effluent	Lytle Cr. Nelson Rd.	Lytle Cr. 150' below WWTP
Lead	2,240	410	10	190
Zinc	29,000	3,240	30	2,000

and upgrading of one WWTP and the construction of two new plants. Also, one industry ('TOTES', Inc.) reduced its chlorine discharge.

Water quality in the East Fork of the Little Miami River is generally good. A pH violation (5.7) was noted near the mouth. The average phosphorus concentration near the mouth increased from 0.28 mg/l during water year 1975 to 0.68 mg/l in 1976. This increase is attributable to increased point source loads and lower stream flows. Bypassing of raw sewage from the Hall Run WWTP creates water quality problems in Hall Run. A similar situation occurs in the Shayler Run system. Both problems will be corrected by the East Fork Regional WWTP. One semi-public WWTP discharge was eliminated in 1976.

During the 1976 water year, water quality standards violations were noted at two stations in the lower segment (river mile 11.1 to mouth). The stations were Duck Creek at Wooster Pike where one dissolved oxygen (1.6 mg/l), two ammonia (6.15 and 3.39 mg/l), and one pH (9.1) violations occurred and Little Miami mainstem at Beechmont Levy where one cadmium (17 ug/l) and one lead (41,200 ug/l) violation occurred. The Duck Creek station also had an average total phosphorus concentration of 1.08 mg/l. The water quality problems occurring in Duck Creek may be the result of industrial sources and combined sewer overflows. The heavy metals problem at the Beechmont Levy are probably due to urban runoff from parking lots and road drainage. Improvements in water quality of Dry Run are anticipated with the improvements in two municipal plants.

In assessing long term water quality improvements, several factors including flow patterns, rainfall and point and nonpoint sources must be evaluated and considered. Dissolved oxygen (D.O.) levels in the Little Miami mainstem at Spring Valley from 1970-1976 show that D.O. levels

have improved significantly during the past 7 years. However, data covering the most recent three years, especially for ammonia and total phosphorus, shows a worsening of actual water quality. Figures 14 and 15 illustrate changes in water quality by river mile for dissolved oxygen, BOD_5, ammonia, and total phosphorus during the summer months of 1976. All 4 parameters show the degradation in water quality that occurs near Spring Valley due to municipal wastewater discharges from Xenia, Greene County and Eastern Montgomery County. Pollution incidents killed more than 18,000 fish in the Little Miami Basin during the 1976 water year. Water quality standard conditions were found for ammonia, hexavalent chromium, copper, pH, dissolved oxygen, cadmium, and lead.

C. Mill Creek Basin

Water quality in the upper segment (headwaters to river mile 16.2) is degraded. One water quality standard violation was noted at the Sharon Road monitoring station for each of the following parameters: phenols (19 ug/l), oil and grease (10.1 ug/l), cadmium (50 ug/l), and lead (170 ug/l). Water quality problems at this station and two others (no violations) are due to semi-public package plants that discharge to streams that may have no flow at critical low flow periods. Intensive surveys in this area show that the average ammonia and total phosphorus concentration from the 16 semi-public and public WWTP are 4.3 mg/l and 6.6 mg/l respectively.

Water quality in the lower segment (river mile 16.2 to mouth) in this basin is extremely degraded. Numerous water quality standard violations for a variety of parameters were documented for this segment. For example, at Gest Street in Cincinnati, 8 of 13 samples for D.O. showed violations (lowest D.O. was 0.9 mg/l on two occassions); 10 of 12 samples of ammonia

FIGURE 14

AVERAGE SUMMER VALUES (JASO-1976) FOR DISSOLVED OXYGEN (D.O.) AND BOD_5 ON THE LITTLE MIAMI MAIN STEM BY RIVER MILE (OEPA DATA)

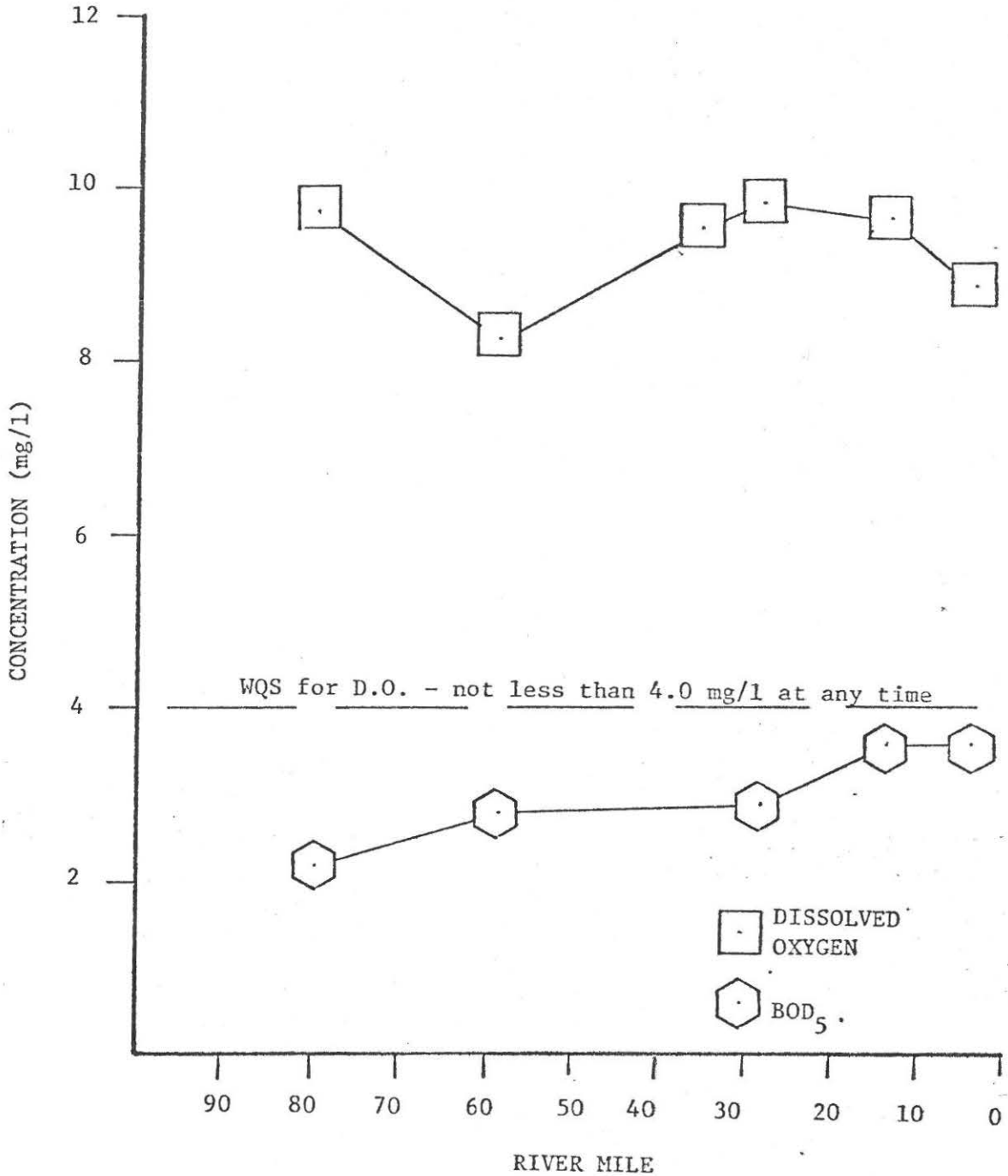
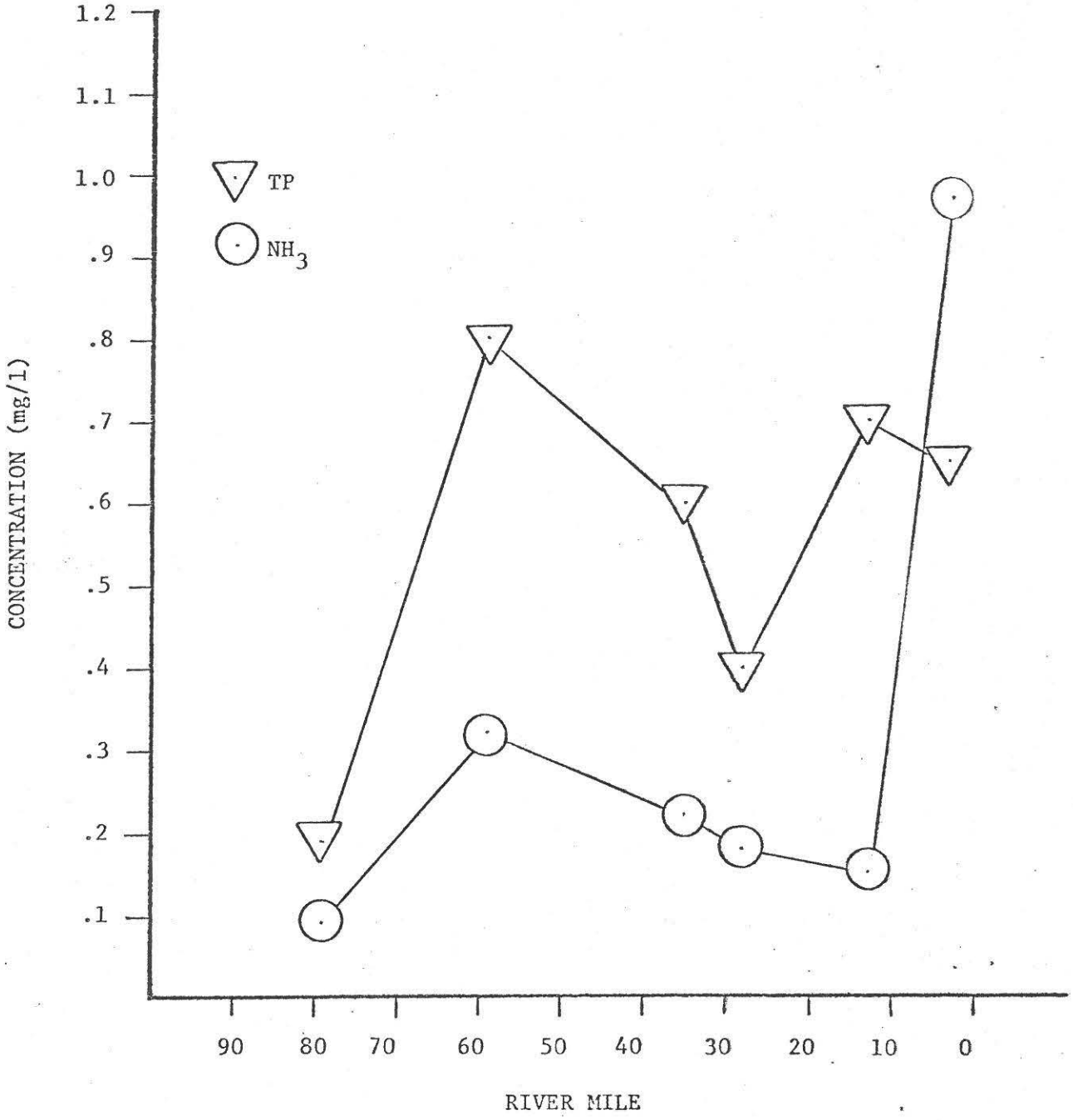


Figure 15

AVERAGE SUMMER VALUES (JASO-1976) FOR TOTAL PHOSPHORUS (TP) AND AMMONIA (NH_3) ON THE LITTLE MIAMI MAIN STEM BY RIVER MILE (OEPA DATA)



were greater than 1.5 mg/l standard (20.0 mg/l highest); 7 of 9 samples for phenols were in violation (115 ug/l highest); 3 of 5 samples for oil and grease were in violation (4900 mg/l highest); 2 of 6 samples for lead were in violation (690 ug/l highest); and 1 of 8 samples for zinc were in violation (740 ug/l). Although no violations, elevated levels of total phosphorus and BOD_5 were noted at several sampling stations throughout the lower segment.

Urban runoff, combined storm sewer overflows, and numerous industrial discharges contribute heavily to the severe degradation of water quality in the lower segment. Figure 16 depicts water quality trends for 4 parameters at Gest Street (Cincinnati) which is near the mouth. By far the most degraded area of the mainstem is below Wayne Avenue (Cincinnati). Here, intermittent point source discharges contribute excessive loads of BOD_5, suspended solids, ammonia, and total phosphorus. Industrial dischargers add significant quantities of oil and grease, metals, and phenols.

Industrial improvements totaling $91,000 should help improve water quality in the lower segment. Proctor and Gamble spent about $80,000 for acid control, while two other industries (Central Soya and McKesson Chemical) eliminated their discharges.

Water Quality in Mill Creek Basin is poor. It is degraded in the upper reaches because of numerous public and semi-public treatment plants discharging to small tributaries. It is extremely poor in the lower segments because of numerous combined storm sewer overflows in the Cincinnati area and many industrial discharges containing high levels of oil and grease, metals, and phenols. Figures 17 illustrates the degradation that takes place in Mill Creek from the headwaters to the mouth. Attainment

FIGURE 16

AMMONIA (NH_3), TOTAL PHOSPHORUS (TP), BOD_5, AND DISSOLVED OXYGEN (D.O.) TRENDS FOR MILL CREEK AT GEST STREET (MOUTH)

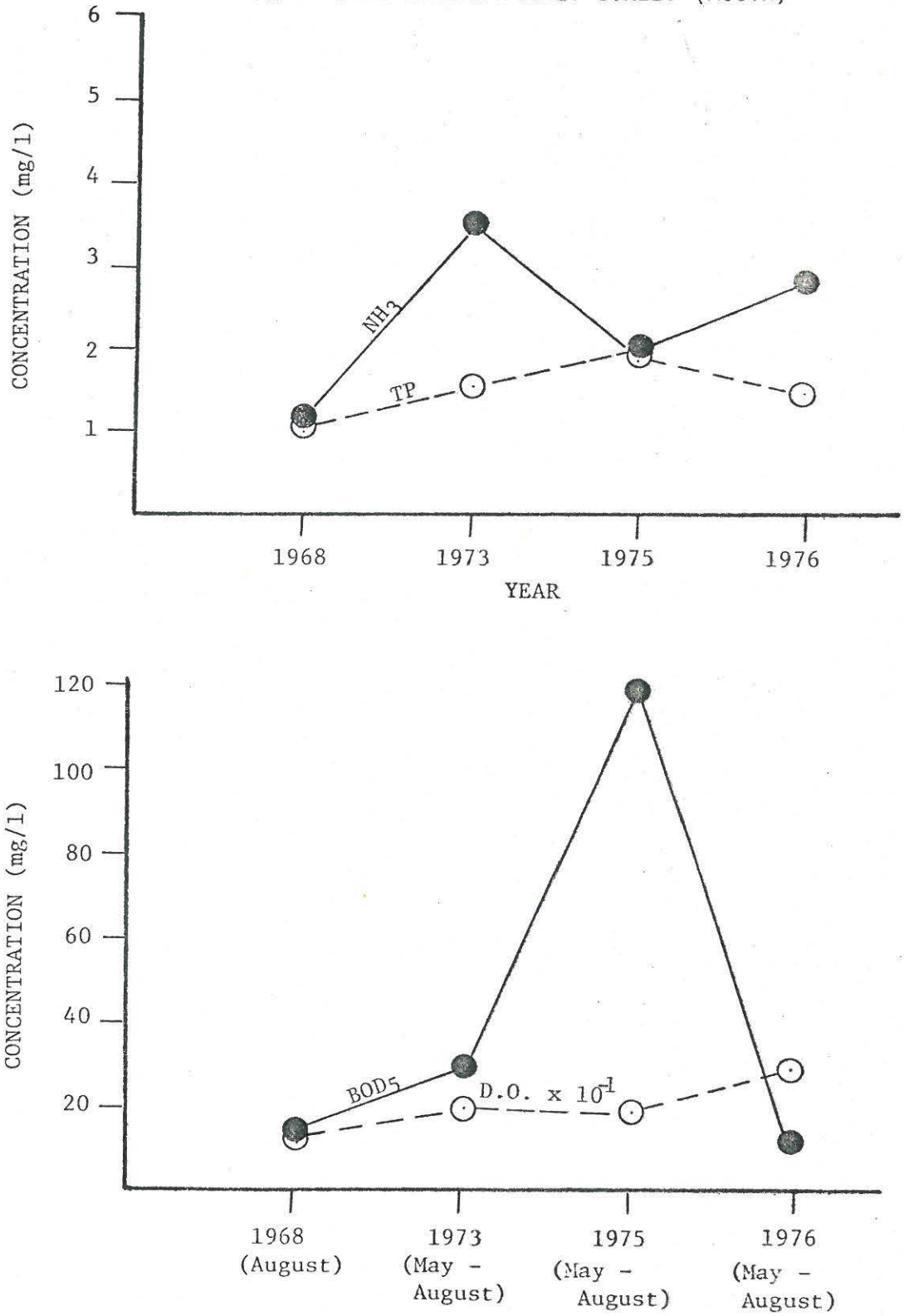
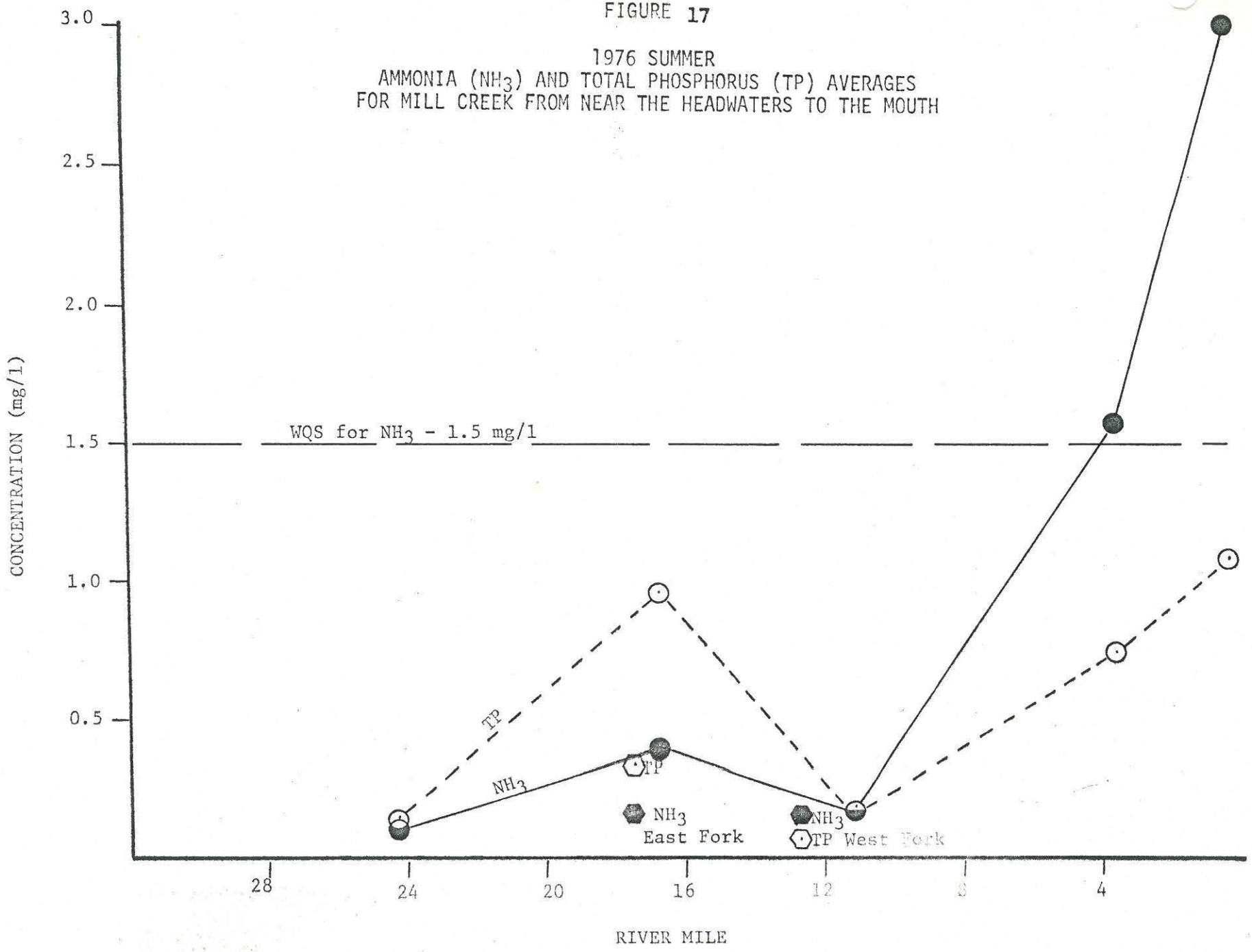


FIGURE 17

1976 SUMMER
AMMONIA (NH_3) AND TOTAL PHOSPHORUS (TP) AVERAGES
FOR MILL CREEK FROM NEAR THE HEADWATERS TO THE MOUTH



of water quality standards in the lower segment of the basin will be difficult because of the enormous costs involved in correcting problems due to combined sewer overflows. Achievement of water quality standards in the upper segment should be possible with proper planning.

D. Minor Southwest Ohio River Tributaries

The minor southwest Ohio River streams include Four Mile Creek, Five Mile Creek, Eight Mile Creek, Nine Mile Creek, Ten Mile Creek, Twelve Mile Creek, Indian Creek, Bear Creek, Bullskin Creek and Muddy Creek. The only water quality violations noted in any of these streams during the 1976 water year occurred on Eight Mile Creek which had 3 dissolved oxygen violations - the lowest D.O. reading being 2.6 mg/l. Elevated concentrations of total phosphorus were noted in a few streams.

There are a total of 15 known point sources. The major impact of these point sources appears to be the creation of isolated problem areas resulting from overloaded or poorly operated treatment facilities. There are also a number of intermittent point sources (storm sewer and combined storm sewer discharge points) in those streams flowing through Cincinnati. In many cases, severe degradation of stream water quality occurs below these types of discharges.

Table 11 lists those industrial and municipal facilities in the minor southwest Ohio River Tributary area that have made an effort to reduce pollution thereby upgrading water quality in this area.

TABLE 11

SUMMARY OF INDUSTRIAL AND MUNICIPAL DISCHARGER IMPROVEMENTS IN MINOR SOUTHWEST OHIO RIVER TRIBUATRIES

County	Facility	Affected Stream	Status/Description
Clermont	Beechmont Woods WWTP	Trib. to Eight Mile Cr.	Under Construction
Clermont	Hopple Hill Farms WWTP	Trib. to Nine Mile Cr.	Under Construction
Hamilton	Foxtrail Farms WWTP	Five Mile Creek	New Plant

A. Municipals

County	Facility	Affected Stream	Status/Description
Hamilton	Cleves WWTP (new name-Indian Creek WWTP)	Ohio River	Turned over to MSD-expansion and improved treatment under construction
Hamilton	Little Miami WWTP	Ohio River	Secondary treatment under construction: to be totally completed by 7-1-78 (primary tanks to be renovated.
Hamilton	Mill Creek WWTP	Ohio River	Secondary treatment under construction; to be completed by 7-1-77

B. Industrials

Hamilton	Ashland Petroleum	Ohio River	Installation of oil/water separator
Hamilton	Chevron Asphalt	Ohio River	Treatment Plant approved (Cost - $94,000)
Hamilton	CG&E - Beckjord	Ohio River	Oil barrier (Cost-$10,000) Coal Pile Runoff (Cost-$150,000
Hamilton	CG&E - Miami Fort	Ohio River	Coal Pile Runoff (Cost-$220,000
Hamilton	CG&E - West End	Ohio River	All flows stopped
Hamilton	Hilltop Concrete	Ohio River	Settling/Neutralization construction started (Cost-$75,000)
Hamilton	Monsanto	Ohio River	Construction started (Cost-$2,400,000)
Hamilton	Tresler Oil	Ohio River	Neutralization (Cost-$20,000)

Total Industrial Improvement Cost $3,969,000

2. Northwest Region

This region of the state consists of predominantly flat agricultural lands. The soils in this area are relatively impermeable resulting in runoff problems. As previously discussed, erosion of soil from agricultural lands and other sources with its subsequent transport of sediment to waterways is the primary water quality problem in this region. In addition, several industrial and municipal point source discharges give rise to localized water quality problems. Significant localized problem areas occur in the Ottawa River below Lima, the Blanchard River below Findlay, the Auglaize River below Wapakoneta, the Maumee River in the Toledo area, and the Sandusky River below Bucyrus and Fremont. The major drainage basins included in this region are the Maumee, Portage, Sandusky, Huron, and Vermilion.

A. Maumee River Basin

The primary water quality problems within the Maumee River Basin are violations of the water quality standard for fecal coliform bacteria, high nutrient concentrations and transport, a heavy suspended solids load, high turbidity, and occasional nuisance algal blooms with associated excessive diurnal oxygen and pH fluctuations. Concentrations of copper and zinc occasionally exceed standards; however the only consistent heavy metal violation is for hexavalent chromium in the Ottawa River downstream from Lima. Violation of the water quality standard for dissolved oxygen and ammonia occur at sampling stations in the Ottawa River downstream of Lima and in the Blanchard River below Findlay.

(1) Ottawa River Subbasin

The Ottawa River below Lima is seriously polluted due to discharges of major industrial and municipal loads. Dissolved oxygen, fecal coliforms,

MBAS, chromium, phenols, cyanide, and ammonia standards are consistently violated. The effects of discharges in the Lima area can be detected at the Kalida station near the mouth, a distance of 34 miles. At Kalida, two dissolved oxygen and six fecal coliform violations occurred during the 1976 sampling period. Of the heavy metals, only total iron and manganese appeared to have somewhat high maximum concentrations. Upstream at the Allentown station, the effects of point source discharges in the Lima area are more readily apparent. Here violations of the standard for dissolved oxygen, fecal coliform, MBAS, phenols, and hexavalent chromium occurred during the sampling year. The yearly average ammonia concentration was 9.2 mg/l, while nitrates averaged 5.7 mg/l. Again, total iron and manganese were the only other heavy metals, aside from hexavalent chromium, to have somewhat high levels.

Although the Ottawa remains seriously polluted downstream from Lima, improvement has taken place. An Ohio Department of Natural Resource fish survey in 1960 indicated that fish had been eliminated from the entire Ottawa River downstream of Lima and even for several miles in the Auglaize River downstream of its confluence with the Ottawa River. Ohio EPA did a fish survey in 1976 and found 23 species of fish inhabiting the Ottawa River near its mouth. Eleven species of fish relatively tolerant of pollution were found in the Ottawa River 15 miles downstream of Lima. Above Lima, a well-balanced warm water fishery was noted with 25 species collected, but for 5 to 10 miles below Lima, fish continue to be absent.

Improved treatment by the Lima WWTP coupled with the city's efforts to abate combined sewer overflows have helped significantly to improve water quality in the Ottawa River. A major refinery and chemical facility both have installed facilities to reduce the amount of ammonia

discharged to the river from their respective outfalls. Nonetheless, the ammonia concentration still is far too high to meet water quality standards. Further treatment is planned by these two industries in 1977 which should continue to improve water quality downstream of Lima. Hopefully by 1980, the lower Ottawa River may again become an important sport fishery.

(2) Blanchard River Subbasin

In the Blanchard River downstream of Findlay, water quality standards are often violated for dissolved oxygen, ammonia, and fecal coliform. The water quality problem here results from inadequate sewage treatment facilities in the City of Findlay. The WWTP is severely overloaded by industrial wastes, particularly oxygen demanding wastes and ammonia. During the 1976 sampling year at the stations below Findlay there were 3 dissolved oxygen violations, 6 fecal coliform violations and 1 MBAS violation. The yearly average ammonia concentration was 1.95 mg/l, while nitrates and total phosphorus averaged 4.6 mg/l and 1.3 mg/l respectively. Of the heavy metals, only total iron and manganese had somewhat high maximum yearly concentrations.

Findlay is presently completing Step I of its construction grant process. In addition, the City plans to adopt a new pretreatment ordinance in 1977. Such an ordinance, if enacted, will reduce industrial loadings to the WWTP until new facilities can be completed and should help improve water quality below Findlay.

(3) Swan Creek Subbasin

The water quality in Swan Creek is degraded due to waste effluents from Swanton WWTP, Whitehouse WWTP, and several industrial sources. The greatest degradation of water quality in Swan Creek occurs in the lower

section where combined sewer overflows frequently enter the stream from sewer regulators in the City of Toledo. No water quality data was collected by Ohio EPA on Swan Creek during the 1976 water year.

(4) Auglaize River Subbasin

The main water quality problem in this basin occurs in and below Wapakoneta. Combined sewer overflows and discharges from the WWTP are responsible for degradation of water quality in this area. The discharge from the WWTP is estimated to contribute 25% or more of the flow in the river for about 20% of the year.

Problematic parameters below the WWTP outfall include dissolved oxygen, nutrients and fecal coliform. At the Fort Jennings sampling station, violations for dissolved oxygen and fecal coliform were noted during the 1976 water year. The yearly average nitrate concentration was 3.1 mg/l with the maximum being 11.4 mg/l. Total phosphorus averaged 0.4 mg/l. Total iron averaged 13.2 mg/l with a maximum of 29.0 mg/l. The river was sampled just downstream of the Wapakoneta WWTP. Elevated concentrations of cadmium, chromium, and nickel were detected. Stream recovery appears to begin about 2 1/2 miles below the outfall. Here, based on the benthic aquatic community found, the stream is characterized as being moderately polluted. Fairly good stream recovery appears to occur about 6 miles below the WWTP.

On two different occasions recently, fish kills were observed. The first kill to be observed occurred about 2 1/2 miles below the Wapakoneta WWTP outfall. This kill appeared to extend about another mile upstream. At least 8 species of fish were affected. Because the fish, when observed, had been dead from one to two days, it could not be determined whether the kill originated upstream or downstream of the WWTP outfall. The second fish kill observed definitely originated upstream of the WWTP

upstream of the DiSalle Bridge (mile point 6.9). However, violations for dissolved oxygen frequently occur from the Anthony Wayne Bridge (mile point 5.4) to the mouth. Violations were most severe near the Craig Bridge (mile point 3.6) which is just below the outfall discharging cooling water from a power plant.

Long retention times in the Maumee estuary, sludge beds below river mile point 6, the erratic performance of Toledo's sewage treatment plant, a large cooling water discharge from a power plant, and large rural sources of landwash were cited as the major factors contributing to the degradation of water quality in the lower Maumee River. The authors of the Enviro-Control report concluded that Toledo's water quality problems are largely local in their consequences. Most of the solids, nitrogen, phosphorus, and oxygen-demanding wastes which enter Maumee Bay originate in the large drainage area above Toledo.

An eleven week study was conducted by the Toledo Metropolitan Area Council of Governments on the lower Maumee River during the summer of 1975. Samples were collected on a weekly basis at 1.5 mile intervals for a number of water quality parameters from river mile point 8.5 to the mouth of the Maumee River. In addition, dissolved oxygen, temperature, and conductivity were measured at 0.5 mile intervals.

Analysis of the data collected indicated that mixing of the waters was rather complete in the study area. Although nutrients appeared to be uniformly mixed from the mouth of the Maumee River to mile point 8.5, dissolved oxygen concentrations showed a decline at and below river mile 5.5. Dissolved oxygen concentrations frequently violated Ohio's instantaneous standard of 4 mg/l below river mile 5.5 and average dissolved oxygen concentrations were less than 5 mg/l from river mile 5.5 to the

mouth. Violations for fecal coliform bacteria were numerous. Forty-three percent or 86 out of 198 samples for fecal coliform analysis were in excess of 400 colonies/100 ml for the entire study area.

Although the lower portion of the Maumee River estuary is heavily polluted, the effects are largely localized in the Toledo area. Most of the solids, nutrients and oxygen-demanding wastes entering Maumee Bay are derived from upstream sources, primarily agricultural runoff.

(6) Improvements Within the Maumee River Basin

Numerous industries within the Maumee River Basin have upgraded and improved their treatment facilities during the last five years. Improvement in wastewater effluents from refineries, food processers, platers and metal finishers, and the chemical industry has greatly improved water quality in many streams within the basin. Improvements at foundries, steel plants, glass manufacturing plants, rubber processing plants, and power plants have also upgraded water quality within the basin.

Equally important to improved water quality within the Maumee River Basin are new and improved treatment facilities constructed by municipalities. Since 1971, six new wastewater treatment plants have been constructed in the basin; seven plants have added additional treatment facilities; and nine localities have constructed interceptor sewers. Funds have been released for the construction of additional treatment facilities at the Swanton WWTP and for the construction of sewer interceptors at three different localities. In addition, numerous municipalities are at different "steps" in the construction grant process. At least four municipalities will begin construction of new treatment facilities and interceptor sewers, and one will construct additional facilities along with interceptor sewers during 1977. The net effect of this construction

will be to improve water quality in areas immediately downstream from these municipalities, as well as to upgrade water quality in the basin as a whole.

In addition to improving treatment facilities, controls have been tightened for new home, on-site, waste disposal systems and wastewater treatment systems are required for new subdevelopments. Better surveillance has resulted in the upgrading and improved operation of existing facilities within the basin.

B. Portage River Basin

Water quality in the Portage Basin is generally good. Degradation of water quality does occur in the North Branch, the result of municipal wastewater dischargers from the Bowling Green WWTP. The water quality problem becomes particularly acute in the North Branch during low flow periods when nearly the entire flow in this segment stream is attributable to the Bowling Green WWTP discharge. Poe Ditch, the recipient of the Bowling Green WWTP discharge is the largest tributary to the North Branch. Problem parameters in Poe Ditch include dissolved oxygen, ammonia, MBAS, and fecal coliform. Similar problem parameters have been found in the North Branch below its confluence with Poe Ditch. At the Pemberville sampling station on the North Branch below Poe Ditch during the 1976 water year, the only violation of water quality standards noted was fecal coliform. Aside from a slightly high yearly average nitrate concentration (5.1 mg/l), all other parameter concentrations measured appeared to be within normal levels.

Downstream in the mainstem of the Portage at the Woodville station, the only water quality standard violation during 1976 was again fecal

coliform. However, less than 50% of the samples collected were in violation of the fecal coliform standard at this station, while 83% of the samples collected at Pemberville violated standards. Maximum yearly concentrations of ammonia, BOD_5, MBAS, chloride and several of the heavy metals were higher at Woodville than at Pemberville. These increases are probably indicative of the additional industrial and municipal discharges throughout the basin. It is interesting to note that the percentage of fecal coliform violations at the Woodville station during the 1976 water year was 20% less than during the previous year.

High fecal coliform counts are the chief water quality problem in both the middle and South Branch of the Portage. Occasional violations of ammonia and MBAS have also been detected in both streams. Phenol violations have been detected in two tributaries to the Middle Branch, while mercury and phenols have been detected in the South Branch.

Other problem areas in the basin besides Poe Ditch and the North Branch include Rader Creek below McComb, Wolf Creek below Gibsonburg, Bull Creek below Jerry City, and the East Branch, a tributary to the South Branch, below Fostoria. The water quality problems in these areas result from significant point source discharges to low flow, small tributary streams. In the case of the East Branch, it receives the municipal discharge from the Fostoria WWTP plus raw sewage from combined sewer overflows in the city.

There appears to be a general improvement in water quality throughout the basin. This is probably reflective of improvements made in treatment facilities by industrial and municipal dischargers. No new serious degradations in water quality in the basin were detected during the 1976 water year. There appears to be an improvement in the water

quality of the North Branch in terms of a reduction in the total phosphorus concentration at the Pemberville stations. The installation of phosphorus removal equipment at the Bowling Green WWTP appears to have effected this change. Elsewhere, the installation of chlorine equipment at the North Baltimore WWTP should reduce fecal coliform levels in Rader Creek. In Fostoria, a new sewer project for the east side of town will eliminate septic tank discharges. The new secondary WWTP at Oak Harbor will help to maintain water quality in the mainstem and in the estuary area. Until controls can be found to contain the movement of sediments such as nutrients from the agricultural lands in the basin, the Portage River will continue to contribute significant quantities of materials which help accelerate the eutrophication process in Lake Erie.

C. Sandusky River Basin

Overall, the water quality in the Sandusky River Basin ranges from fair to good. The water quality problems are: high nutrient concentrations and transport, a heavy suspended solids load, high turbidity, occasional nuisance algal blooms and associated excessive diurnal oxygen fluctuation, and high fecal coliform bacteria levels in many portions of the basin. The water quality problems within the basin are primarily the result of nonpoint source pollution and inadequate treatment of municipal wastes.

An intensive sampling program conducted by Ohio EPA during 1974 concentrated on moderate to low flow regions rather than peak discharges. The major water quality problems discovered during this study were primarily related to inadequate municipal sewage treatment facilities and combined sewer overflows. Problem areas include the Sandusky River below Bucyrus, Spring Run below Carey, Paramour Creek below Crestline

and the Sandusky River below Fremont.

Inadequate treatment of sewage at Crestline seriously degrades water quality in Paramour Creek. Frequent standards violations occur for dissolved oxygen, ammonia, foaming agents (MBAS) and fecal coliform bacteria. Fecal coliform bacteria densities were consistently above 15,000 per 100 ml. Less frequent violations occur for phenols and total copper.

As was discussed previously, a study by Burgess & Niple, Ltd. of the Bucyrus combined sewer system found that any rainfall event greater than 0.05 inch for a 20 minute duration would result in discharge of raw sewage to the Sandusky River. Rainfalls of this intensity can be expected to occur on an average of once every five days. The result is a serious water quality problem in the river below Bucyrus which has been blamed for several fish kills in this area. Frequent water quality standards violations occur in this reach for dissolved oxygen, ammonia and fecal coliform bacteria. Occasional standards violations occur for foaming agents (MBAS), phenols, copper and mercury.

In Spring Run, downstream from Carey, ammonia and fecal coliform bacteria violations have been measured. While dissolved oxygen violations have not been noted, it would seem likely that such violations would occur during the night and the early morning hours. Inadequate sewage treatment at Carey is the source of these materials.

Prior to 1976, Muskellunge Creek at Fremont received untreated sewage from a storm sewer serving the west side of Fremont. Violations of standards for dissolved oxygen, fecal coliform bacteria, ammonia, MBAS, and mercury were detected during the 1974 study. With the connection of this area to the Fremont sanitary sewer system in 1976, water quality in Muskellunge Creek is expected to improve considerably.

The Sandusky River downstream from Fremont is essentially a lacustrine estuary of Lake Erie. This area receives heavy organic loadings from the Fremont WWTP which, in addition to domestic wastes, receives effluents from the Heinz Company and Northern Ohio Sugar Company. Frequent water quality standards violations occur in this area for dissolved oxygen and fecal coliform bacteria. An automatic water quality monitor located 0.7 miles downstream from the Fremont WWTP recorded numerous violations of the dissolved oxygen standard. Also, malfunction of in-plant equipment at the Fremont WWTP have caused fish kills downstream of the plant. A number of industries within the Sandusky River Basin have upgraded and improved their treatment facilities recently. These improvements have resulted in better water quality in some of the small receiving streams within the basin, but probably had little impact on water quality in the Sandusky River.

Improvements in the water quality of the Sandusky River have been primarily a result of upgrading municipal wastewater treatment plants. The cities of Attica, Bucyrus, and Upper Sandusky have added new treatment facilities within the last five years which should improve the quality of their respective effluents. In addition, Fremont proposes to improve and expand their present facilities by providing better sludge handling capabilities and greater capacity. The Bellevue WWTP now provides for phosphate removal.

Two major causes of water pollution within this basin have been unaffected by the State's pollution control program during the 1976 water year. These are nonpoint source pollution (primarily agricultural runoff) and combined sewer overflows from municipalities. It should be pointed out that Bucyrus is in the Step II phase of the construction

grant process and that detailed plans for the construction of improved treatment facilities, including the treatment of combined sewer overflows, should be completed in 1978.

D. Huron River Basin

Water quality in the Huron River Basin is generally very good with the exception of several tributaries to the mainstem and the West Branch both of which receive discharges from industrial and municipal sources. The most common water quality problem in the basin is fecal coliform bacteria with an occasional heavy metal violation in the mainstem and some of the smaller tributaries. Overall, the Huron River is one of the highest water quality streams in the northwest region.

Water quality is presently measured at two locations in the basin: the East Branch below Norwalk at Shaeffer Road and the mainstem below Milan off Mud Brook Road. During the 1976 water year, the only water quality standard violation noted at the East Branch station was fecal coliform bacteria. Of the four samples collected for these parameters, three were found to be in violation. All other parameters measured appeared to be well within acceptable limits. At the station on the mainstem below Milan, the most frequently occurring standards violation was fecal coliform bacteria. There was also one violation for mercury. Total iron concentrations, both the yearly average and maximum concentration, were somewhat high at 3.3 mg/l and 11.4 mg/l respectively.

Most of the point source related water quality problems in the basin are found in the West Branch. Specific problem areas include (1) Marsh Run, a tributary of the West Branch which receives primarily industrial discharges, (2) Jacob Creek, which drains into Holiday Lake, receives the

effluent from the Willard WWTP, and Rattlesnake Creek, a tributary to the East Branch, which receives the effluent from the Norwalk WWTP.

There have been a number of improvements in treatment facilities at industrial and municipal entities in the basin over the past five years. These improvements have had favorable effect on water quality in the basin. A continued improvement in water quality is anticipated as a number of municipalities begin facilities planning for the first phase of the Construction Grant Program.

E. Vermilion River Basin

The Vermilion River Basin is one of the most pollution free rivers in the State of Ohio due to the small number of discharges. The water quality of the basin has always been, and continues to be good. A few rather minor localized problems do exist below some communities, but these problems should be easily corrected as new or improved wastewater treatment facilities are constructed. Potential problem areas exist below Wakeman on the mainstem and below New London on Skellenger Creek (East Branch). While only fecal coliform bacteria violations were noted at these two areas, it is believed that other problems could exist at critical low flow conditions. Nonpoint source pollution is generally considered the greatest pollution problem in the basin, with sediment being the greatest single pollutant.

3. Northeast Region

This region encompasses the most heavily industralized areas of the state. Akron, Cleveland, Warren-Youngstown are major areas of population and industralization. Severe water quality problems, the result of both industrial and municipal point source discharges, occur in the lower Cuyahoga River (from the Cleveland Southerly WWTP to the mouth) and in the Mahoning River (from Warren to the Pennsylvania-Ohio stateline). Frequent violations of the water quality standards for dissolved oxygen, ammonia, heavy metals, fecal coliform bacteria, and phenols occur in these two segments. Other localized problem areas in this region include the Black River in and below Elyria and Fields Brook, a tributary to the Ashtabula River, in the City of Ashtabula. Other drainage basins in the region, in addition to the ones already mentioned, include the Rocky, Chagrin, Grand, Conneaut, and Little Beaver Creek Basins.

A. Black River Basin

The water quality in the middle and upper portions of the Black River basin is generally good. The upper reaches of the basin drain rural areas. Limited data in this area shows the water quality to be very good with the possible exception of fecal coliform bacteria violations. There are, however, several isolated problem areas experiencing degradation of water quality. Plum Creek downstream of Oberlin is a good example of such an area. Here, ammonia, dissolved oxygen, and fecal coliform bacteria frequently violate water quality standard limits.

The lower portion of the Black River, in the Lorain-Elyria area, flows through a heavily industrialized area. Industrial and municipal waste generated in this area cause degradation of water quality in the mainstem of the Black River. Ammonia, fecal coliform bacteria, and

dissolved oxygen were the parameters most frequently found to be in violations of water quality here. Other problem parameters include MBAS, copper, phenols, and hexavalent chromium. High concentrations of BOD, COD, and phosphorus were also measured here.

During the 1975 water year, two sampling stations were located on the East Branch of the Black River. The sampling sites were located upstream and downstream of Grafton. The data indicated high fecal coliform bacteria levels at both monitoring sites, with the downstream site having significantly higher levels. A single zinc violation was recorded at the upstream site.

Also during 1975, several samples were collected on Plum Creek at U.S. Route 20. Plum Creek, tributary to the West Branch of the Black River, drains the Oberlin area and receives the treated discharge of the Oberlin WWTP. The data collected showed Plum Creek to be grossly polluted. Extremely high concentrations of ammonia (maximum 11.5 mg/l) and phosphorus (maximum 8.3 mg/l) were measured in addition to excessively high fecal coliform bacteria counts. Dissolved oxygen concentrations were in violation of the water quality standard two of the three times samples were taken. With the renovation of the Oberlin Plant, water quality in Plum Creek is expected to improve.

Ohio EPA maintained one primary water quality monitoring station on the Black River during the 1976 water year. This station was located at Cascade Park in Elyria just downstream of the confluence of the East and West Branches of the Black River. This site monitored the impact on water quality of upstream dischargers including a small part of Elyria. Ammonia and fecal coliform bacteria levels were the most frequent violations of water quality standards at the Cascade Park sampling location.

The water quality in the Black River becomes further degraded as it

flows through the remainder of Elyria. Ohio EPA data collected during the 1975 water year at Ford Road in Elyria showed seven parameters violating water quality standards. Ammonia and fecal coliform bacteria were the parameters most frequently violating water quality standards here. Phenols, hexavalent chromium, copper, and mercury were also found to exceed water quality standards on several occasions. Data collected by the U.S. Geological Survey's continuous water quality monitor at this site during the 1976 water year, showed numerous dissolved oxygen violations during the warmer summer months.

Further downstream, the tributary of French Creek empties into the Black River. Past sampling results showed violations of ammonia, dissolved oxygen and fecal coliforms and high concentrations of phosphorus near the town of Avon. However, the completion of a new tertiary wastewater treatment plant near North Ridgeville is expected to alleviate many of the wastewater related problems caused by Avon and North Ridgeville.

The following pollution abatement projects were accomplished in the Black River basin during the past five years:

(1) Ohio Water Development Authority - French Creek water treatment plant is a new 7.5 mgd tertiary treatment plant constructed in 1975.

(2) Oberlin Wastewater Treatment Plant - has been renovated during 1974 and 1975. The plant presently consists of a contact stabilization plant with a tertiary sand filter, phosphorus removal facilities and chlorination facilities. The capacity of the plant is 1.5 mgd.

(3) Wellington Sewage Treatment Plant - has added new primary tanks, aerobic digestors, a trickling filter and chlorination facilities in 1972. The plant capacity is 0.75 mgd.

(4) Lodi Wastewater Treatment Plant - was upgraded to a 0.350 mgd plant in 1972. The upgrading included the addition of micro-strainers and

chlorination facilities.

(5) Spencer Wastewater Treatment Plant - is a new 0.086 mgd sewage system consisting of two waste stabilization ponds in series, and chlorination facilities. The facilities were constructed in 1971-72.

(6) Schneider Farms Plant - was expanded from a .045 mgd plant to a .100 mgd plant in 1973. Sewage treatment consists of an extended aeration plant, tertiary sand filter, chlorination facilities and sludge handling facilities.

(7) General Motors, Fisher Body Division, Elyria - has exceptional facilities for treating wastewaters from their large plating operation. These include the chemical reduction of chrome and oxidation of cyanide wastes. Further treatment includes precipitation of heavy metals and clarification. They also have sludge dewatering facilities, and pH adjustment controls.

(8) Republic Steel, Elyria - had a pickling operation for an architectural tubing and steel forming operation. The operations were changed, eliminating the pickling step with consequent improvement of their discharge.

(9) American Shipbuilding, Lorain - are planning improvement in oil and suspended solids removal from their discharge in the near future which will attain best practicable treatment levels.

(10) Stanadyne, Inc. Elyria - have recently installed modern facilities for treating wastewater from plating operations, which includes oxidation of cyanides, reduction of chromium wastes, and the precipitation of copper. They also have installed pH adjustment controls.

(11) Invacare, Inc., Elyria - are recycling treated wastewater from their plating operation using ion-exchange resins and reverse osmosis for part of their purifying procedures.

(12) Cleveland Steel Products - has installed waste oil storage tanks for off-site disposal of waste oils.

B. Rocky River Basin

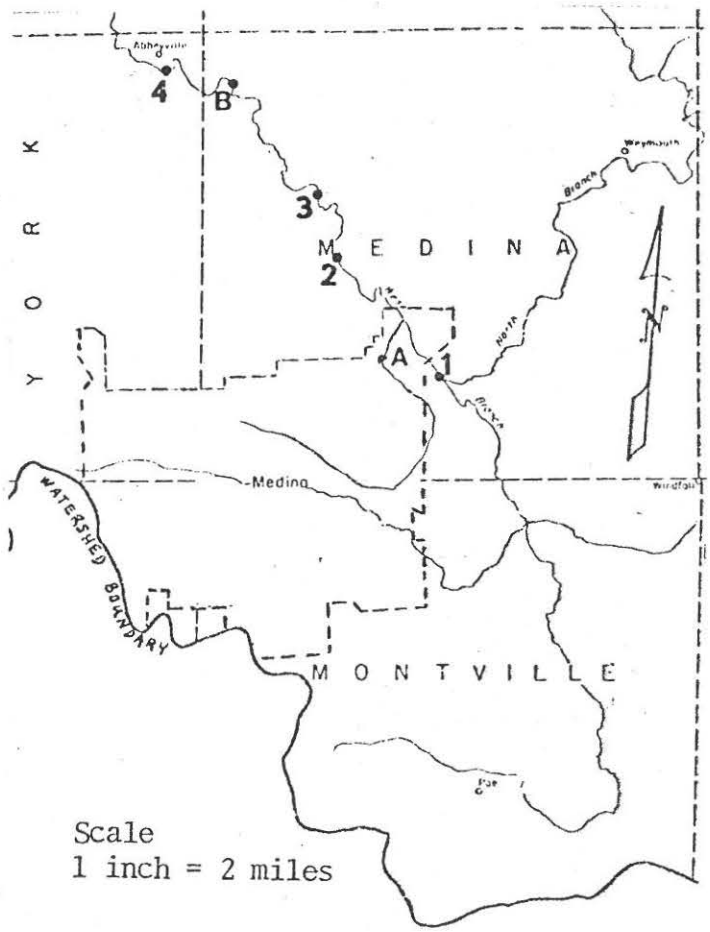
Numerous municipal WWTP discharges throughout the basin give rise to frequent fecal coliform bacteria violations. There are only a few industrial dischargers in the basin. Other problematic parameters include ammonia, dissolved oxygen, MBAS, chloride, and phenols. Specific problem areas in the basin include the upper reaches of the West Branch, Abram Creek, and occasionally the lower reaches of the East Branch.

The upper reaches of the West Branch, below the City of Medina, are grossly polluted by the effluent from the overloaded Medina #200 WWTP. Stream recovery from this discharge does not fully occur before an additional pollutant load enters the West Branch from the Medina 100 WWTP. The combined effect of these two discharges causes violations of the water quality standards for dissolved oxygen, ammonia, MBAS, fecal coliform bacteria, and chlorides. Figure 18 highlights this problem area.

Abram Creek also has poor water quality due to the poorly treated Middleburg Heights WWTP effluent plus the added waste load from Brook Park WWTP. In addition to these two sources, other undetermined sources are contributing phenols, chlorides, and ammonia. Figure ___ shows the location of several dischargers and sampling station locations on Abram Creek and summarizes water quality data at the two sampling stations.

Degradation of water quality occurs in the lower reaches of the East Branch below the Berea WWTP. Here, violations of the water quality standard for ammonia are noted. The water in this segment is frequently turbid because of suspended solids and occasionally has a green color due to algal growth.

Figure 18. Map of Problem Area On Segment WRR4
Showing Sampling Stations And Dischargers



Source Key: (A) Medina 200 STP
(B) Medina 100 STP

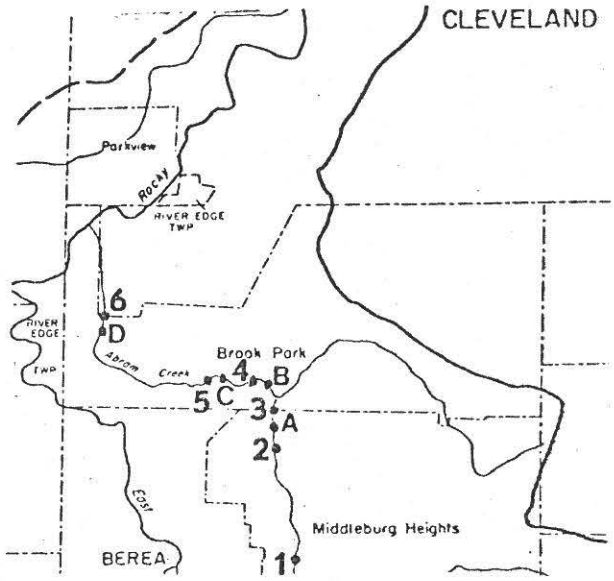
Sampling Stations: (1) Weymouth Road
(2) Fenn Road
(3) Pearl Road
(4) Abbeyville Road

Selected Parameters For Stations 1 And 2 In Figure 18

Selected Parameters	Unit	Max.		Min.		Avg.		N		WQS
		1	2	1	2	1	2	1	2	
NH_3-N	mg/l	0.60	8.90	0.13	0.33	0.39	3.07	3	11	1.5
TKN-N	mg/l	1.1	12.1	0.0	0.5	0.5	5.99	3	11	-
Total Phosphorus	mg/l	0.0	3.61	0.0	<0.1	0.0	0.74	3	11	*
BOD5	mg/l	2	33	0	4.4	1	15.4	3	9	-
D.O.	mg/l	8.8	11.9	5.7	0.5	-	3.8	3	9	5.0
Fecal Coliform	#/100 ml	230	260000	210	100	-	4237	3	10	200
MBAS	mg/l	0.12	0.73	0.05	0.06	0.08	0.37	3	11	0.5
Chloride	mg/l	80	540	51	63	64	194	3	11	250

* Refer to Water Quality Standards in Appendix

Figure 19 Map Of Problem Area On Abram Creek
With Locations Of Sampling Stations And Dischargers



Scale:
1 inch = 2 miles

Source Key: (A) Middleburg Heights STP
(B) Brook Park STP
(C) Foseco
(D) NASA - Lewis Research

Sampling Stations Key: (1) Bagley Road
(2) Above Middleburg Heights STP
(3) Sheldon Road
(4) Eastland Road
(5) Riverside Drive
(6) Cedar Point Road

Selected Parameters For Stations 1 and 2 In Figure 19

Parameters	Max.		Min.		Avg.		N.		WQS
	1	2	1	2	1	2	1	2	
NH_3-N, mg/1	0.96	4.26	0.43	3.98	-	-	2	2	1.5
Total P, mg/1	0.36	0.35	0.24	0.13	-	-	2	2	*
BOD_5, mg/1	2.7	6.7	2.2	4.5	-	-	2	2	-
D.O., mg/1	6.2	7.2	5.0	-	-	-	2	1	5.0
Chloride, mg/1	142	490	141	341	-	-	2	2	250
Phenols, ug/1	11	21	4	17	-	-	2	2	10
Fecal Coliform-#/100 ml	5000	700	3700	27	-	-	2	2	200

* Refer to Water Quality Standards in Appendix

Selected Parameters For Stations 3 & 4 In Figure 19

Parameter	Max. Value		Min. Value		Average		N		WQS
	3	4	3	4	3	4	3	4	
NH_3-N, mg/l	14.9	11.1	3.8	4.2	10.0	7.6	3	3	1.5
Total P, mg/l	0.9	3.4	0.6	1.4	0.7	2.7	3	3	*
BOD_5, mg/l	8.7	8.7	< 1.0	< 1.0	–	5.5	2	3	–
D.O., mg/l	7.0	6.8	4.0	4.8	–	–	2	2	5.0
Chloride, mg/l	117.0	168.0	86.0	100.0	100.0	137.0	3	3	250
Phenols, ug/l	22.0	18.0	4.0	4.0	12.7	11.7	3	3	10.0
Fecal Coliform, #/100 ml	7500	9500	4	36	157	1256	3	3	200

Selected Parameters For Stations 5 And 6 In Figure 19

Parameter	Max. Value		Min. Value		Average		N		WQS
	5	6	5	6	5	6	5	6	
NH_3-N, mg/l	13.7	15.0	4.0	3.3	10.3	10.6	3	3	1.5
Total P, mg/l	2.4	2.8	1.1	0.9	1.8	2.0	3	3	*
BOD_5, mg/l	14.0	14.0	–	7.7	–	10.9	1	3	–
D.O., mg/l	5.2	9.4	1.8	7.9	–	–	2	2	5.0
Chloride, mg/l	189.	131.	98.	93.	141.3	114.3	3	3	250.
Phenols, ug/l	2960.	54.	219.	11.	1653.	39.	3	3	10.
Fecal Coliform, #/100 ml	9400	20000.	< 9.	8000.	63.	12429.	3	3	200.

* Refer to Water Quality Standards in Appendix.

Water quality in this basin should improve significantly as two water pollution control projects are implemented. One of these projects is the Southwest Suburban Interceptor of the Cleveland Regional Sewer District, which will, within the next five years, divert discharges from Berea and other sewage treatment plants in this basin that are not providing advanced treatment to the Cleveland Southerly WWTP. The second project should correct the existing water quality problem in the upper West Branch when the effluents from the Medina 200 and 100 WWTP facilities are diverted to the Medina 500 WWTP which will have the capability of providing advanced wastewater treatment. This diversion should be accomplished within 4 years at which time water quality standards are expected to be met throughout the basin, although there may be isolated areas where bacteriological violations may occur due to nonpoint sources such as combined sewer overflows.

Several waste treatment facilities within the basin have improved their operations during the last few years. Lakewood WWTP has added phosphorus removal facilities, while two facilities, North Olmsted and Traxler Mast (a semi-public plant) have each increased their capacity (9 and 0.25 mgd respectively) and added tertiary treatment. In Medina County, Sewer District #300 completed construction of a 2 mgd plant in 1976. The plant provides pre-aeration and primary settling followed by a bio-surf wastewater treatment system and mechanical microscreens. Chlorination and phosphorus removal are also provided. Completion of this plant allowed for the elimination of two smaller plants. Medina Sewer District #500 Plant is presently being expanded from 1.5 mgd to 10 mgd.

C. Cuyahoga River Basin

The quality of water in the Cuyahoga River Basin ranges from very

good to extremely poor. Generally, the upper reaches of the river and its tributaries are of high quality and support excellent populations of fish and other aquatic organisms. However, the middle and lower portions of the mainstem and the tributaries draining the industrialized and densely populated areas are of much poorer quality. In some areas there are continuous violations of water quality standards and little or no aquatic life can be found. The problem areas are divided into eight sections and will be discussed separately so that the varying degrees of water quality found in the Cuyahoga can be addressed in some detail. A basin map showing the locations of all the sampling sites referred to on the Cuyahoga is illustrated in Figure @).

(1) Headwaters to Lake Rockwell Spillway

The upper reaches of the Cuyahoga from the source downstream to Lake Rockwell Spillway has high water quality. A 25 mile portion of this area was designated as a "scenic river" by the Ohio Department of Natural Resources on June 26, 1974. The dischargers in the upper reaches consist of one municipal and several small industrial dischargers most of which are sand and gravel operations. Consequently, the impact of agricultural runoff and septic tanks may contribute the most significant pollutant loadings relative to the other sources in the area.

(2) Breakneck Creek

Entering the Cuyahoga just below Lake Rockwell is Breakneck Creek (see Figure 21). The water quality in the lower reaches of Breakneck Creek are influenced by the discharges of two major municipal waste treatment plants, several industries, and numerous small semi-public waste treatment facilities. Sampling results indicate that Wahoo Ditch, an

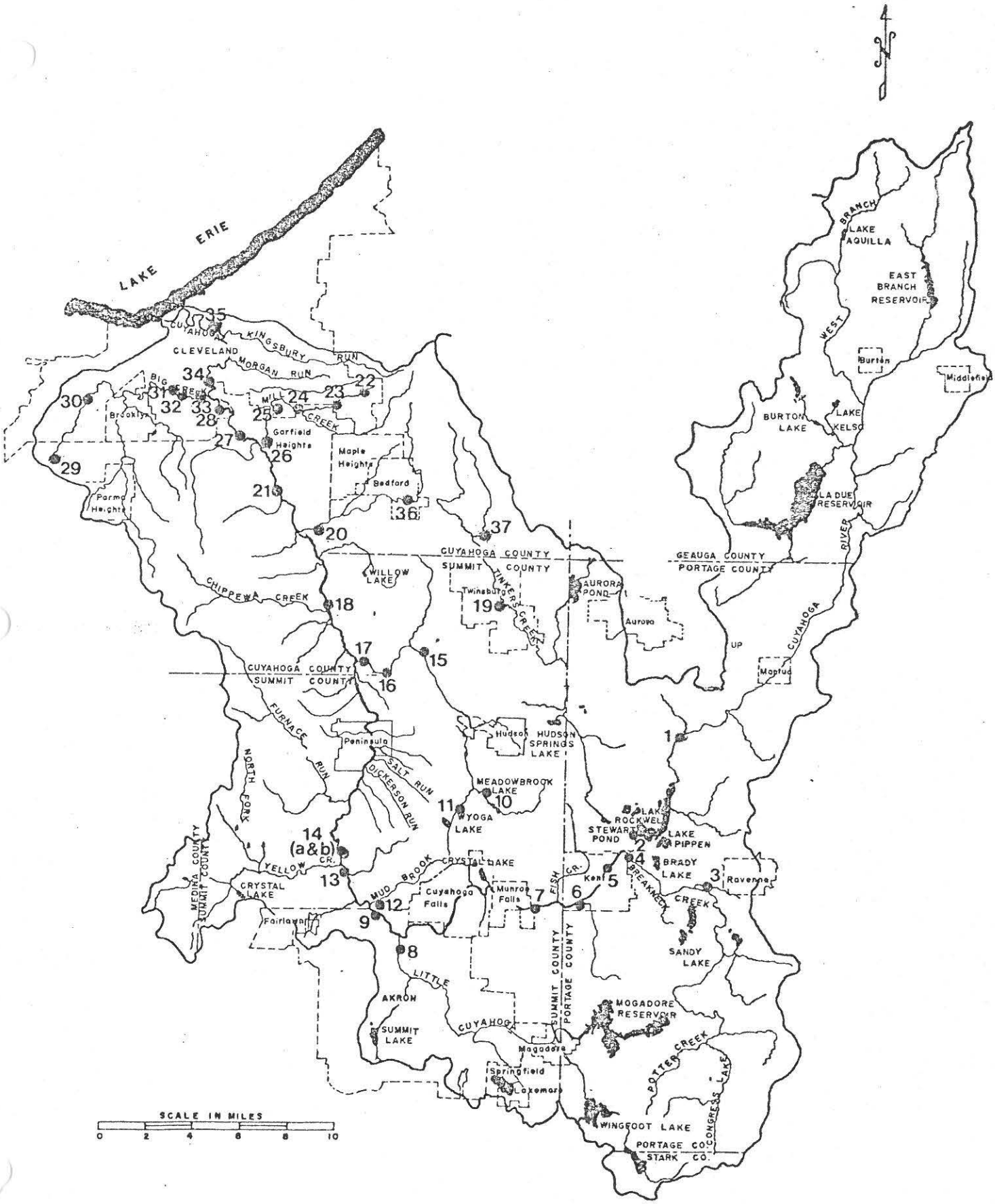
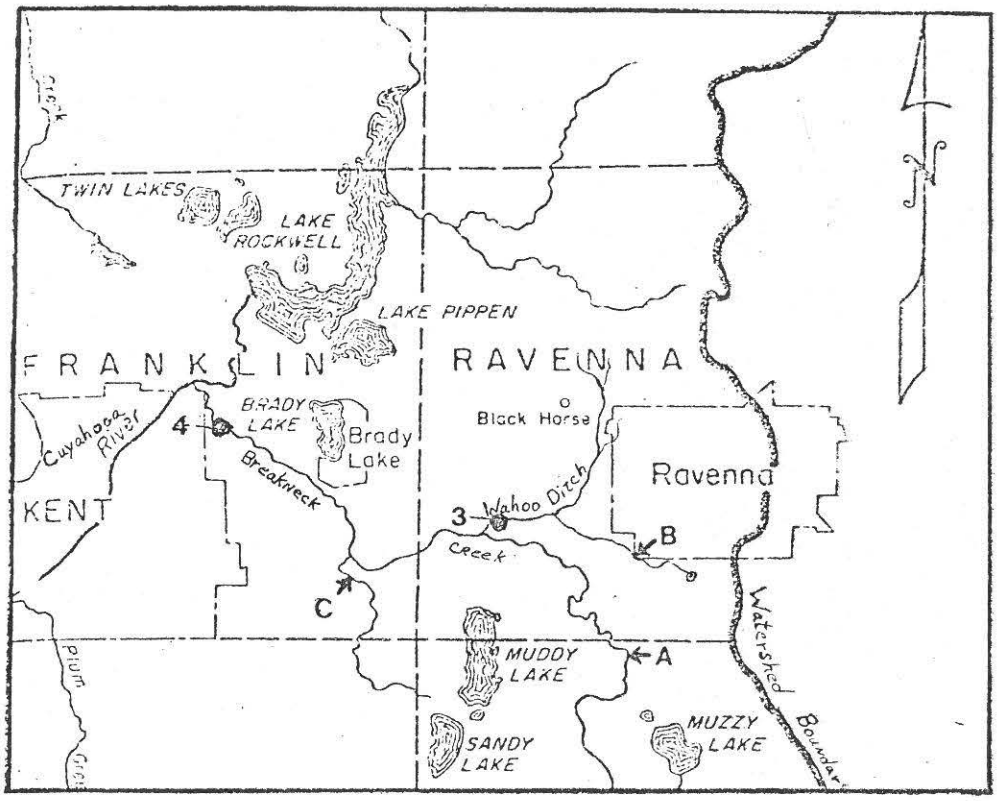


FIGURE 20 CUYAHOGA RIVER BASIN SHOWING 1975 & 1976 SAMPLING SITES

Figure 21 Map of Problem Area in Segment 3 Showing Sampling Stations and Dischargers
Scale: 1" = 2 miles



Source Key: (A) Flintkote; (B) Ravenna STP; (C) Franklin Hills S.D. #1 STP
Sampling Site Key: (3) Wahoo Ditch at Lakewood Rd.
(4) Breakneck Creek at Lake St.

Selected Parameters for Station 3

Selected Parameters	Unit	Max	Min	N	WQS
MBAS	mg/l	0.41	0.31	2	0.5
NH_3-N	mg/l	7.49	3.69	2	1.5
TKN-N	mg/l	4.6		2	-
Nitrate	mg/l	1.7	0.74	2	8.0
Tot. Phosphorus	mg/l	2.77	1.69	2	-
BOD_5	mg/l	18	2	2	-
D.O.	mg/l	4.6		1	5.0
Fecal Coliform	#/100 ml	330		1	200

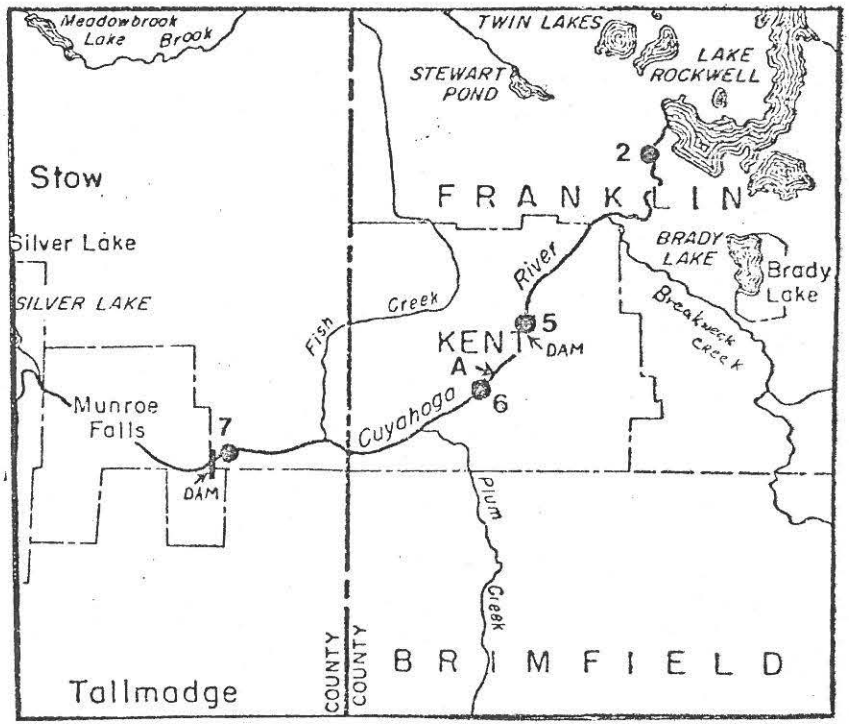
upstream tributary originating in Ravenna, is in violation of water quality standards for excessive ammonia and low dissolved oxygen concentrations. In addition, there were high concentrations of phosphorus, MBAS, BOD, TKN, and nitrates, all of which are associated with sanitary wastes. The source of these high concentrations of pollutants originates primarily from the Ravenna wastewater treatment plant. Although this facility recently upgraded and expanded their facility, their discharge makes up the majority of flow in Wahoo Ditch during low flow periods.

Additional monitoring is planned for this area to measure water quality improvements anticipated as a result of the improvements made at the Ravenna plant. The immediate impact of Wahoo Ditch on Breakneck Creek is uncertain. The only recent data on Breakneck Creek is near the mouth of the stream. Samples collected at this point indicate no violations except for fecal coliform bacteria. This reflects the excellent assimilative capabilities of lower Breakneck Creek.

(3) Lake Rockwell Dam to the Confluence of the Little Cuyahoga River

The basic water quality problem associated with this segment is the low dissolved oxygen concentrations found in the many dam pool areas (see Figure 22). There are five dam pools in this stretch of the river. The Lake Rockwell Dam creates the major impoundment on the main stem of the Cuyahoga River. This reservoir serves as the primary water supply for the City of Akron which removes an average of 46 million gallons of water a day. During the dryer summer months very little or no water flows over the spillway. This considerably reduces the flow of the Cuyahoga River through the City of Kent since most of the remaining water originates from the area dischargers and Breakneck Creek. During these lower flow conditions, the river becomes semi-stagnate and the dissolved oxygen content is greatly

Figure 22 Map of Problem Area in Segment 4 Showing Sampling Stations and Significant Dischargers
Scale: 1" = 2 miles



Source Key: (A) Kent STP

Sampling Site Key: (2) Cuyahoga River at Ravenna Rd.; (5) Cuyahoga River at Main St.; (6) Cuyahoga River at Middleburry Rd.; (7) Cuyahoga River at Rt. 91

Dissolved Oxygen Survey

		Station 5			Station 6			Above Station 7		
		Depth Ft.	D.O. mg/l	Temp. Co.	Depth Ft.	D.O. mg/l	Temp. Co.	Depth Ft.	D.O. mg/l	Temp. Co.
6:00 A.M. to 7:30 A.M.	Surface	1	5.0	23.0	1	6.9	23.0	1	6.2	23.5
	Mid-Depth	5	4.0	22.5	-	-	-	6	2.6	22.0
	Bottom	12	2.5	22.0	4	5.6	22.8	9	0.1	22.0

reduced, especially during the early morning hours due to the effect of algae.

The primary sources of biochemical oxygen demanding substances in this segment come from Breakneck Creek and the Kent sewage treatment plant. However, there are also numerous semi-public discharges and some industrial discharges. Also, there is a significant new source scheduled for completion in 1978. This is the Fish Creek sewage treatment plant which will discharge 4 million gallons of wastewater per day. The badly needed treatment facility will be designed to provide the best treatment levels required by the State at this time. Even with the attainment of these high treatment levels, this source will still add an additional BOD load within the Munroe Falls Dam Pool. This additional loading will not help ease the dissolved oxygen problem that occurs here during the summer months. For these reasons, it is extremely important that the best water quality reasonably attainable be achieved above the proposed Fish Creek discharge.

Calculations in a special stream study indicate that the dissolved oxygen concentrations in the Munroe Falls Dam Pool will not meet stream standards even with all major upstream sources of BOD reducing their effluents to provide the best treatment levels required by the State at this time. Accordingly, in-stream aeration or adoption of less stringent stream standards may be necessary for this segment.

Another area where stream standard violations are expected is in the Ohio Edison Dam Pool. To date, no stream samples have been collected here, but dissolved oxygen and temperature violations would seem probable. Investigations in this area are planned for the summer of 1977.

(4) Little Cuyahoga River

The Little Cuyahoga River drains a significant portion of the highly

industrialized and urbanized area of Akron. It receives numerous industrial discharges, but no municipal or semi-public discharges. There are, however, numerous storm sewer overflows from the combined sewer system.

One sampling site located below the confluence of the old canal at the USGS gauge, was sampled on the Little Cuyahoga River during the 1976 water year. The data collected here indicated that six parameters were in violation of water quality standards. Fecal coliform bacteria values were in gross violation in all nine samples collected. The other parameters occasionally in violation included temperature, MBAS, copper, phenol, and cyanide. Also, elevated concentrations of ammonia, BOD, COD, and lead were measured which indicate potential problems.

(5) Confluence of the Little Cuyahoga to Canal Diversion Dam

The mainstem of the Cuyahoga in this reach is influenced primarily by one major discharger, the Akron sewage treatment plant, having a discharge of approximately 90 million gallons a day. The effluent from this plant can account for up to two-thirds of the flow in the Cuyahoga River during periods of critical low flow. Under these conditions, the Akron WWTP discharge has a major impact upon water quality in this segment. In addition, numerous discharges to the five major tributaries located in this segment also cause degradation of water quality in the mainstem. Only two of these tributaries, Mud Brook and Brandywine Creek, were investigated during the 1976 water year.

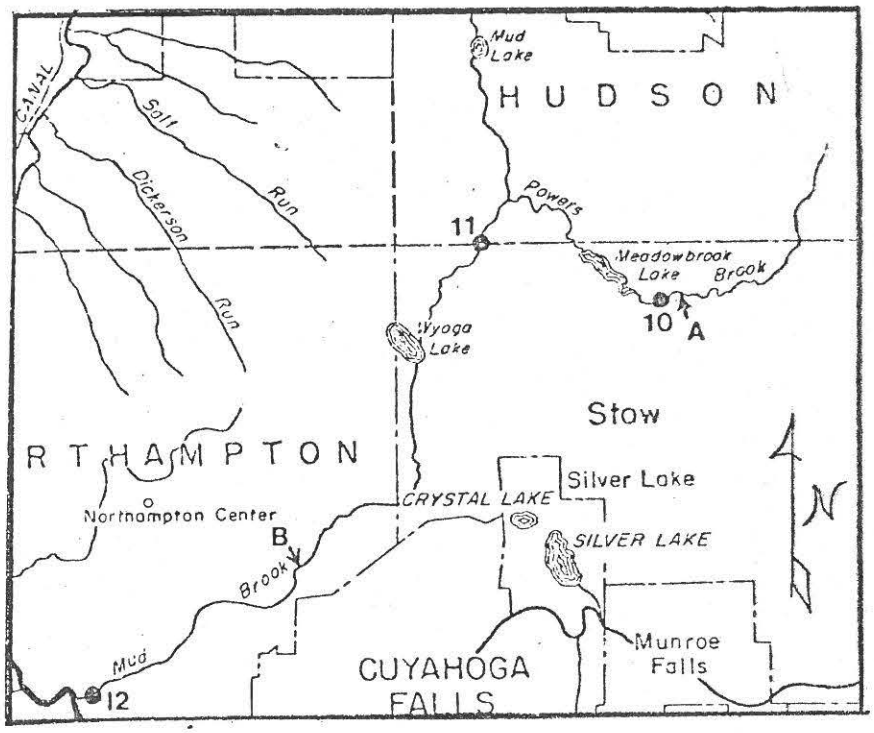
The general water quality in the Cuyahoga River begins to steadily deteriorate after it flows along the northern edge of Akron and receives the flow of the Little Cuyahoga River and then further deteriorates after it receives the effluent of the Akron sewage treatment plant. Violations

of ammonia, MBAS, total phosphorus, and excessive phosphate values, lead, and fecal coliform bacteria violations occur downstream from Akron. A significant quantity of total pollutant loadings to this segment results from combined sewer overflows during periods of precipitation. High flows necessitate bypassing of untreated or partially treated sewage to the river. This practice is extremely detrimental to water quality because substantial quantities of pollutants are discharged to the Cuyahoga River during periods of bypassing. This procedure must be corrected if maintenance of high water quality conditions at all times downstream of Akron and through the National Recreation Area is to be achieved. The National Recreation Area will be discussed later in this section.

This portion of the mainstem is also affected by the flow from Mud Brook shown in Figure 23. Significant water quality problems exist in the upper reaches of Mud Brook where violations of the standard for ammonia, dissolved oxygen, and fecal coliform bacteria occur. High concentrations of BOD and phosphorus have also been measured in this area.

Below the Mud Brook confluence in the mainstem, the Cuyahoga River receives the effluents from numerous semi-public facilities. Considering the pollutant loads discharged to this segment, overall water quality is reasonably good. Near the end of this reach, the mainstem receives the flow from Brandywine Creek and the effluent from the Greenwood Village waste treatment facility. Violations of the standard for phenols and fecal coliform bacteria, in addition to excessive concentrations of BOD and phosphorus, have been detected at the mouth of Brandywine Creek. The sources of these pollutants in Brandywine Creek are from discharge from municipal waste treatment plants and a paper products company. On the mainstem downstream from Brandywine sampling site (see Figure 20), violations of the standard for dissolved

Figure 23 Map of Problem Area in Segment 6 Showing Sampling Stations and Significant Dischargers
Scale : 1" = 2 miles



Source Key: (A) Hudson Township # 6 STP; (B) Alside Inc.
Sampling Site Key: (10) Powers Brook below Hudson STP; (11) Mud Brook at Seasons Rd; (12) Mud Brook at Akron Penninsula Rd.

Selected Parameters For Station 10 & 11

Selected Parameters	Unit	Max 10	Max 11	N	WQS
NH_3-N	mg/l	3.12	2.27	1	1.5
TKN-N	mg/l	4.2	3.4	1	-
Nitrate	mg/l	0.7	0.3	1	8.0
Tot. Phosphorus	mg/l	1.12	0.71	1	-
BOD_5	mg/l	15	12	1	-
D.O.	mg/l	3.5	5.2	1	5.0
MBAS	mg/l	0.15	0.15	1	0.5
Fecal Coliform	#/100 ml	220	330	1	200

oxygen, MBAS, copper, and fecal coliform bacteria were measured.

A considerable portion of this segment has been recently designated as a National Recreational Area. Public Law 93-555 was signed into law by President Ford on December 27, 1974. On June 26, 1975, the National Park Service established the area as the Cuyahoga Valley National Recreational Area and assigned William Birdsell as the Superintendent. Initial funds for purchasing the land were released on December 31, 1975. It is estimated that it will take three to five years to purchase the land and build the facilities to make it operable.

The area scheduled to become the National Recreational Area extends from Bath Road, just north of Akron, and follows the Cuyahoga River Valley, to Rockside Road just south of Cleveland. Several existing city parks are to be incorporated into the National Recreational Area. These include Virginia Kendall Park, Furnace Run Park, Hampton Hills Park, Brecksville Reservation and the Bedford Reservations.

(6) Tinkers Creek

Tinkers Creek is a major tributary to the Cuyahoga River. Water quality in this tributary is heavily influenced by the suburban/industrial land use patterns of the middle and lower portions of the basin. During low flow conditions, much of the flow in the stream is attributable to treated wastewater discharges. The watershed has numerous parks and natural scenic areas making it desirable to uphold water quality standards.

The Ohio EPA has maintained one primary water quality monitoring site on Tinkers Creek. The station is located in Bedford at the USGS gauging station. Data collected at this site during the 1976 water year indicated seven parameters to be in violation of water quality standards. Frequent violations of the standard for phenol and fecal coliform bacteria were measured, while

occasional violations of the standard for zinc, total chromium, ammonia, hexavalent chromium, and lead were observed. Also, very high concentrations of total phosphorus have been measured.

Tinkers Creek receives the treated discharges of several significant municipal sewage treatment plants in addition to numerous smaller semi-public facilities and industrial discharges. Due to the excellent assimilation capabilities of lower Tinkers Creek, the organic impact of these sources is lessened thus avoiding total anoxic conditions. However, there are several localized areas of severe pollution in the watershed.

(7) Canal Diversion Dam to Cleveland Southerly STP

The water quality in this segment begins to deteriorate rapidly. As the Cuyahoga River flows toward the City of Cleveland, it begins to receive the wastes of numerous industrial operations. Also, many of the tributaries entering this portion of the mainstem add considerable amounts of pollutants. Two of the major tributaries are Tinkers Creek and Mill Creek. The problems associated with Tinkers Creek have already been discussed.

Mill Creek is a relatively small tributary to the Cuyahoga River, but it carries a high pollutant load. There are no municipal or semi-public facilities discharging to Mill Creek but there are numerous combined sewer overflows. Many of these carry wastes which are of industrial origin. Four industries located in the Mill Creek Basin are under NPDES permit, but apparently there are several others which should be. It is very difficult to determine the exact source of pollution coming from a storm sewer in a highly industrialized area. A thorough investigation will be necessary to locate the sources of these wastes in order to bring them under control. There are also two solid waste landfills along the banks of lower Mill Creek. Both of these are privately operated and are used primarily as industrial waste disposal sites. The specific impact of

these landfills is uncertain but some leachate has been observed at both sites.

Sample site 26 (Figure 20) located on Canal Road near the mouth of Mill Creek measures the overall impact of the basin's problems. There were ten parameters found to be in violation of water quality standards during the 1975 water year. Some of the parameters such as ammonia, MBAS, zinc, copper, phenols and fecal coliform bacteria seem to be in constant violation of water quality standards; occasional violations were found for mercury, lead, chloride, dissolved solids and dissolved oxygen. Below the confluence of Mill Creek, the water quality in the mainstem continues to deteriorate as it flows toward Cleveland.

(8) Cleveland Southerly Sewage Treatment Plant to Mouth

The water quality in the mainstem of the Cuyahoga River in this segment is polluted to the extent that general water quality standards cannot be met by feasible pollution abatement efforts. To deal with this situation, the Ohio EPA adopted less stringent standards for the lower Cuyahoga River on December 10, 1974. This segment begins at the discharge of the Cleveland Southerly Sewage Treatment Plant and flows north to Lake Erie through Cleveland. There are several tributaries which empty into the lower Cuyahoga, all of which have very poor water quality. These tributaries include Big Creek, Morgan Run, Burke Brook, and Kingsbury Run.

The major tributary, Big Creek, has land uses ranging from parks and recreational areas to heavily industrialized and commercialized areas. Big Creek is example of a stream having severe water quality problems resulting from uncontrolled urban runoff and industrial dischargers. Violations of standards for ammonia, phenols, copper, lead, zinc, oil and grease, and fecal coliform bacteria have been detected downstream from industrial dis-

chargers and storm sewer overflows. Near the mouth of Big Creek, at Jennings Avenue, parameters in violation of water quality standards include ammonia, dissolved solids, oil and grease, fecal coliform bacteria, MBAS, phenols, chloride, copper, lead and zinc. Many of these parameters are nearly in constant violation.

The combined sewer overflow at Jennings Avenue is considered to be a significant pollutant source because it discharges waste during both wet and dry weather. The volume flow discharge from this sewer is significant while its quality is very poor. Raw sewage containing high amounts of suspended solids and oil and grease are continuously being discharged from it. This problem cannot be corrected until the southwest interceptor is completed sometime in 1981. This interceptor will also eliminate most of the industrial dischargers to Big Creek.

The principal source of municipal wastewater to the lower Cuyahoga River is from the Cleveland Southerly Wastewater Treatment Plant. The flow from this plant averages about 102 million gallons per day. During critical low flow periods, this discharge can account for up to 60% of the Cuyahoga River. The inadequately treated wastewater from this plant along with the need for frequent bypassing has a significant adverse impact on the water quality in the river. The Cleveland Southerly facility is currently being upgraded to meet the more stringent effluent limitations imposed upon it. The plant should be producing a much higher quality effluent by 1983.

This segment of the river also receives significant waste loads from numerous industrial sources from combined sewer overflows. The industrial sources consist primarily of two major chemical and four major steel plants.

The Ohio EPA samples at two locations in the lower Cuyahoga River - Lower Harvard Avenue (station 34, Figure 20) and West Third Street (station 35, Figure 20). Even with the less stringent water quality standards being

applied, there were several water quality standard violations noted in the Lower Cuyahoga River. Toxic wastes such as ammonia, cyanide, phenols, and several heavy metals violate water quality standards or have been recorded at near violation levels. There are also low concentrations of dissolved oxygen due to excessive amounts of biochemical and chemical oxygen demanding substances. Violations of dissolved oxygen standard of 5.0 mg/l occur during the hot summer months, but occur less frequently during April, May, and June.

The physical conditions of this portion of the river compound the water quality problems. The lower five miles of the river are continuously dredged for maintenance of the navigation channel. The intrusion of water from Lake Erie coupled with the physical characteristics of the navigation channel (deep and wide) reduces stream velocity throughout this lower section. The resulting slow time of travel along with elevated water temperature from steel making operations allows the oxygen demanding substances to exert themselves, thus lowering the dissolved oxygen levels to near zero in this section. Also, the water is reused several times by the large steel mills, which substantially increases the pollutants. These physical conditions will make the achievement of general water quality standards very difficult throughout the Lower Cuyahoga River.

Water Quality Trends

It is necessary for any pollution abatement program to monitor water quality trends in order to determine the worth of the program. Before several million dollars are spent in an area to improve wastewater treatment facilities it is very important to be able to determine the impact these efforts should have on the water quality of the receiving stream. Monitoring is very valuable for future pollution abatement projects.

To determine water quality trends, it is necessary to compile large volumes of data in order to account for a variety of influences. It is also necessary to collect data at a high frequency and over a long period of record. Many factors must be taken into consideration such as varying weather conditons from year to year or other temporary influences such as major construction sites. Any of these factors may cause a brief improve-ment or deterioration of water quality which is not directly related to the pollution abatement efforts.

In the Cuyahoga River Basin most water quality data collected by Ohio EPA is limited both by the frequency of collection and by the period of record. There are however, sufficient quantities of data furnished to Ohio EPA by the Cities of Akron and Cleveland which give some indication of water quality trends in the Cuyahoga River near these cities. U.S. Geological Survey Water Quality Records from the continuous water quality monitoring stations are also available. This data meets the requirements for frequency of collection and period of record, which make it useful for trend analysis, but is limited to four parameters. This can also be used to determine extremes and "true" averages in a stream.

The water quality of the Cuyahoga River below the Akron WWTP appears to be improving steadily. Data furnished by the Akron Wastewater Quality Management Group shows that concentrations of most pollutants have been reduced significantly since 1969. The vast amount of data compiled by the Akron Wastewater Quality Management Group makes it possible to evaluate water quality trends in the Cuyahoga River below Akron.

Table 12 lists yearly averages for selected parameters at two monitoring locations. The "above" site refers to the upstream monitoring station which is located several hundred yards upstream of the Akron WWTP discharge. The downstream site, "below", is located at Ira Road which is approximately 2 miles downstream of the Akron WWTP discharge.

Table 12 Average Yearly Concentrations Of Selected Parameters In The Cuyahoga River Upstream And Downstream Of The Akron Wastewater Treatment Plant

water year	Dissolved Oxygen mg/l		Dissolved Oxygen % Saturation		Ammonia-N mg/l		Nitrates-N mg/l		B.O.D. mg/l		Total Phosphorus mg/l		C.O.D. mg/l	
	above	below	above	below	above	below	above	below	above	below	above	below	above	below
1969	8.1	7.4	72.3	67.4	1.00	5.66	0.79	0.57	3.3	13.7	0.28*	1.73*	28	72
1970	8.3	7.7	73.9	69.8	1.01	4.02	0.90	0.76	3.6	9.5	0.22*	1.46*	32	64
1971	9.2	8.4	78.8	75.9	1.13	3.22	0.75	0.72	2.9	5.8	0.22*	1.00*	29	59
1972	8.9	8.6	78.8	77.8	0.56	2.35	0.67	0.98	3.2	7.9	0.59*	1.55*	43	62
1973	-	8.8	-	82.6	-	1.75	-	1.11	-	10.1	-	0.69*	-	34
1974	9.2	9.1	91.5	85.8	0.25	2.02	0.77	0.94	2.9	8.5	0.34*	0.63*	24	34
1975	10.4	9.8	95.3	89.4	0.21	1.07	0.77	1.22	3.0	6.0	0.13	0.39	24	32
1976	9.8	9.5	87.8	85.7	0.29	0.88	0.90	1.56	3.0	6.0	0.15	0.43	21	25

* Converted from total phosphate values

DATA furnished by Akron Water Pollution Control Laboratory

A comparison of the "above" and "below" dissolved oxygen values shows only a slight reduction at the downstream site. The downstream site is located too close to the effluent to adequately measure the full impact the increased BOD load has on the dissolved oxygen concentration of the river. The assimilation of this BOD load brings about a reduction in the dissolved oxygen concentration further downstream, especially in the deep, slow moving portions of the river. The downstream concentrations of selected parameters shows a significant increase as a result of the Akron WWTP discharge. Improvements at the Akron Wastewater Treatment Plant have greatly reduced these pollutant concentrations over recent years. A comparison of the 1969 and 1976 water quality shows the impact of the Akron WWTP discharge on the Cuyahoga River to have been greatly reduced.

This significant improvement in water quality below the Akron WWTP discharge since 1969 is shown graphically in Figures 24 through 25. Figure 24 shows a steady yearly increase in the percent saturation of dissolved oxygen while Figure 25 shows a similar reduction of BOD concentrations, although increases in BOD were noted during 1972, 1973 and 1974. However, it does show that the immediate impact at the Akron WWTP discharge is lessening. Dissolved oxygen concentrations in the river above the plant have also increased since 1969, while upstream BOD concentrations have remained about the same.

Another indication of recovery in the river is shown in Figures 26 and 27. The drastic reduction of these pollutants since 1969 is remarkable. Average ammonia concentrations have decreased by almost 5 mg/l, as shown in Figure 26. The significant reduction in ammonia concentration is the result of improved nitrification at the Akron WWTP plant. Total phosphorus concentrations in 1975 and 1976 were reduced to one-fourth of the values recorded in 1969, as shown in Figure 27. This significant decrease can be attributed largely to the phosphate detergent ban enacted in the Akron area. These improvements in water quality show positive effects of the pollution abatement efforts made in this area.

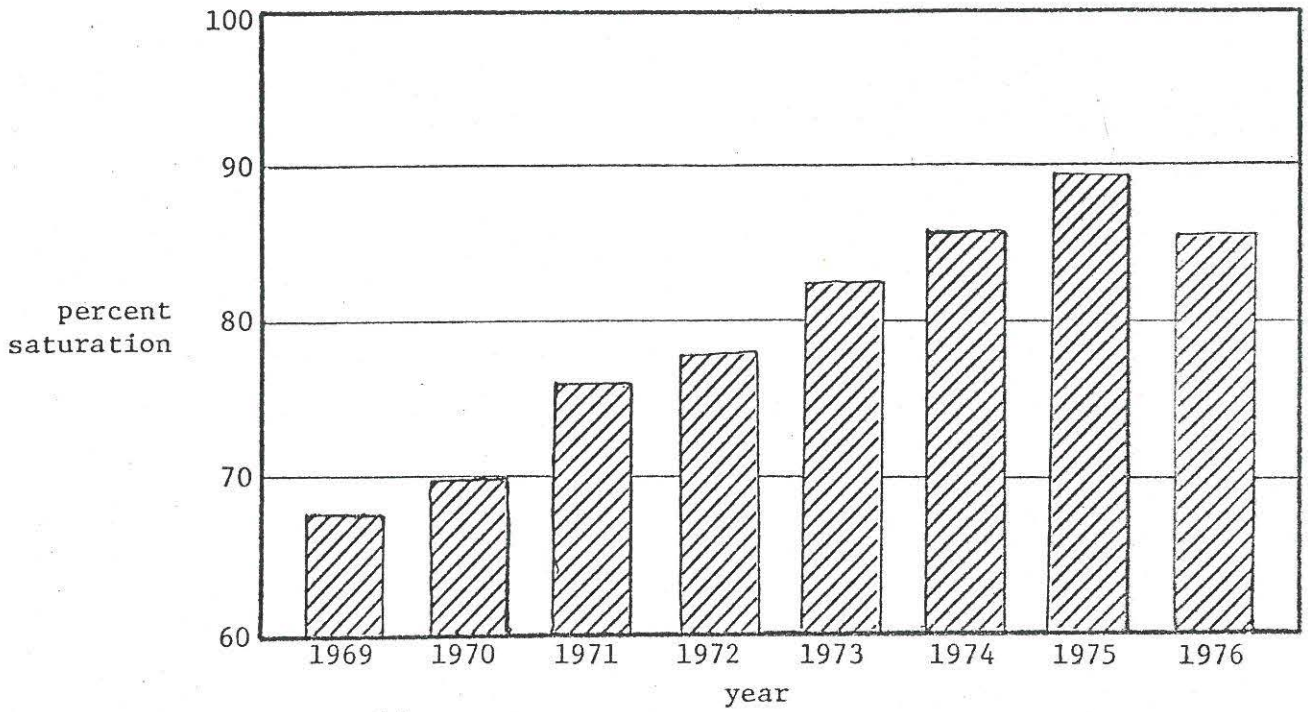


FIGURE 24 AVERAGE YEARLY PERCENT SATURATION OF DISSOLVED OXYGEN DOWNSTREAM OF AKRON STP

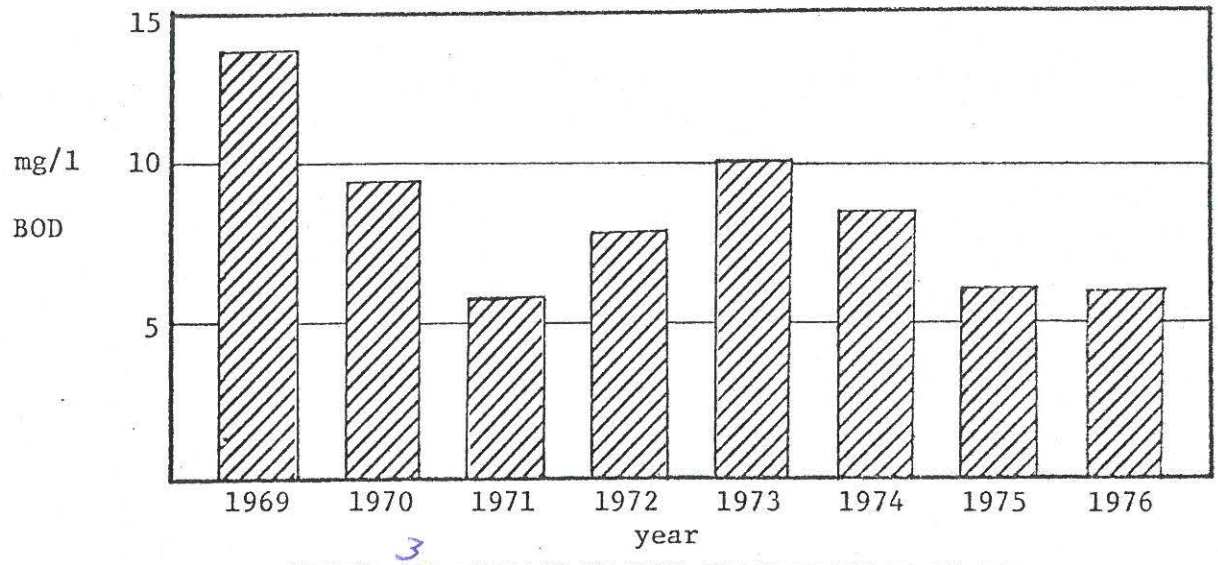


FIGURE 25 AVERAGE YEARLY CONCENTRATION OF BOD DOWNSTREAM OF AKRON STP

Data used to develop graphs furnished by Akron Water Pollution Control Laboratory

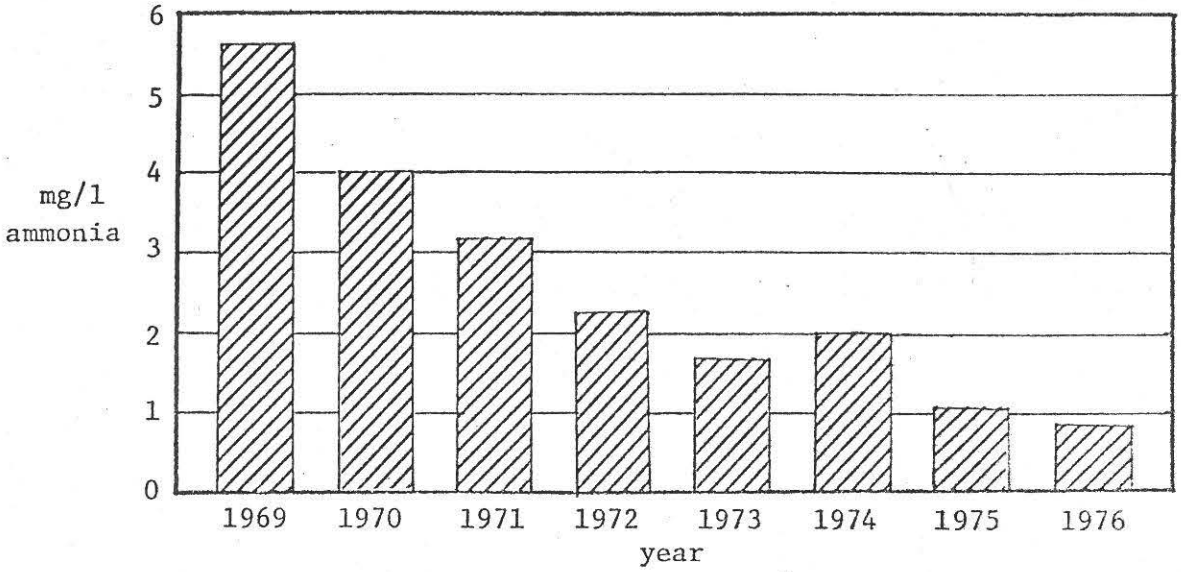


FIGURE 26 AVERAGE YEARLY CONCENTRATION OF AMMONIA DOWNSTREAM OF AKRON STP

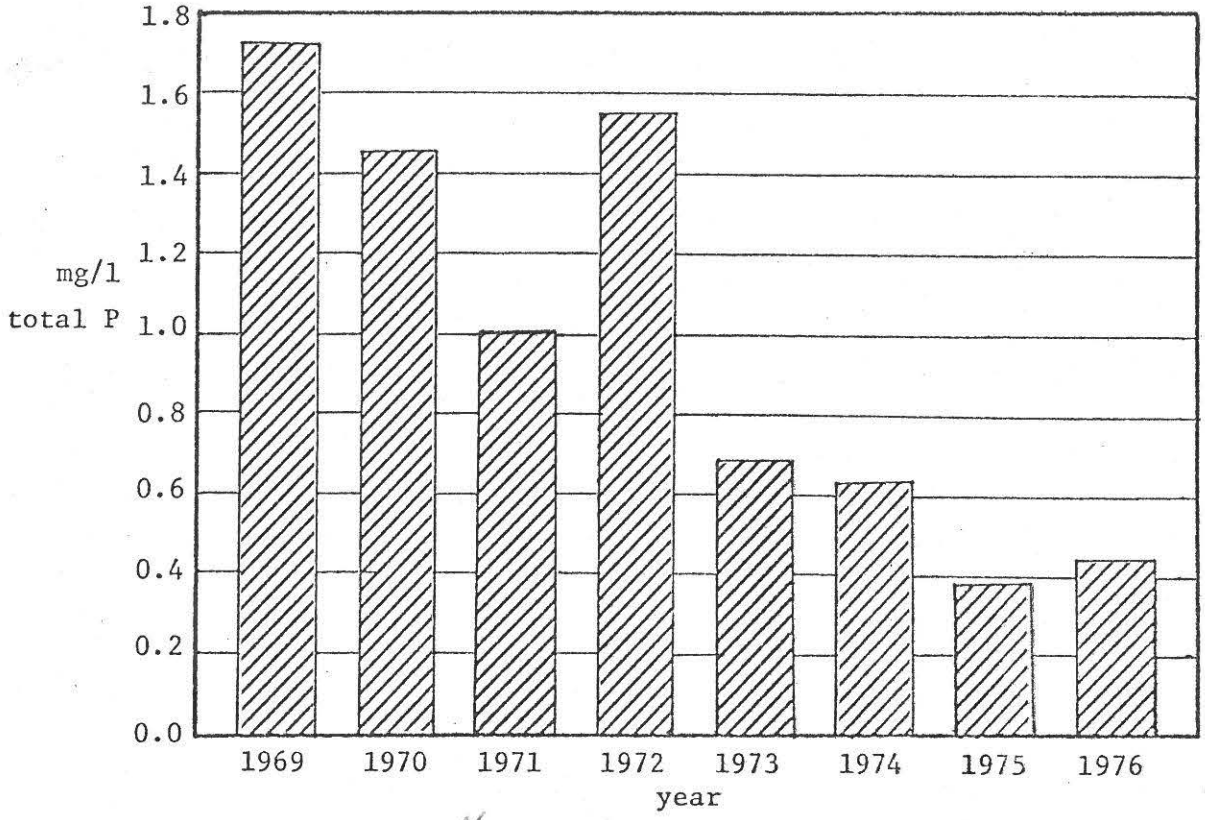


FIGURE 27 AVERAGE YEARLY CONCENTRATION OF TOTAL PHOSPHORUS DOWNSTREAM OF AKRON STP

Data used to develop graphs furnished by Akron Water Pollution Control Laboratory

At Independence, the Ohio EPA has collected water quality data since April 1973. The data base for this location was compiled from grab samples taken at a frequency of once or twice a month. Pollutant loadings (phosphorus and ammonia) were calculated for the 1974, 1975, and 1976 water years, since these were the only years with complete data. These parameters were selected because they showed the most noticeable improvements in the reach below the Akron WWTP. The average concentrations and loadings are presented in Table 13 below.

TABLE 13

AVERAGE CONCENTRATIONS AND LOADINGS FOR PHOSPHORUS AND AMMONIA AT INDEPENDENCE

water year	average flow cfs	average total phosphorus concentration mg/l	average total phosphorus loading lbs/day	average ammonia-N concentration mg/l	average ammonia-N loading lbs/day
1974	931	0.36	1534	0.76	4587
1975	2051	0.44	4880	0.56	4465
1976	1101	0.38	2030	0.55	3254

The average yearly total phosphorus loadings do not seem to show a conclusive Pattern, but rather seem to fluctuate randomly. Actually, phosphorus loadings at Independence have probably remained about the same or slightly decreased. The changing average daily loadings from year to year seem to reflect the flow conditions during the time samples were collected. It has been shown elsewhere that phosphorus loadings increase as flow increases, with maximum loadings occurring during maximum runoff conditions. This data seems to follow that pattern, but the number of samples collected is insufficient to reach a positive conclusion.

The average yearly ammonia values at Independence seem to show a definite improvement. This data indicate there was a slight reduction in the concentrati and loading during the 1976 water year. A similar pattern was observed in the average concentrations recorded, and also the maximum ammonia values recorded during the three year period. Much of this improvement can be attributed to the increased nitrification at the Akron Wastewater Treatment Plant and improvements made by several municipalities in the Tinkers Creek Basin.

Substantial amounts of data and a report on the water quality of the lower Cuyahoga River have been furnished to Ohio EPA by the Cleveland Water Quality Program. Most of their data has been converted to loadings which more accurately reflect actual changes of water quality. Tables 14 and 15 list this information for two of their sampling sites. This data seems to indicate that substantial improvements in the water quality in the lower Cuyahoga River have taken place over the last several years. Pollutants which have been reduced significantly since 1970 include phosphorus, organic nitrogen and ammonia. Increases in the dissolved oxygen concentration are also evident. Biochemical oxygen demanding (BOD) substances have remained about the same below the Cleveland Southerly WWTP discharge, but have decreased at Center Street.

The Center Street sampling site is used to establish pollutant loadings entering Lake Erie from the Cuyahoga River. There has been much talk that Lake Erie may be recovering from its present state of advanced eutrophication as pollutant loads entering it are reduced. The data from the Center Street monitoring site would seem to indicate the pollutant loads entering Lake Erie from the Cuyahoga River have been reduced. This is illustrated by Figures 28, 29, and 30 which show three parameters which have shown significant improvements. There were some unexplainable increases of phosphorus in 1971 and organic nitrogen in 1972, but the general trend definitely shows a decreasing pollutant load to Lake Erie from the Cuyahoga River.

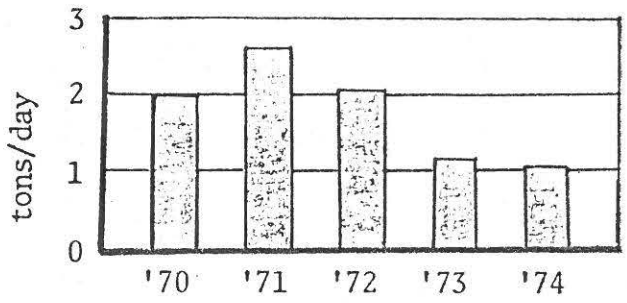


FIGURE 28 AVERAGE TONS PER DAY OF TOTAL PHOSPHORUS AT MOUTH OF CUYAHOGA RIVER

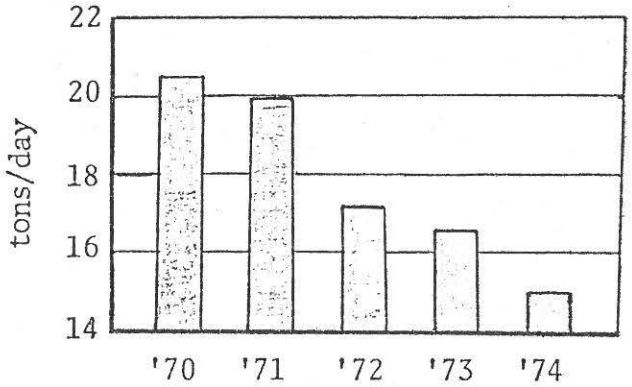


FIGURE 29 AVERAGE TONS PER DAY OF AMMONIA NITROGEN AT MOUTH OF CUYAHOGA RIVER

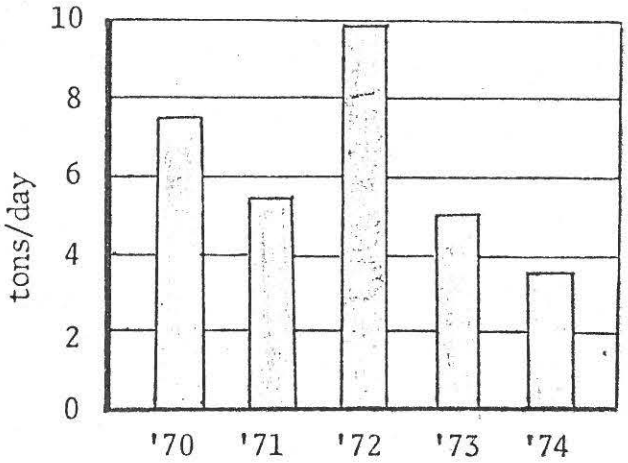


FIGURE 30 AVERAGE TONS PER DAY OF ORGANIC NITROGEN AT MOUTH OF CUYAHOGA RIVER

Data Furnished by Cleveland Water Quality Program

Table 14 Average Loadings For Cuyahoga River At Mile Point 11.0, Lower Harvard Avenue

	tons/day				
	1970	1971	1972	1973	1974
Average Flow, MGD	766	747	977	877	*842
Dissolved Oxygen	N/A	20.8	N/A	31.1	30.1
Biochemical Oxygen Demand	35.5	33.0	46.9	37.3	36.2
Chemical Oxygen Demand	208	196	208	165	169
Non-filterable Residue	249	246	583	311	312
Total Phosphorus	5.7	4.7	4.1	3.7	2.8
Organic Nitrogen	10.9	6.5	8.6	4.8	4.9
Ammonia Nitrogen	11.2	13.7	10.2	9.9	8.1
Nitrite Nitrogen	1.2	1.3	1.3	0.8	0.7
Nitrate Nitrogen	4.2	6.0	8.2	6.3	4.0

Table 15 Average Loadings For Cuyahoga River At Mile Point 1.0, Center Street

	tons/day				
	1970	1971	1972	1973	1974
Average Flow, MGD	805	784	1025	921	*884
Dissolved Oxygen	18.5	13.4	25.2	20.4	21.7
Biochemical Oxygen Demand	26.5	28.4	30.8	23.8	22.1
Chemical Oxygen Demand	154	170	154	134	114
Non-filterable Residue	225	167	141	158	162
Total Phosphorus	2.0	2.6	2.1	1.2	1.1
Organic Nitrogen	7.7	5.6	9.8	5.0	3.7
Ammonia Nitrogen	20.5	19.9	17.1	16.5	15.1
Nitrite Nitrogen	1.0	0.8	1.3	0.8	0.8
Nitrate Nitrogen	3.8	4.1	7.8	5.4	3.6

* Estimated Flow.

N/A - Not available due to equipment failure and limitation.

Tables from Cuyahoga River Monitoring Program For 1976, furnished by Cleveland Water Quality Program.

New and Improved Facilities

The following wastewater treatment facilities in the Cuyahoga River Basin have had improvements as listed within the last 5 years:

Municipal

1. City of Independence (Furmeyer Road Plant) has 250,000 gpd secondary treatment plant was constructed in 1972.

2. City of Solon's Central Plant, added centrifuge to sludge handling facilities in 1972.

3. City of Bedford - upgraded and expanded their existing plant to a 3.2 mgd tertiary treatment plant with oxidation towers, microscreens and phosphorus removal. Plant construction was completed in 1975.

4. City of Twinsburg - upgraded and expanded plant to a 2.2 mgd plant with activated sludge, phosphorus removal, and microscreens. Plant construction was completed in 1973.

5. Cuyahoga County Walton Hills Plant - expanded and upgraded their existing treatment plant to 0.75 mgd with hydroseives and aerated lagoons. This construction was completed in 1974.

6. Cuyahoga County Echo Hills Plant - a new 36,000 gpd treatment plant with activated sludge and microstrainers was constructed and completed in 1974.

7. Summit County Roseland Estates Plant - upgraded existing treatment plant with aerated lagoons. Construction was completed in 1975.

8. Summit County Robinwood Plant - a new .018 mgd tertiary treatment plant was constructed in 1975.

9. Summit County Ohio Sports Center Plant - a new .22 mgd tertiary treatment plant was constructed in 1974.

10. Summit County Aurora Shores Subdivision Plant - expanded and upgraded to a 0.25 mgd tertiary treatment plant. Construction was completed in 1974.

11. City of Akron - added Zimpro sludge treatment facilities in 1972 and have plans approved for sludge disposal facilities in 1977.

12. Mobile Manner - a new .04 mgd tertiary plant was constructed in 1975- Summit County semi-public plant.

13. Peninsula Night Club - Peninsula had a new .012 mgd tertiary treatment plant constructed in 1974.

14. Feil Lake Park, Summit County - a new .005 mgd tertiary treatment plant was constructed in 1974.

15. Village of Middlefield - upgraded existing treatment plant with an aerated lagoon.

16. City of Aurora (Waldon Plant) - expanded and upgraded plant to 160,000 gpd with activated sludge, sand filter, and metering. This was constructed in 1975.

17. City of Aurora (Geauga Lake Plant) - expanded plant to 400,000 gpd in 1975.

18. City of Aurora (Four Seasons Plant) - expanded plant with addition of a 40,000 gpd package plant.

19. City of Ravenna - expanded and upgraded plant to a 2.8 mgd activated sludge, phosphorus removal, microscreens, sludge digestion and gas recirculation. Construction was completed in 1975.

Industrial

1. Goodyear Aerospace: Oil water separation was installed.

2. Mohawk Rubber: Industrial process wastewater to City in 1970.

3. B.F. Goodrich, Main Plant: Installation of collection basin for oil and suspended solids removal.

4. B & O Railroad, Akron: Installed oil separator and holding tank.

5. Alside: Partial tie-in to sanitary (Mud Brook Interceptor) in 1971.

6. Hudson Plating: Shut down.

7. Tecumseh Cor. Box: Primary clarifier installed (1971).

8. Akron Packing: Sand filters and chlorination was provided and the system was upgraded with a flow equalization grease tank in 1976.

9. Procex: Eliminated process wastewater discharge.

10. North American Manufacturing: None (non-contact cooling water .012 mgd).

11. Cleveland Cap Screw: Tied process water into Cleveland system.

12. Bradley Metal: Installed recycle system; no discharge.

13. Lamson-Sessions, Brookpark; Tied into sanitary system.

14. Parr, Inc.: Eliminated process wastewater discharge.

15. GMC Chevrolet, Parma: Oil skimmers provided for storm water runoff.

16. Allied Chemical: Additional recycling capacity was provided. In 1976 a partial shut down was initiated and plans to eliminate the discharge were drawn up.

17. Elco: Tied into Cleveland system.

18. Harshaw Chemical: Hydrofluoric Acid process changed to yield dry by-products calcium sulfate which is trucked to landfills. Initiated construction for BPT facilities in 1976.

19. Ford Motor: Improved oil separation facilities provided. They will also combine all engine plant wastewater/soluble oil flows for treatment plant #2.

20. U.S. Steel Central Furnace: Added polymer feed to clarifier.

21. Republic Steel, Cleveland: Oil separation and solids removal were improved. Recycling systems were built for steel plant #1-4, blast furnace #5, and 6 blast furnaces in 1976.

22. Portage County Franklin Hills Plant - expanded to a 1.0 mgd secondary treatment plant in 1974, and added phosphorus removal in July 1976.

23. City of Broadview Heights (Vineyards) - a new .10 mgd plant with extended aeration and tertiary rapid sand filter was constructed in 1974.

24. Summit County - Fishcreek; (New Facility) is to discharge 4 mgd with tertiary bio-discs treatment and chlorination.

25. Macedonia #15 has submitted plans for expansion from 1 mgd to 3 mgd with extended aeration, phosphorus removal, and chlorination.

26. Summit County,Hudson #5 is planning an expansion of facilities to increase their flow from 0.2 mgd to 0.8 mgd.

27. Summit County, Westmont Woods; (New Facility) is to discharge 54,000 gpd with tertiary treatment and chlorination.

28. Cleveland Southerly - construction was initiated during 1976 to increase capacity from 90 mgd to 200 mgd. Treatment will be upgraded to tertiary with nitrification. Final completion of all phases of construction is scheduled for 1983 to 1985.

29. Middlefield Swiss Cheese: An additional surface aerator has been provided. Construction began on BAT facilities in 1976.

30. Johnson Plastics: Surface sand filters and chlorination was provided for sanitary waste.

31. A.C. Williams (Iron and Steel): Partially shut down.

32. A.C. Williams (Aluminum and Magnesium): Reduced production.

33. Hamilton Kent: Sanitary waste tied into Kent system.

34. Hydraulic Pressed Brick: Eliminated discharge.

35. Teledyne Monarch Plant#2: Improved oil removal.

36. Lamson-Sessions: Installed pretreatment and then tied all process and sanitary wastewater into Kent system.

37. Eclat Rubber: Shut down for urban renewal.

38. Norton Company, Tallmadge: Improved solids removal.

39. Hilltop Sand and Gravel: Improved settling basins and reduced storm water erosion.

40. Firestone: Oil collection basin installed.

41. J & L Steel: Blast furnace recycling was provided and also oil removal facilities for rolling mills.

42. E.I. DuPont: Clarifier provided and concrete bins built to contain zinc raw materials. Construction of an impounding basin was initiated in 1976 to handle contaminated water.

43. C.E.I.: Converted to dry fly ash handling.

44. Sherwin Williams: Process wastewater tied into Cleveland system.

45. Stroup Sand and Gravel: Improved settling basins and reduced storm water runoff.

46. Chrysler Corporation: Built pond with oil removal facilities.

47. Norandex: Improved solids removal. Discontinued anodizing operations in 1976.

48. Ferro Corporation, Cleveland Division: Pretreatment facilities.

49. Zircoa: Progressing towards complete recycle. Plans were approved for BAT facilities in 1976.

50. Great Lakes Etching: Eliminated chromium from operation.

51. Consolidated Natural Gas: Use of chromate paints stopped, also chrome treatment of cooling water discontinued. Chlorination of sanitary waste is to be completed in 1977.

52. Lester Industries: Preparing plans to tie into sanitary sewer.

Summary

The Cuyahoga River Basin exhibits water quality conditions ranging from clean water areas to grossly polluted zones. In the upper reaches, the river flows through farmland and sparsely populated areas. Isolated data collected in 1973 indicated that there were some dissolved oxygen and fecal coliform bacteria

violations in the upper reaches, but water quality is generally very good in this area.

The middle and lower sections of the Cuyahoga River receive considerable amounts of industrial and municipal wastes from Akron and Cleveland, and from numerous smaller cities and villages located on tributaries of the Cuyahoga River. The City of Kent, which is located in the upper middle section of the basin, marks the beginning of water quality degradation in the mainstem.

In the summer when stream flows are reduced, the City of Akron may use nearly the entire flow of the river at the Lake Rockwell Dam for water supply purposes. Under these circumstances, little water is available through the City of Kent to help dilute the high concentrations of coliform bacteria, BOD, ammonia, and phosphorus. Below the City of Kent, several small dams create pooling areas having slow moving water and reduced dissolved oxygen concentrations particularly during summer months.

The City of Akron, located in the middle portion of the Cuyahoga River Basin has a major impact upon the river. Numerous industrial discharges and the Akron Wastewater Treatment Plant contribute considerable amounts of pollutants to the river. During periods of low flow, these dischargers account for 80% of the flow in the Cuyahoga River below Akron.

Further downstream, at the confluence of Tinkers Creek, additional pollutant loads are added to the mainstem. Tinkers Creek receives the discharges from several sizable municipal waste treatment plants in addition to numerous smaller semi-public facilities and several industrial plants. Isolated areas in the upper slow moving portions of Tinkers Creek and its tributaries experience significant water quality problems. Although much of the upstream organic pollutant load may be reduced by natural stream purification processes before it reaches the Cuyahoga mainstem, nonetheless, the flow at the mouth of Tinkers Creek still contains significant concentrations of phosphorus and phenols.

The water quality in the lower section of the Cuyahoga River, which flows through the Cleveland area is poor. Major dischargers such as Cleveland Southerly Wastewater Treatment Plant and several sizable industries have a significant impact on the water quality in this reach. Also, the tributaries which empty into this segment of the river are severly polluted. The intrusion of Lake Erie waters at the mouth causes a stagnation in the river allowing time for the organic material to exert its load, thereby decreasing the dissolved oxygen concentration. During higher flows, urban runoff and combined sewer overflows contribute additional pollutant loadings to this already severly polluted segment of river.

Although numerous areas in the Cuyahoga River Basin are experiencing water quality violations, improvements in water quality are evident. The number of water quality violations and the maximum concentrations for many parameters are decreasing throughout the basin. Data collected in the Akron and Cleveland areas show there have been significant improvements in water quality in the Cuyahoga mainstem over the past 6 to 8 years. These trends indicate that pollution abatement efforts are beginning to accomplish their intended goals.

D. Chagrin River Basin

The Chagrin River is a fast flowing stream with good assimilative capabilities. Water quality throughout the basin is good even though it receives discharges from numerous wastewater treatment plants and leachates from areas having septic tanks. Because the vast majority of these plants are small and tend to be scattered throughout the basin, the only impact these facilities appear to have on stream water quality is to elevate bacterial levels above acceptable limits. All other water quality criteria appear to be in conformance with water quality standards with the exception of an occasional violation of the public water supply standard for phenols at the Willoughby water supply intake.

There is only one major industrial discharger in the basin. This facility is located in Chagrin Falls and discharges paper mill waste containing suspended solids and oxygen demanding materials. The major municipal dischargers include Chagrin Falls, Aurora, and Solon N.E. WWTP. There are over 50 small "package plants" serving commercial establishments and housing developments with flows of less than 0.025 mgd.

The lower reaches of the river have reaeration capabilities. In the Chagrin Falls area, the stream experiences a drop of more than 90 feet in gradient. Such a steep gradient provides excellent stream reaeration which assists in the natural assimilation of oxygen demanding materials such as those discharged by the paper mill and by the Chagrin Falls WWTP and other upstream sources.

One notable improvement in water quality in the basin is evident. The reach below the Chagrin Falls WWTP has lower levels of fecal coliform bacteria apparently due to the new advanced waste treatment facility completed by Chagrin Falls in 1973. Other improved facilities should help to upgrade quality in the basin. Chase Bag installed a new clarifier and additional tank storage which allows for more recycling and a reduced volume of discharge. Several municipal waste treatment facilities have increased their capacity and provided for advanced waste treatment. These include Aurora-Jackson Road, Russel Park, Pilgrim Village, and McFarland Creek.

E. Grand River Basin

Overall, water quality in the Grand River is very good. Most of the basin drains rural areas having few point source discharges. Those point sources have only a localized impact on water quality. The only problem area in the basin is located near the mouth of the Grand River. Here, several parameters have exceeded water quality standards. However, at the

sampling station located at S.R. 84 just upstream from the mouth, data collected during the 1976 water year indicated very good quality water. A single violation of copper was the only parameter found to exceed water quality standards during the 1976 water year.

At sampling sites located at S.R. 535 in Painesville and near the mouth of the river, phenols and chlorides were nearly always in violation. Maximum recorded concentrations of phenols and chlorides were five and ten times the allowable concentrations respectively. In addition, dissolved solids and fecal coliform bacteria were well in excess of the allowable limits when samples were taken. Dissolved oxygen concentrations were often below 4 mg/l in the summer months. Occasional violations of the standard for ammonia and MBAS were recorded as were single violations for temperature, pH, and copper.

Using the long term data (1970-1976) collected at the U.S. Geological Survey continuous monitor station near Painesville, it is possible to evaluate water quality trends in the river at this location. It would appear that temperature, dissolved oxygen, and specific conductance values have remained fairly constant during the past six years. However, values for pH seem to have improved significantly. Although violations still occur, the frequency of these violations is less and the pH values lower. In 1970, maximum pH values recorded for each month ranged from 11.9 to 10.0, which were considerably over the upper pH limit of 9.0. By 1973, the maximum values ranged from 10.9 to 7.9. And 1976, during the water year, only one pH violation was recorded a 10.6 during the month of January.

This improvement in pH can be attributed in large part to pH control improvements made by an industrial facility. This same facility has recently ceased operations. Curtailment of this discharge to the river should bring about reductions in suspended solids, dissolved solids, chlorides. Further pollutant reductions are anticipated in this basin as improvements are

made to the Painesville WWTP (upgrading to provide tertiary treatment). Several facilities including the Painesville Municipal Power Plant plan to eliminate their discharge while several industries propose to tie into municipal sanitary sewers. Elsewhere in the basin, two WWTP's (Chardon and Jefferson) expanded capacity and upgraded their respective treatment processes.

F. Ashtabula River Basin

Water quality in this basin strongly parallels that of its neighboring basin to the west, the Grand River. This basin drains predominantly rural areas with only a few minor point sources causing localized problems. Water quality is very good throughout the entire basin with the exception of that portion located near the mouth in the City of Ashtabula. The major problem in this area is associated with industrial discharges to Fields Brook, a tributary to the Ashtabula River near its mouth.

Fields Brook receives the discharges from 9 industrial sources. Sampling of this stream reveals frequent standard violations for total dissolved solids, mercury, chlorides, phenols and MBAS. Less frequent standard violations for lead and copper have also been detected. The discharge from Fields Brook appears to degrade water quality in the mainstem of Ashtabula River, particularly during low flow periods. Discharges from Fields Brook are believed responsible for 2 dissolved oxygen violations, and single violations for chloride, copper, and lead noted at the 5th Street Bridge in Ashtabula. Fecal coliform bacteria violations were frequent occurrences at this location also.

Several industrial facilities in the basin have constructed or improved their waste treatment facilities. New Jersey Zinc installed a new lime slurry system to provide better pH control, while Diamond Shamrock has installed facilities to provide primary and secondary neutralization,

filtration, and oil and grease removal. The total discharge volume from Diamond Shamrock was reduced during 1976 with the completion of a new cooling water recycle system. Olin Corp. is pursuing a program to improve pH control and also initiating steps to reduce the amounts of organic chemicals entering their waste treatment system. General Tire has significantly reduced its waste volume discharge and Reactive Metals plans to upgrade their wastewater treatment facility.

G. Conneaut Creek Basin

Like the Grand and Ashtabula Rivers, Conneaut Creek drains rural areas with a few point source discharges resulting in minor localized water quality problems. Conneaut Creek is one of only a few streams in Ohio that can support a cold water fishery. It is not without its problems. Fecal coliform bacteria violations occur throughout the basin; the result of septic tank leaching or discharges from "package waste treatment plants" that serve commercial establishments or small housing developments.

A few heavy metal violations have been noted in the basin. A lead violation was noted at the Furnace Road station near the Ohio-Pennsylvania state line. One copper and one lead violation were observed at the U.S. Geological Survey gauging station just upstream of the City of Conneaut. Slightly elevated concentrations of nutrients have been noted at various sampling stations throughout the basin. The origin of these nutrients is probably the result of nonpoint sources and discharges from "package waste treatment plants."

H. Mahoning River Basin

The water quality in the Mahoning River varies from extremely high

to grossly polluted. The upper and middle reaches of the mainstem and most tributaries are of relatively high quality and include five major reservoirs for recreational and/or public water supply uses. As the river approaches and flows through the City of Warren, septic tank leachates and numerous combined sewer overflows cause elevations of bacterial levels and just downstream of Warren the water quality is drastically reduced by discharges from several industrial discharges. From here to the Ohio-Pennsylvania State line, a distance of more than fifteen river miles, the water quality is extremely poor. In fact, this reach is perhaps the most polluted body of water in the entire state of Ohio.

The existing water quality of the upper to middle reaches of the Mahoning River is generally very good and should continue to be of fairly high quality since much of the drainage basin lies in rural and low population density areas. Alliance is the only major city in the upper reaches of the basin and does have some impact on the water quality. According to data collected during 1976 at Alliance, the water quality is fairly good except that the stream standards for fecal coliform bacteria and phenols were violated occasionally.

Two high quality reservoirs, Lake Milton and Berlin Reservoir, are located in the middle reaches just downstream of Alliance. These reservoirs are used for primary and secondary contact recreation. The Pricetown sampling site on the mainstem just downstream of Lake Milton has high quality water with only occasional violations of the fecal coliform bacteria standard. The West Branch enters the mainstem just downstream of Newton Falls. This is a very high quality tributary as it generally flows through rural and undeveloped areas.

Water quality data collected at the Leavittsburg monitoring station, a

few miles upstream of Warren, indicates that water quality conditions here were relatively good. There are consistent violations of the general stream standard for fecal coliform bacteria presumably due to the discharge from the Newton Falls WWTP along with leaching from numerous septic tanks in the Newton Falls and Leavittsburg areas.

The Mahoning River flows from Leavittsburg into the northeast section of Warren past a steel mill and then south past two municipal parks. The water quality in this reach is relatively good despite discharges from combined sewer overflows and from the steel mill. All water quality criteria are well within stream standards except fecal coliform bacteria and occasionally, zinc and oil and grease.

The water quality in lower Mahoning River from Warren to Lowellville is extremely poor due to several factors. These include the need by industries to use and reuse the water, discharge of untreated or partially treated sanitary and industrial waste loads, and unnatural seasonal flow characteristics. This region is heavily industrialized with seven major steel plants which may reuse the total flow of the river from three to five times depending upon the time of year, and discharge large loads of suspended solids, oil and grease, ammonia, cyanide, phenolics, metals and heat. There is one power plant which also contributes to the thermal loadings in this reach. There are eight municipal primary and secondary wastewater treatment plants which discharge an average of 50 million gallons of wastes per day which cause elevations of BOD, ammonia, and bacteria.

The water quality of the Mahoning River changes drastically downstream of Warren due to pollutant loads discharged from the outfalls at the Republic Steel-Warren plant. The outfall from the blast furnace contributes significant loads of suspended solids to the river. Just downstream of the Republic

Steel plant, the Warren WWTP discharges to the river. The combination of these two discharges causes elevations in the river of fecal coliform bacteria, ammonia, and lead, as well as increased concentrations of phenols, zinc, and occasionally cyanide above water quality standards levels.

In Niles, problem parameters included fecal coliform bacteria, oil and grease, phenols, lead, ammonia, and zinc, all of which were above desirable water quality standard levels. Municipal wastewater discharges from WWTP's in Niles, McDonald, and Girard cause elevations of fecal coliform bacteria and ammonia. Industrial discharges in this area add ammonia, oil, grease, zinc, cyanide, chrome, phenol, heat, and metals to the river.

The water quality in the the Youngstown-Struthers area of the mainstem is further degraded by several industrial dischargers and municipal waste-water treatment plants. Oil and grease commonly covers much of the river's surface in this area. Ammonia, fecal coliform bacteria, temperature, phenols, and zinc are at elevated levels. In addition, there are occasional violations of cyanide and copper.

The water quality at Lowellville near the Ohio-Pennsylvania state line does not improve significantly. The Struthers WWTP is the only major point source discharger in this reach. However, fecal coliform bacteria, ammonia, temperature, phenols, and zinc concentrations are above desirable levels. Occasional high concentrations of oil and grease, cyanide and copper, and low dissolved oxygen readings have been noted.

Water Quality Standards are currently being met on most tributary streams and with the exception of bacteriological violations, are also met on the upper mainstem from Lake Milton downstream to Warren. Standards

are not met through the lower section of the Mahoning from downstream of Warren to the Ohio-Pennsylvania state line. The problematic parameters in this reach include fecal coliform bacteria, dissolved oxygen, temperature, ammonia, phenols, zinc and occasionally cyanide, copper and lead. Present Ohio Water Quality Standards (OAC 3745-1) include specific standards for the Mahoning River, which were adopted by the Water Pollution Control Board on July 11, 1972. The Mahoning standards are currently being revised, and should be promulgated in 1977. Many permits and subsequent industrial waste control programs await the establishment of these new standards. By 1983 the Mahoning River at the state line will be suitable for fishing and public water supply.

Several industrial entities have recently constructed or are now building improved wastewater treatment facilities. Many other industries are in the planning stage towards providing improved wastewater facilities. Those industries which have completed improvements or plan improvements are listed below:

(1) Amsted Industries - improved pickle rinsewater pretreatment with tie-in with Alliance sanitary system completed.

(2) Babcock and Wilcox - improved pickle liquor treatment plus tie-in with Alliance.

(3) Transue Williams - pickle rinsewater pretreated and discharged to Alliance sanitary system. Steam operated forge hammers converted to compressed air operation.

(4) Rockwell International - discontinued operations.

(5) Copperweld - scheduled to build retention basin with planned 100% recycle of treated wastewater.

(6) Republic Steel, Warren - improved solids and oil treatment.

(7) Thomas Steel Strip - improved plating solution treatment.

(8) General Motors, Packard Electric - improved wastewater treatment with construction of tie-in with Warren now complete.

(9) RMI - improving their wastewater treatment facilities by use of improved retention basis.

(10) General Electric - has an on-going study and facility improved program for reduction of fluorides.

(11) Jones and Laughlin, Niles - installing improved facilities for reduction of chromium, zinc, suspended solids and oil loading in their discharge along with destruction of cyanide.

(12) Jones and Laughlin, Youngstown; Republic Steel, Youngstown; U.S. Steel, Youngstown, and McDonald; Youngstown Sheet and Tube, Youngstown, Campbell and Struthers - in the planning stage with Youngstown Sheet and Tube completing construction of cold rolling mill and pickle rinsewater treatment facilities at Campbell.

The following lists municipal wastewater treatment facilities that have been constructed or upgraded within the last five years:

(1) Mahoning County Meander Creek Wastewater Treatment Plant Facility (4 mgd) presently under construction and estimated to be in service by September 1976; unit process consists of two stage pure oxygen activated sludge treatment providing for phosphorus removal with lime addition, rapid sand filters and disinfection by ozonation; sludge to be incinerated.

(2) Village of Cortland Wastewater Treatment Plant - construction completed to upgrade and expand present treatment facilities; plant provides treatment with sludge to be spread on farm land.

(3) Trumbull County Brookfield No. 4 Wastewater Treatment Plant - plant upgraded and with additional capacity added to provide secondary treatment.

(4) Mahoning County Sherwood Forest Subdivision Wastewater Treatment Plant - plant upgraded to provide extended aeration with chlorination and additional capacity.

(5) Trumbull County Newton Manor Wastewater Treatment Plant - treatment consists of contact stabilization sand filter and chlorination.

(6) Village of Windham Wastewater Treatment Plant - treatment consists of oxidation ditch and chlorination.

I. Little Beaver Creek Basin

Water quality in the Little Beaver Creek Basin is good. Discharges from several municipal WWTP degrade water quality in localized areas and are probably responsible along with septic tank leachate for the violations of the fecal coliform bacteria standard that occur throughout the basin. Several industrial discharges cause additional violations of pH, phenols, chlorides, MBAS, heavy metals, and ammonia. About 36 stream miles have been designated as "Wild or Scenic" by the Ohio Department of Natural Resources. Because the basin has not experienced high intensity development, it has been able to retain much of its natural scenic beauty. Ten areas within the basin have been designated as natural areas. Several archaeological and historic sites have also been identified in the basin.

The headwaters of the Middle Fork of Little Beaver Creek receive the discharge from the Salem WWTP. Violations of the water quality standard for ammonia, phenol, and dissolved oxygen have been noted at the Beechwood Road sampling station downstream of the Salem WWTP discharge. Stone Mill, a tributary to the Middle Fork, drains the southern portions of Salem. The water quality in this stream is degraded by industrial discharges. Problematic parameters detected include MBAS, fecal coliform bacteria, lead, zinc and fluoride. Further downstream, an occasional dissolved oxygen and fecal coliform bacteria violations have been noted.

A water quality problem associated with an industrial waste discharge exists in the West Fork. The industrial facility discharges to a small tributary which flows into the West Fork. Sampling at the mouth of this tributary revealed significant water quality standard violations for pH, ammonia, phenols, chlorides, MBAS, and zinc. Occasional violations for fluoride and copper were also noted. The impact of this discharge on water quality in the West Fork appears to be localized amd confined primarily to the small tributary because sampling further downstream in the West Fork showed only a violation for fecal coliform bacteria. It should be pointed out that the industrial facility has made efforts to improve the quality of its discharge by upgrading its waste treatment system.

The most severe water quality problems in the basin are found in Stateline Creek. Stateline Creek, a small tributary to the North Fork, receives the discharge from several industrial facilities. Numerous water quality standard violations have been documented at the sampling site located near the mouth of the stream for ammonia, chloride, phenols, total iron and manganese. Other violations noted in this stream include selenium, lead, zinc, MBAS, and one PCB. These constituents emanate from two industrial facilities engaged in liquid waste disposal operations. Leakage and/or direct discharges from industrial lagoons is believed to be the means by which these constituents enter Stateline Creek. The flow from Stateline Creek has been shown to have an adverse impact on water quality in the North Fork of Little Beaver Creek. Violations of stream standards for lead and fecal coliform have been detected in the North Fork just downstream of its confluence with Stateline Creek. Sampling has also revealed high total iron concentrations at this location. A continuous water quality monitoring station has recently been installed by the U.S. Geological Survey near the mouth of Stateline Creek to monitor flow, pH, temperature, conductivity, and dissolved oxygen.

Additional surveillance and sampling is planned during the 1977 water year in this area by Ohio EPA.

Several industrial facilities in the basin have improved or added new waste treatment capabilities. Eljer Plumbingware has eliminated their contact cooling water discharge thereby eliminating the discharge of lead to the receiving stream. Chemlime Corp. has completed construction of an industrial wastewater treatment system. Browning-Ferris Industries has discontinued use of 2 lagoons which were causing groundwater contamination as well as surface water problems. This facility plans to install an industrial wastewater treatment system during the spring of 1977.

4. Southeast Region

The southeastern region of Ohio encompasses the Muskingum River Basin which is the largest drainage basin in the state (over 8,000 square miles), the Hocking River Basin, and the minor tributaries discharging directly to the Ohio River from East Liverpool to Portsmouth. This region lies entirely within the Allegheny Plateau Province. The far northern and western portions of the basin are glaciated, the remainder being unglaciated. Cropland is the primary land usage in the glaciated portion, while in the unglaciated areas land usage is devoted to pasture land and livestock. Significant amounts of coal still exist in the unglaciated portion. The mining of coal (particularly the pre-reclamation strip mining operations) and other related activities have given rise to the most common water quality problem in this region, acid-mine drainage. The extent and impact of mine drainage on water quality was discussed in a previous section. Aside from the mine drainage problem, many localized water quality problems associated with point source discharges occur in this region. This section of the report will highlight those problem areas in the Muskingum and Hocking River Basins. No new water quality data was obtained during the 1976 water year for the minor tributaries that discharge directly to the Ohio River. For this reason, no assessment of water quality in these streams will be made. For the vast majority of these streams, degradation of water quality due to mine drainage continues to be a major problem.

A. Muskingum River Basin

Perhaps the best way to describe water quality in the Muskingum Basin is to say that it is very diverse. The Tuscarawas River below Barberton and Massillon and Rocky Fork Creek below Mansfield have severe water quality problems. On the other hand, the Mohican River near Greer or the Muskingum

River near Beverly have excellent water quality. High fecal coliform counts are the most common water quality problem throughout the basin.

Occasional water quality standard violations of dissolved oxygen and total iron were noted in Stillwater Creek below Urichsville. On one occasion at this site, a cadmium concentration over 5 times the standard (5 ug/l) was noted. In Sugar Creek below the Strasburg WWTP, high levels of fecal coliform and total iron are often noted. Cadmium and copper violations have also been noted here. An industrial discharge is believed responsible for the heavy metals found in this location. Copper and cadmium violations have been recorded in Wills Creek below Cambridge. High concentrations of total iron and high fecal coliform counts occur regularly here also.

Apparent violations of the water quality standard for phenols were noted in the Muskingum River below Coshocton. The average phenol concentration (based on 10 samples) at this station was 14 ug/l. An industrial discharger is believed responsible for these high phenol concentrations. High phenol concentrations have also been noted in the Licking River below Newark. Heavy industrial loadings to the Newark WWTP coupled with inadequate treatment at the plant create serious water quality problems in this stream below the WWTP outfall. Ammonia, heavy metal, and dissolved oxygen violations frequently occur at the sampling station downstream from Newark.

The most severe point source problems occur in the upper third of the Muskingum Basin. Water quality standard violations for cadmium, copper, zinc, iron, total chromium, hexavalent chromium, phenol, ammonia, and to a lesser extent, MBAS are frequently noted in Rocky Fork Creek below Mansfield. Numerous industrial effluent discharges in this area create these problems. In the summer months when flows are low, heated discharges cause temperature violations. The elevated water temperatures coupled with biochemical

oxygen demanding substances result in dissolved oxygen violations. The water quality in Rocky Fork Creek is generally degraded from Mansfield downstream to its confluence with Black Fork. In Killbuck Creek below Wooster, violation of water quality standards for dissolved solids, ammonia, phenols, total iron, and lead have been noted. A copper concentration of 2950 ug/l was the most significant standard violation noted at this station. This value exceeded by more than 50 times the maximum allowable value for this parameter (the standard being 50 ug/l with a water hardness of 241-320 mg/l). Industrial discharges are responsible for the water quality problems found in this stream segment.

Some of the most serious water quality problems in the entire Muskingum Basin occur in the Tuscarawas River in the Massillon-Barberton area. Low stream flows coupled with numerous industrial and municipal point sources combine to cause significant water quality degradation. Phenol, ammonia, dissolved oxygen, chloride, and total and dissolved solids parameters frequently are in violation of standards in this area. At Clinton, downstream of Barberton, phenol, ammonia, dissolved solids, total iron, chlorides, dissolved oxygen, and MBAS violations frequently are noted. Phenol violations are particularly serious at this station. A ten sample average showed the phenol concentration to be 66.6 ug/l with the maximum being 273 ug/l. Continuing downstream, the Tuscarawas River at New Philadelphia appears to recover somewhat and is not nearly as polluted as it was in the Massillon-Barberton area. Nonetheless, violations of the standards for chloride, ammonia, manganese, and total iron occurred below New Philadelphia. At Coshocton, prior to its confluence with the Walhonding River to form the Muskingum, the Tuscarawas River continues to have violation levels of total iron, manganese, and high levels of fecal coliforms. Apparent phenol concentrations in the river at Coshocton are well above the water quality

standard level. A ten sample average showed the phenol concentration here to be 29.2 ug/l with a maximum of 141 ug/l (the phenol standard is 10 ug/l). This is an alarmingly high concentration of phenols to be found on a continuous basis.

Nimishillen Creek below Canton is severely degraded. Fecal coliform, ammonia, and total iron violations occur often in this area. During periods of low flow, the dissolved oxygen in the stream drops below the standard of 5 mg/l. Although only one of four samples showed a phenol violation, the other three samples had values near the violation level.

Even though water quality in the upper Tuscarawas Basin is poor, it should begin improving as a result of improvements made by several industrial dischargers. Timken Roller Bearing in Canton recently spent $10 million for a central treatment facility to handle wastewater from its Gambrinus and Duber Avenue plants. When construction is complete, the water quality in Hurford Run should show significant improvement. Some improvement in water quality has already been noticed in Hurford Run because of a new biological treatment plant installed by Ashland Oil Company to reduce oil and grease and phenolic wastes. Water quality in the East Branch of Nimishillen Creek should improve dramatically following completion of a $19 million control pollution abatement facility by Republic Steel Corporation.

On the Tuscarawas River, Pittsburgh Plate Glass (PPG) in Barberton has discontinued production of soda ash but continues production of chlorine with caustic soda as a by-product. The release of high concentrations of dissolved solids discharged by PPG is expected to continue. Downstream at Dover, Empire Detroit Steel expects to have completed by April of 1977, a complete treatment plant to handle its waste discharge. Greer Steel, which at this time has no facility to treat its wastes, expects to have such a facility within two years. Problematic parameters associated with these

two sources, which discharge to the Tuscarawas River, include total iron, pH, suspended solids and zinc. In New Philadelphia, Union Camp plans to upgrade their treatment facility which when completed should reduce the amount of suspended solids and BOD discharged to the Tuscarawas River.

Elsewhere, Barmet Corporation hopes to have completed by mid-1977, a complete recycling system which, when completed, will eliminate discharge of aluminum, iron, and chlorides into Stillwater Creek. In the Wills Creek basin, both the Elwin G. Smith Co. and the Sandstone Corporation have added pollution control facilities. The former now pretreats some of its wastewater prior to discharge into the Cambridge sewer system, while the latter now discharges only non-contact cooling water to Leatherwood Creek, having eliminated its discharge containing lead. Brockway Glass (Zanesville) has eliminated their oil and grease discharge to the Licking River. Essex International has added pre-treatment to reduce heavy metals concentration prior to discharge into the Zanesville sanitary sewer system. On the mainstem of the Muskingum River, the Philo Electric Generating Plant of Ohio Power Company has been closed, thereby, eliminating a tremendous volume of heated effluent. The water temperature in the Muskingum River is elevated as a result of the discharge of heated water from the Conesville Electric Generating Plant of Columbus & Southern Ohio Electric Company. The addition of cooling towers may help reduce the thermal load and its impact on water quality during periods of low stream flow. Improvements at the Beverly Plant of Ohio Power have also been made by the addition of another ash pond to contain waste.

Massillon has recently completed a secondary wastewater treatment plant, while Canton is nearing completion of its secondary treatment plant. These plant improvements should do much to improve the water quality in the Upper Tuscarawas River and Nimishillen Creek respectively.

In spite of the numerous water quality problems mentioned above, improvements can be noted in the basin. Chloride concentrations in the Tuscarawas River near Massillon-Barberton area have decreased somewhat since 1970. Copper concentrations in the Muskingum River below McConnelsville are much lower now than they were five years ago. When the other improvements noted above are completed, additional improvements in water quality are anticipated. Water quality in areas like Rocky Fork Creek below Mansfield, Licking River below Newark, Jerome Fork below Ashland, Killbuck Creek below Wooster, and others is expected to remain degraded due to municipal and industrial point sources. Until the acid-mine drainage problem can be corrected, water quality of many streams in this basin will continue to be poor.

B. Hocking River Basin

Water quality in this basin, like the Muskingum Basin, is most adversely affected by mine drainage. Point source discharges cause a few localized problems, but overall, result in little degradation of stream water quality in this basin.

The Hocking mainstem in the Lancaster area is degraded due to industrial and municipal point source discharges to a greater extent than any other area in the basin. Problems in this area result from combined sewer overflows plus discharges of poorly treated municipal wastes from an overloaded WWTP. Slugs of heavy metals and oil and grease are frequently discharged by industrial sources to the sanitary system. These periodic slugs have an adverse effect on the WWTP operations resulting in poor removal of nutrients, heavy metals, and suspended solids. Sludge deposits in the river downstream of the WWTP attest to this problem. The problematic parameters in this area include periodic depressed dissolved oxygen levels, ammonia, heavy

metals, and oil and grease. Occasional heavy metals are found in the mainstem upstream of the WWTP outfall. This is probably the result of combined sewer overflows. During water year 1976, nine samples were collected below the Lancaster WWTP for ammonia with two violations of the ammonia standard noted. Personnel from the WWTP collected ten ammonia samples downstream of their outfall; six of the ten samples violated the water quality standard. No violations of the dissolved oxygen standard were noted during the 1976 water year. Anchor Hocking Glass Company has two plants located in different sections of Lancaster. Each has a discharge to a small stream that is tributary to the Hocking mainstem. Both discharges contain suspended solids and organic matter.

Occasional slugs of oil and grease from an industrial source, which discharges to a sanitary sewer, create water quality problems in Rush Creek below Bremen. Action to correct this problem is underway. Four Mile Creek, a tributary to the Hocking mainstem near its mouth had periodic high levels of cyanide and heavy metal contamination resulting in fish kills. A photographic processing firm was responsible for these discharges but has recently relocated, thus eliminating the problem.

Presently there are 12 communities in this basin which have no facilities for treatment of municipal wastes. These communities are listed in Table 16. Of particular concern is the Village of Amanda. Septic tanks from residential properties are tiled into ditches and storm sewers that discharge to a tributary of Clear Creek. Water quality degradation in the tributary and in a small segment of Clear Creek has occurred because of this discharge. The Village of Amanda is eligible to receive Federal monies amounting to $12,713 to assist in the planning of a treatment facility.

During water year 1976, there were no new municipal or industrial dischargers in the basin. Both Bremen and Lancaster applied for federal

TABLE 16

COMMUNITIES WITHOUT SEWAGE TREATMENT PLANTS

ENTITY		COUNTY	POPULATION
Amanda	*	Fairfield	2,194
Buchtel		Athens	592
Coolville	*	Athens	672
Corning		Perry	838
Glouster	*	Athens	2,121
Jacksonville		Athens	545
Junction City	*	Perry	732
Murray City		Hocking	562
New Straitsville	*	Perry	947
Pleasantville		Fairfield	754
Shawnee		Perry	914
Trimble		Athens	542

*Have applied for Step 1 Federal Funding Grants

grants to help finance the upgrading of present WWTP facilities. Both Anchor Hocking Plants are working on plans to recycle their waste flows. They hope to be able to eliminate their present discharge to Baldwin Run and Hunters Run by 1978.

There are several areas in the basin having high quality waters worthy of mention. One such area is the Clear Creek Basin (some slight problems in the Amanda area), which is the only major subbasin in the Hocking system whose waters are not degraded by mine drainage. The waters in this basin are generally very high quality and flow through a very picturesque area. In the Rush Creek subbasin, Center Branch Creek, Little Rush Creek and Raccoon Run have high quality water. Some other minor tributaries to the Hocking mainstem having high quality water include upper reaches of Hunters Run, Margaret Creek, and Four Mile Creek.

5. Central Region

The Scioto River Drainage Basin encompasses approximately 6,510 square miles in the south central portion of Ohio. It is the third largest river basin in the state. Three distinct physiographic subdivisions are represented in the basin. About 65% of the basin is in the Glacial Till Plains of the Central Lowlands Province. The flat or gently rolling northern part of the basin is made up of thick glacial drift mantling the bedrock and filling the pre-glacial valleys. The eastern portion of the basin from Chillicothe north is in the Glaciated Plateau Province. Here the topography is more rolling, with rounded hills and valleys filled with glacial deposits. The southern and southeastern quarter of the basin lies within the Unglaciated Allegheny Plateau which is characterized by its steep slopes and rugged topography. Water quality within the basin ranges from fair to good. Violations of the fecal coliform standard (200 colonies/100 ml sample) is widespread throughout the basin. Areas where water quality problems exist include Marion, Columbus, Circleville, Chillicothe, Jackson, Marysville, Galion, and Reynoldsburg. Water quality in subbasins and in the mainstem will be discussed individually.

A. Olentangy River Basin

In previous years during low flow periods, the discharge from the Galion WWTP caused water quality standard violations for dissolved oxygen and ammonia. Some improvements to this plant were made in 1975, but overloading continues to cause degradation of water quality in the stream below the outfall. Nearby, Whetstone Creek experiences occasional dissolved oxygen and ammonia violations below Mt. Gilead and Cardington.

Downstream of the Delaware Dam and continuing to Worthington, water quality in the river is very good. This segment of river has been designated

a scenic river by the Department of Natural Resources. During the 1976 water year, sampling at the Stratford Road station downstream of the Delaware WWTP revealed an occasional ammonia violation. In the Columbus area, the water quality in the river becomes somewhat degraded due to urban stormwater runoff, a thermal discharge, and combined storm sewer overflows. Also, several industries discharge to the river near its mouth.

B. Little Scioto River Subbasin

For years, the combination of inadequate treatment of municipal wastes by the Marion WWTP coupled with low flows has severely degraded the water in the Little Scioto River below Marion. It is not uncommon to find the water in this segment totally devoid of oxygen during the summer months. Sludge deposits abound in this segment and the release of methane gas from these highly polluted sediments can be seen. Violations of the ammonia standard occur frequently. Marion has recently upgraded its WWTP to provide for advanced treatment. This should help improve water quality appreciably, but the polluted sediments may still cause occasional water quality problems.

C. Mill Creek Subbasin

Problem parameters in Mill Creek below Marysville include dissolved oxygen and ammonia. One phenol violation was noted in Mill Creek near its mouth. The water quality problems in this area result from industrial and municipal discharges. There are a number of industries in the Marysville area that utilize on site "package" treatment facilities to treat their waste flow. Such treatment facilities generally provide secondary treatment. The problem with several of these facilities is that their discharge goes to dry ditch tributaries of Mill Creek. The reduction levels in BOD and

ammonia that these facilities can provide is insufficient to prevent standards violations for ammonia and dissolved oxygen in the ditch and in Mill Creek. Advanced treatment may be required or pretreatment with discharge to the Marysville sanitary system should help alleviate this problem.

D. Big Walnut Creek Subbasin

Water quality in the upper reaches from the headwaters to Hoover Reservoir is good. A minor localized problem area exists in this segment near the Sunbury area where an industrial discharge and the discharge from the Sunbury WWTP result in a few minor water quality problems. Downstream of Hoover Reservoir, the water quality is good and is used as a water supply for the City of Columbus. In the lower segments, some degradation of the water quality occurs due to storm water runoff and combined sewer overflows. Occasional dissolved oxygen violations are noted in this lower segment.

Two tributaries discharge to the lower segment of Big Walnut Creek. These are Blacklick Creek and Alum Creek. Water quality in Blacklick Creek above the City of Reynoldsburg is good, but below the Reynoldsburg WWTP, serious degradation of water quality occurs. Poor treatment of municipal wastes, plus frequent bypassing, accounts for numerous dissolved oxygen, ammonia, and fecal coliform violations in this area. Sludge deposits downstream of the WWTP outfall further add to water quality degradation. It is hoped that the Reynoldsburg WWTP can be eliminated by diverting sewage flow into the Columbus system. The City of Westerville presently withdraws water from Alum Creek for water supply. Minor water quality problems exist in the lower segments of Alum Creek near its confluence with Big Walnut Creek, probably the result of storm water runoff and combined

storm sewer overflows. The only water quality standard violation detected in this segment during the 1976 water year was one low dissolved oxygen concentration.

E. Little Walnut Creek Subbasin

Little Walnut Creek enters the Scioto River just downstream from Big Walnut's confluence. The headwaters of the basin drain predominately agricultural lands. Other than during high runoff periods when sediments and nutrients are eroded from the agricultural lands, water quality in this area of the basin is good. Water quality is degraded below the City of Baltimore. Here an industrial source discharges paper mill wastes containing dyes and oxygen demanding materials to the stream. These materials in combination with the discharge from the Baltimore WWTP cause violations in the dissolved oxygen and ammonia standard. The dye discolors the water and the suspended solids material contained in the paper mill waste create sludge deposits thereby causing aesthetic degradation of the stream. Further downstream, local problems exist below the outfalls of the Canal Winchester and Rickenbacker Air Force Base WWTP facilities. Apparently in spite of these point source discharges upstream, the water quality in the stream near its mouth recovers because no water quality violations were noted during the 1976 sampling period at this location.

F. Big Darby Creek Subbasin

The entire basin is relatively free of point source pollution and has high quality water. About 54 miles of Big Darby Creek (From S.R. 38 to its confluence with the Scioto River) has been proposed for scenic river designation. At the Darbyville sampling station, aside from two fecal coliform violations, the only other water quality standard violation was

that one of four phenol samples had a concentration of 11 ug/l (standard is 10 ug/l). Water quality in Little Darby Creek is also good. A good portion of the basin drains predominately agricultural lands. Therefore it is conceivable that occasional water quality problems may arise during high runoff periods

G. Deer Creek Subbasin

Deer Creek, like Big Darby Creek, is a basin having few point source discharges and hence, has relatively high quality water. Localized water quality problems may occur below Mt. Sterling and Williamsport. A new WWTP at London has improved water quality conditions in Oak Run, a tributary to Deer Creek. The sampling station located near the mouth of Deer Creek showed only one dissolved oxygen violation out of 48 samples and one pH violation (pH of 10) out of 50 samples. Two fecal coliform violations were noted at this station during the water year.

H. Paint Creek Subbasin

Paint Creek has the largest drainage area of all the tributary basins in the Scioto River drainage system. There are several problem areas in the upper reaches of the basin attributable to municipal point source discharges. The problem areas include Paint Creek below Washington Court House, Rattlesnake Creek below South Solon and Sabina, the North Fork of Paint Creek below New Holland, the East Fork of Paint Creek below Bloomingburg, and Rocky Fork Creek below Hillsboro. In these areas, infrequent to frequent violations of the standards for dissolved oxygen, ammonia, and fecal coliform are known to occur. Downstream of these areas, but upstream of Chillicothe, water quality in Paint Creek appears to recover from the upstr point source discharges. At the sampling station near Bourneville, the only

water quality violation noted during the water year was for fecal coliform. Although not a violation, the average nitrate concentration of 1.53 mg/l seems to illustrate the influence of the upstream municipal discharges. The average total iron and manganese concentrations of 4375 ug/l and 130 ug/l respectively are also somewhat high.

A particularly significant volume of paper mill waste is discharged to Paint Creek just prior to its confluence with the Scioto River in Chillicothe. This discharge has an adverse impact on water quality, particularly during lowflow periods. Although the paper mill company provides treatment in the form of aerated lagoons, significant amounts of oxygen demanding solids enter Paint Creek resulting in depressed dissolved oxygen levels. As these solids settle out in either the bottom of Paint Creek or the Scioto mainstem, they exert an additional oxygen demand. The discharge permit for the company requires that it reduce its present discharge load by one-half. The company is presently working towards attainment of its permit requirements.

I. Salt Creek Subbasin

Water quality in this basin is generally good. Lab error is believed responsible for the three oil and grease violations. The only other parameter observed to be in violation at the sampling site near Richmondale was fecal coliforms. Stream degradation in Little Salt Creek below the City of Jackson has been noted. Violation of the standards for ammonia, dissolved oxygen, and fecal coliform were recorded in this stream several miles below the Jackson WWTP outfall.

J. Scioto Mainstem

The upper Scioto Mainstem has generally good water quality. However, during summer months when flow is low, occasional dissolved oxygen and

ammonia problems in the Kenton and Green Camp areas occur. Fecal coliforms were sampled at the station below Kenton five times in 1976 and all five times the counts were above the standard for this parameter (the standard is 200 colonies per 100 ml of sample). This was the only standard violation noted at this station. Further downstream at the Prospect station, 7 samples collected for fecal coliform were in violation of the standard. Water quality in this area is expected to improve in the near future as a number of communities begin receiving grant monies for correcting their problems.

The segment of the mainstem from just above O'Shaugnessy Reservoir to Frank Road in Columbus has fair to good water quality. Water is withdrawn from the river just downstream of Griggs Reservoir to serve as a water supply for the City of Columbus. The lower segment has occasional water quality problems due to urban runoff and combined sewer overflows.

The most serious degradation of water quality in the mainstem occurs in the segment below Frank Road in Columbus and extends downstream to near Circleville, a distance of about 25 miles. The critical water quality problem in this area occurs during low flow periods. Under these conditions, the effluent from Columbus' two waste treatment plants may account for as much as 95% or more of the flow in the Scioto River below Columbus. Serious water quality problems occur in the river under these circumstances. Problem parameters include dissolved oxygen, ammonia, fecal coliform, and heavy metals. At the sampling station at Shadeville, which is downstream of the Columbus Jackson Pike WWTP but upstream of Columbus Southerly WWTP, of 48 samples collected during 1976 for fecal coliform, all 48 were in violation of the stream standard. During this same period, there were a total of 9 dissolved oxygen violations. The average ammonia concentration here was 2.6 mg/l with a maximum of 6.3 mg/l. Nitrate concentration averaged

3.5 mg/l (11.6 mg/l maximum), while total phosphorus concentrations averaged 1.3 mg/l (4.2 mg/l maximum). High levels of total iron, manganese, copper and zinc were noted. At the Circleville station which is downstream of Columbus Southerly WWTP, fecal coliform and dissolved oxygen violations continue to persist. Here too, total iron continued to increase in concentration from the previous station as did manganese, while copper and zinc concentrations remained about the same or decreased slightly. The ammonia concentration showed a significant decrease both in terms of the average concentration (1.3 mg/l) and the maximum concentration (2.8 mg/l). Similar decreases occurred in the average nitrate and total phosphorus concentrations.

The river appears to recover somewhat by the time it reaches Chillicothe. The only parameter not meeting standards is fecal coliform, although the maximum and average number of colonies has decreased from the previous two upstream stations. No dissolved oxygen violations occurred and the average ammonia concentration has decreased by over 50% (down from 1.3 mg/l at Circleville to 0.6 mg/l at Chillicothe). Average nitrate concentration increased slightly, but was not in violation. Most heavy metals showed decreases in concentration when compared to the Circleville station.

At the last sampling station on the Scioto mainstem at Higby, water problems are again noted. Parameters not meeting water quality standards during the sampling period at this location include dissolved oxygen, fecal coliform, and phenols. The degradation in stream quality occurring at this location is most likely due to a combination of effects, one of which is the large volume of paper mill waste discharged to Paint Creek near its confluence with the Scioto and discharges from the Chillicothe WWTP. The average BOD_5 concentration at Higby shows nearly a 100% increase when compared to the station upstream of Paint Creek. Ammonia concentration at

Higby continue to show a decrease as do the average nitrate and total phosphorus concentrations. The maximum phenol concentration here was 14 ug/l, which is 4 ug/l above the standard for this parameter. Also showing increases in terms of maximum values observed were several heavy metals including total iron, manganese, zinc, lead, and copper. The increases in heavy metals is probably indicative of industrial discharge in the City of Chillicothe plus urban-stormwater runoff.

Data collected during the 1976 water year by the Ohio River Valley Water Sanitation Commission (ORSANCO) at the mouth of Scioto seems to indicate a continued improvement in water quality. The average ammonia concentration has decreased to 0.28 mg/l at the mouth compared to an average concentration of 0.34 mg/l at Higby. The average nitrate concentration at the mouth decreased slightly when compared to the Higby station, but the average total phosphorus showed a slight increase (0.46 mg/l at the mouth vs. 0.34 mg/l at Higby). Maximum readings for heavy metals generally were higher at the mouth than at the Higby station. Both maximum total iron and lead showed increases, with the maximum lead concentration more than double the maximum value that occurred at Higby. Maximum manganese and zinc concentrations also were higher.

Water quality in the basin should improve because of the upgrading in quality or in some cases elimination of discharges by several industrial and municipal sources. In Circleville, Container Corporation of America installed a clarifier and dredged their lagoons which should reduce their BOD and suspended solids loading to the Scioto River. Also in Circleville, DuPont has added chlorination to its sewage plant and has installed continuous monitoring devices to detect accidental spills of paints as well as provide for onsite storage areas to contain spills. Owens Illinois in Columbus

will eliminate their discharge containing lead, arsenic, and chromium to the Scioto River by July 1977. In Marysville, Abex Corporation now has their industrial wastes transported to a liquid waste treatment plant. This plant has also improved their domestic waste treatment system by installing a bio-disc and clarifier. Mead Paper Company in Chillicothe has added additional aerators to their lagoons and soon will be adding two secondary clarifiers. With the addition of these clarifiers, Mead plans to reroute their discharge about 3/4 of a mile downstream from its present location in Paint Creek. The new aerators should help reduce biochemical oxygen demand, while the clarifiers should help reduce the amount of solids discharged to the stream.

During the 1976 water year, the improved Marion WWTP began operation. It presently provides secondary treatment, but will be upgraded to provide tertiary treatment in April of 1977. Significant water quality improvement is expected in the Little Scioto below the WWTP as a result of these improvements. The new London WWTP was completed and put into operation resulting in a noticeable improvement in water quality in Oak Run below the discharge. Reduced loadings to the Scioto River at Circleville are anticipated as Circleville's new WWTP comes on-line. New facilities are presently under construction at Ashley(Alum Creek) and Bloomingburg (East Fork of Paint Creek). Construction of new sewage plants at New Holland (North Fork Paint Creek), Washington Court House (Paint Creek), and Chillicothe-Pleasant Valley Regional Sewer District is expected to start in 1977.

For the most part, water quality throughout much of the Scioto River Basin is good. The largest or most significant problem area occurs in the mainstem below Columbus during low flow periods when the discharge from the city's two WWTP may account for upwards of 95% of the flow in the Scioto River below Columbus. The effects on water quality in the Scioto which

these two plants can have was dramatically illustrated in 1976. A strike by municipal workers resulted in the by-passing of millions of gallons of raw sewage to the river. At several downstream locations, dissolved oxygen readings reached zero, and very low dissolved oxygen levels were noted as far downstream as Chillicothe. This unfortunate incident caused the estimated (Department of Natural Resources) death of 71,000 fish. Figures 31, 32, and 33, show the percentage of days each year starting with 1965 (except at Higby station) and continuing to 1976, that dissolved oxygen levels in the Scioto mainstem at Shadeville, Chillicothe, and Higby were less than 5.0 mg/l. The conclusions that can be drawn from such figures is limited without relating it to rainfall and streamflow data, although the trend seems to indicate a general improvement of this parameter.

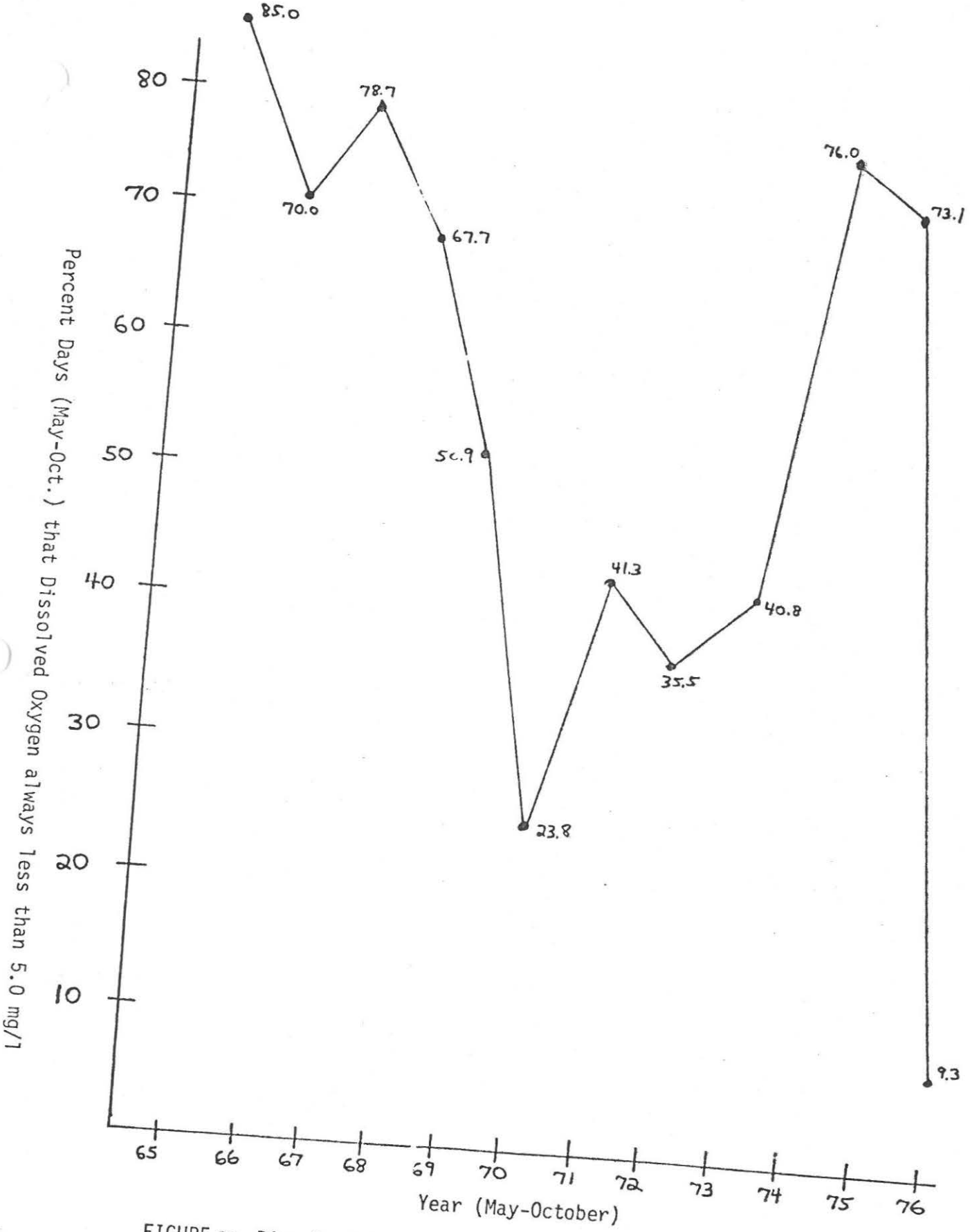


FIGURE 31 Dissolved Oxygen Trend - Scioto River below Shadeville

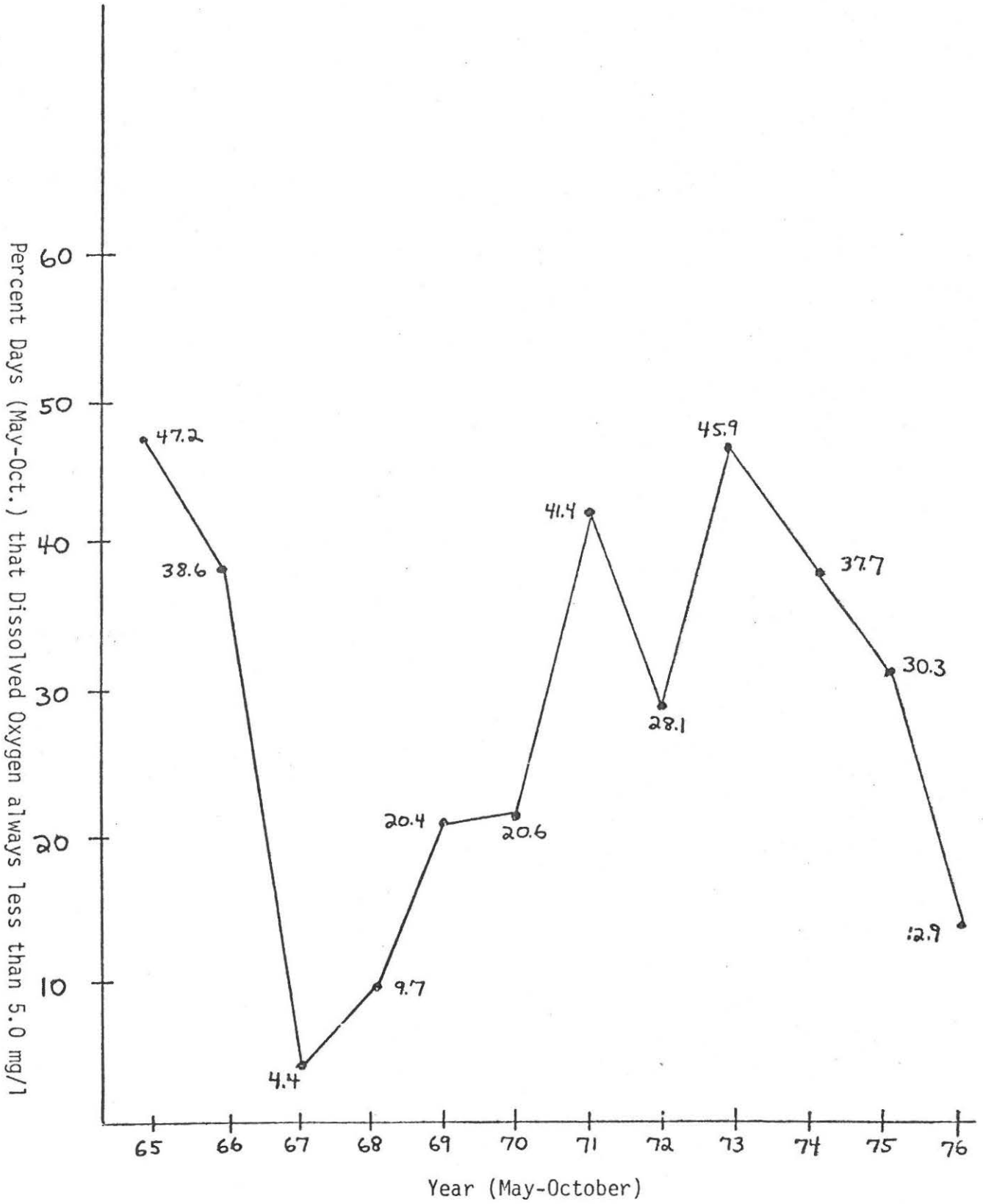


FIGURE 32 Dissolved Oxygen Trend - Scioto River at Chillicothe

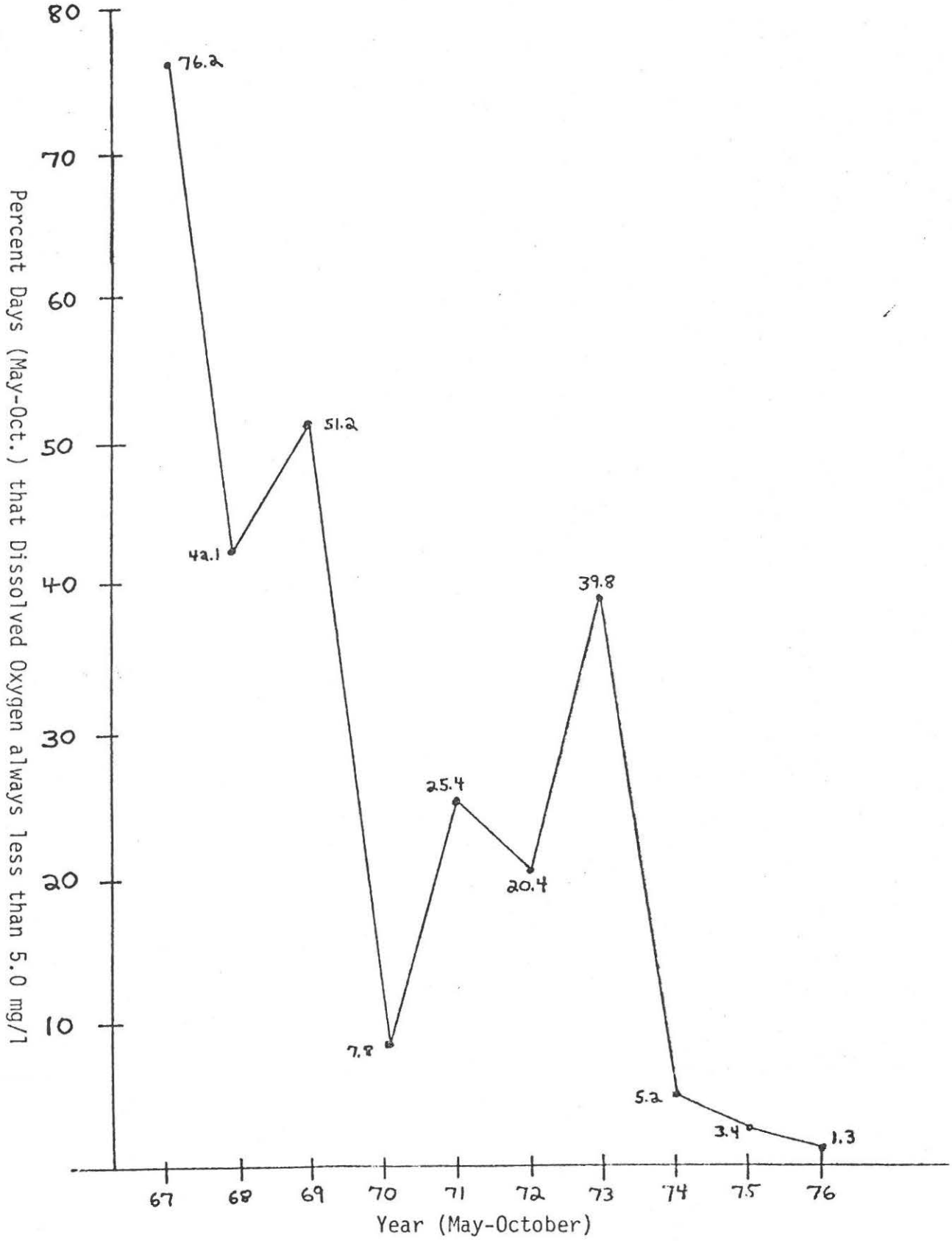


FIGURE 33 Dissolved Oxygen Trend - Scioto River at Higby

COSTS

The Federal Water Pollution Control Act requires that an estimate be made of the costs necessary to achieve the objectives of the Act. This section presents an estimate of the costs of construction of publicly-owned wastewater treatment plants needed to implement the provisions of the Act. Also provided is an estimate of the cost for industrial wastewater treatment facilities.

Cost estimates for the construction or upgrading of municipal wastewater treatment facilities were obtained from the 1976 Needs Survey. Table 17 presents a cost breakdown by category of the different types of municipal needs. The 1974 Needs Survey costs are also presented in Table 17 for comparison purposes. A few 1976 category estimates were lower when compared to 1974 estimates because the latest estimates reflect a better formulated and more consistent survey methodology and greater amounts of information became available from such sources as new facility plans, basin plans, and discharge permits. The significant cost differential between plants needed to provide secondary treatment vs. plants needed to provide more advanced waste treatment can be explained in two ways:

(1) more advanced waste treatments are needed to meet water quality standards because of the prevalence of low flow streams in Ohio, and

(2) the pollution abatement program conducted in Ohio prior to the enactment of the Act resulted in the installation of facilities designed for secondary treatment.

Table 18 presents estimates for the cost of constructing industrial wastewater facilities. The $386 million is on the low side because of the exclusions noted. The costs for very small industrial facilities were not estimated, although the total cost for these facilities could be substantial because of their large number.

TABLE 17

Municipal Wastewater Treatment Facilities
1974 Survey of Needs
and
1976 Survey of Needs

		June 1973 Millions of Dollars	January 1976 Millions of Dollars
Category I:	Facilities to meet "Secondary Treatment"	26	28
Category II:	Facilities to meet Advanced Treatment or Water Quality Standards	1,508	2,062
Category IIIA:	Sewer costs for correction of "infiltration/inflow" problems	635	629
Category IIIB:	Sewer costs for replacement/rehabilitation	115	432
Category IVA:	Construction of collection Sewers	626	975
Category IVB:	Construction of new inceptors	946	1,375
Category V:	Correction of bypassing problems due to combined sewers	3,790	1,765
Sub-total		7,646	7,270
Category VI:	Treatment and control of storm waters	6,570	3,936
Total		14,216	11,206

TABLE 18

COSTS ESTIMATES IN OHIO FOR INDUSTRIAL WASTEWATER

POLLUTION ABATEMENT FACILITIES

Hocking River	$ 480,000
Scioto River	3,060,000
Grand & Ashtabula Rivers	1,330,000
Maumee River	9,680,000
Sandusky River	1,430,000
Central Ohio River & Tributaries	39,850,000
Tuscarawas River	11,730,000
Little Beaver River	530,000
Southeast Ohio River & Tributaries	29,700,000
Southwest Ohio River & Tributaries	5,310,000
Little Miami River & Mill Creek	380,000
Huron, Vermilion & Black Rivers	17,960,000
Rocky, Chagrin & Cuyahoga Rivers	60,660,000
Great Miami & Wabash Rivers	18,910,000
Walhonding River	1,550,000
Portage River	600,000
Muskingum River	13,160,000
Mahoning River	127,700,000
Lake Erie	41,980,000
TOTAL	$386,000,000

Notes:

The cost figure was arrived at by estimating on a permit-by-permit basis the approximate cost per facility. All costs for entities located within a defined drainage area were tabulated and added to come up with the totals by basin. Then the costs for all drainage basins were added together for the total statewide cost figure.

All industrial permits (manufacturing and business service entities) and proposed permits on file with Central Office WM&C as of February 7, 1975 were used for cost estimating. Active surface mine abatement costs were included by basin for three hundred mines.

The power plants' costs for pollution sources other than thermal were estimated, but costs for cooling facilities at Hutchings, Gavin, and Davis-Besse were included.

This estimate did not include costs on abatement facilities at the municipal power plants, state-owned power plants, water treatment plants, gas stations, agricultural run-off and general non-stream run-off from most industrial manufacturing sites, pretreatment of industrial wastes going to municipal sewage plants and cooling facilities for most of the public utility steam electric power plants.

FIELD BIOLOGICAL INVESTIGATIONS

Biological monitoring programs are conducted by the Ohio Environmental Protection Agency (OEPA) in partial fulfillment of the requirements of the 1972 Federal Water Pollution Control Act Amendments. Sections 106(e), 303 and 305 of the Act specifically call for the establishment of biological "base-line" data for the major river basins and the use of those data in pollution abatement planning procedures. Additionally, these data will suppport the National Pollution Discharge Elimination System NPDES permit issuance process and the NPDES permit compliance monitoring.

Section 502(15) of PL-92-500 defines biological monitoring as the "determination of the effects on aquatic life, including accumulation of pollutants in tissues, in receiving waters due to the discharge of pollutants". The biological monitoring programs of OEPA during 1972 were confined to benthic (bottom) community analyses due to limited staff resources. Current plans are underway, however, to restore the Agency's bioassay capability, increase the number of dischargers monitored, and to expand the biological parameters measured to include periphyton analyses. A laboratory capability is also being developed to determine levels of toxic materials in fish tissue.

The 1976 Field Biological Program consisted of two basic elements. Primary biological monitoring stations were established at selected Primary Water Quality Monitoring Network Stations. These sites also coincided with USGS gaging stations, six of which are part of the National Stream Quality Accounting Network (NASQAN). Twenty-five of these stations were established. The analyses of data generated from these sites will contribute to long-term trend analysis and will provide

a long-term measure of the effectiveness of State water quality standards to develop conditions satisfactory to support balanced indigenous aquatic communities.

A second program element to assess the impact of specific discharges on aquatic communities has been in effect for several years. Stations are located upstream and downstream from entities selected from the Ohio Major Dischargers List. The entities for biological monitoring are chosen on the basis of a recognized pollution problem, and where, through the NPDES permit system, improvement in waste treatment has been requested. Data generated from these stations measures the effectiveness of the Agency's water pollution control programs and the recovery of biological communities as degraded segments of streams are improved. Because of limited resources only two major dischargers were selected for biological monitoring this year. These were sewage treatment plants located in the communities of Marion (Little Scioto River) and Lima (Ottawa River). Industrial outfalls are also present a short distance below the Lima facility.

Field and laboratory methods for the Primiary Biological Network Stations and the Major Dischargers were essentially the same. Five multiple-plate artificial substrate samplers, of the modified Hester-Dendy type, were exposed for a six week period at each station. Major dischargers normally had one upstream station and at least two downstream from the outfall while one set of samplers was usually placed at each Primary Network Station.

The samplers were placed in runs rather than pools or riffles and an attempt was made to establish stations in as similiar an ecological situation as possible. At some stations,where the stream was greater than 40 feet wide, a set of five samplers was installed approximately 20 feet from each bank. Qualitative samples of the natural substrate were

collected at the time of retrieval of the multiple-plates. Dip net samples were taken in a stream segment approximately 20 yards long, in the area where the multiple-plates were placed. The qualitative collecting continued until, by gross examination, no additional species were being taken.

The multiple-plates were dismantled in the laboratory and the material washed through a US Standard Testing Sieve number 40 (0.425 mm openings). The larger organisms were hand-picked from the screens and the smaller material washed into a jar containing 70% alcohol. Where the number of organisms collected was so large that the identification of each individual was impractical, a Folsom Sample splitter was used to obtain a subsample. Identifications and counts were made using dissecting and compound microscopes and currently acceptable taxonomic keys. After the benthic organisms had been identified and counted, species diversity indices (d) were calculated using the expression

$$d = \left(\frac{ni}{n}\right) \log 2 \left(\frac{ni}{n}\right)$$

This formula is a function of the number of species (ni), total number of individuals (n), and the distribution of the individuals within the number of species.

The twenty-five primary biological monitoring network stations, were established and sampled for the first time in 1976. The data base will be insufficient to continue long-term trend analysis until after several sampling periods.

Stations above and below the Marion Sewage Treatment Plant, on the major dischargers monitored, were sampled for macrobenthos in 1974 and again in 1976. Biological data from both years indicate that though the quality of water above the treatment plant is imposing a stress on the benthic macroinvertebrate community, further and severe degradation occurs downstreams from this facility. Improvements in the treatment of waste from this plant were initiated in the

latter part of 1976, after biological sampling had been completed. Tertiary treatment is scheduled to begin in April, 1977.

Benthic samples were collected from the Ottawa River above and below the Lima Sewage Treatment Plant and below the outfalls of Vistron Corporation and the Standard Oil Company in 1974 and 1976. Six stations were sampled in 1974 and eight in 1976. Data from Station 1, above the Lima plant and industrial outfalls, indicated that a high water quality situation existed at this site. Severe degradation occurs below the sewage plant and industrial discharges and significant recovery is not evident until Station 8, located approximately 43 miles below Station 1. The same general pattern was demonstrated by the distribution of fish species collected by the OEPA Northwest District Office. Some improvement was noted immediately below the Lima STP in terms of substrate condition and number of taxa present from 1974 to 1976. The substrate in 1974 was covered with sewage sludge and only five taxa were collected. The sludge was essentially absent in 1976 and the number of taxa collected increased to 14.

The Lima sewage facility was expanding in 1975 and 1976. Secondary settling tanks were operational before the biological sampling period in July, but complete secondary and tertiary treatment was not on line until fall of 1976. Major improvements in ammonia reduction in the Vistron discharge will be in effect in early 1977. Improvements are also expected in the Standard Oil waste treatment.

The segment of the Ottawa River below Lima and the segment of the Little Scioto River below Marion will be monitored biologically for the next several years. Hopefully, the ongoing improvements in the waste treatment from these entities will be reflected in a more stable and diverse community of aquatic organisms.

OHIO LAKES AND RESERVOIRS

A. General

Ohio has more than 200 publicly owned lakes and reservoirs over 14 acres in surface area. Combined surface area of all these lakes is more than 100,000 acres. In general, water quality is good. The common problems occurring are, for the most part, related to nutrient enrichment, which has resulted in large standing crops of algae and macrophyte aquatic plants. Some lakes in the east and southeastern parts of the state are being affected unfavorably by coal mining operations.

B. Current Survey Program

The joint Ohio EPA and USGS lake sampling program will begin its 3rd season of sampling in 1977. Seventeen lakes were sampled in 1975 and 14 in 1976. Of the 45 lakes in Ohio classified as significant in the 1976(b)-314 lakes report to the Federal EPA, 34 have been surveyed. The Army Corp of Engineers collects data on Corp projects in the state. Local studies associated with colleges and universities are also being conducted. Figure ___ shows the lakes surveyed as well as showing each lake's location and the year it was surveyed.

C. Water Quality

The National Eutrophication Survey concluded after review of their data, that all 19 of the public lakes they sampled in Ohio were eutrophic on the basis of Vollenweider's system of trophic level determination. The Ohio EPA Lake Survey also found problems associated with high nutrient loadings. Large standing crops of blue green algae were found during the summer months in most of the lakes sampled in 1975 and 1976. Scums

FIGURE 34

Locations of Lakes Sampled to date in Ohio EPA Lakes Program - 1975 and 1976

of decomposing algal colonies were noted at the late summer sampling in Burr Oak Lake.

Nuisance growths of aquatic macrophytes, chiefly Myricophyllum sp., were noted in a number of lakes. These were being controlled by mechanical harvesting in some cases. It was found that stratification of lakes was occurring in the summer months in lakes over 17 feet in depth. Highly stratified lakes had little or, many times, no oxygen in the bottom waters.

Coal mining operations are affecting several lakes in the state. Piedmont Lake has a high sulphate concentration, as a result of current and previous strip-mine operations in the watershed. Lake Hope, an aesthetically beautiful lake, receives low pH waters coming from abandoned deep mines in its watershed. The pH at this lake was below 5.1 in the spring and below 6.3 in the summer when sampled by the Ohio EPA in 1975. A pH of 7.0 or greater would be natural to a lake in this region.

D. Control

Problems associated with nutrient loadings should be alleviated somewhat as new and improved sewage treatment plants come on line. A detergent phosphate ban similar to those instituted in Indiana and New York would have an immediate impact on lake nutrient loadings. The National Eutrophication survey found that point sources contributed anywhere form 0 to 82% of the nutrient loadings to lakes they surveyed in Ohio, so the effect on each lake must be evaluated on an individual basis.

E. Future Lake Study

The joint OEPA/USGS Lake Survey will continue in 1977. Most of the

effort will concentrate on lakes where little or no historical data exists. Sampling will be changed to include chlorophyll analysis and PCB determinations. In addition, as part of another program, PCBs and pesticide residues of fish collected in selected lakes around the state will be measured.

APPENDIX I

Instream Water Quality Summary

These tables present a summation of the water quality data for the primary and secondary monitoring stations in the State. This summation consists of the maximum, minimum and average concentrations for the parameters analyzed at each site. It also includes the Water Quality Standards, where applicable; the number of times each parameter was analyzed and the number of times the standards were violated. Note that the averages under fecal coliform and fecal streptococcus bacteria are geometric means.

The following is a list of the Ohio Department of Health Laboratory Detection Limits for use in evaluating the succeeding Water Quality Summary Tables.

In cases where a parameter could not be detected by the laboratory, the limits of detection for analyses are given as the minimum and there was no average computed.

PARAMETER	DETECTION LIMIT	PREVIOUS LIMIT	DATE CHANGE
NH-N	0.05 mg/1		
TKN-N	0.05 mg/1	0.3 mg/1	September, 1976
Nitrate-N	0.05 mg/1	0.1 mg/1	January, 1976
Total Phosphorous-P	0.05 mg/1	0.1 mg/1	September, 1976
BOD_5	1 mg/1		
Diss. Solids	10 mg/1		
Susp. Solids	10 mg/1		
TOC	1 mg/1		
Oil & Grease	5 mg/1	0.5 mg/1	February, 1976
Fecal Coliform	1/100 mg/1		
Fecal Strep.	1/100 mg/1		
MBAS	0.05 mg/1		
Conductivity	1 micromho		
Turbidity	1 FTU		
Total Hardness	2 mg/1		
Phenol	2 mg/1		
Cyanide	0.01 mg/1		
Chloride-Cl	5 mg/1		
Fluoride-F	0.02 mg/1		
Arsenic-As	10 ug/1		
Barium-Ba	200 ug/1	100 ug/1	March, 1975
Cadmium-Cd	5 ug/1	10 ug/1	July, 1976
Total Chromium-Cr	30 ug/1		
Copper-Cu	30 ug/1		
Total Iron-Fe	30 ug/1		
Lead-Pb	5 ug/1	10 ug/1	February, 1977
Manganese-Mn	30 ug/1		
Mercury-Hg	0.05 ug/1	1.0 ug/1	July, 1976
Selenium-Se	5 ug/1	10 ug/1	July, 1976
Silver-Ag	30 ug/1		
Zinc	30 ug/1		
Alumimum-Al	200 ug/1		
Sulfate-SO_4	10 mg/1		
Chromium-Hex	30 ug/1		

Wabash River at State Line

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	11	1490	10	278	
Temperature	°C	*	10	21.8	0.1	10.3	
pH	S.U.	6.0-9.0	11	7.90	7.30	7.67	
NH-3-N	mg/1	-	10	1.25	0.23	0.55	
TKN-N	mg/1	-	7	1.9	0.5	1.3	
Nitrate	mg/1	-	10	38.80	0.71	5.96	
Total Phosphorous	mg/1	-	10	0.90	0.20	0.41	
BOD_5	mg/1	-	11	16.3	1.8	6.9	
D.O.	% Saturation		10	98.5	45.5	74.5	
D.O.	mg/1	5.0	10	13.3	4.0	8.9	1
Dissolved Solids	mg/1	1500	11	1259	184	658	
Suspended Solids[5]	mg/1	-	11	232	16	69	
TOC	mg/1	-	10	21.0	7.0	12.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	10	2250	90	643	8
Fecal Strep.	#/100 ml	-	3	8600	750	1842	
MBAS	mg/1	0.5	10	0.80	0.06	0.24	1
Conductivity	Micromhos	-	10	1440	262	911	
Turbidity	J.U.	-	9	160.00	7.50	43.61	
Total Hardness	mg/1	-	4	540	164	422	
Phenols	ug/1	10	2	5.0	4.0	4.5	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	7	90.0	22.0	61.1	
Fluoride	mg/1	1.3	4	0.57	0.17	0.43	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	30	30	--	
Total Iron	ug/1	-	3	11700	1110	4937	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	310	110	205	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	70	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	280.0	53.0	208.2	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River near Lawrenceburg, Ind.

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	11	27.0	0.0	14.1	
pH	S.U.	6.0-9.0	10	8.2	6.9	7.8	
NH-3-N	mg/1	-	11	0.86	0.05	0.31	
TKN-N	mg/1	-	11	1.5	0.3	0.8	
Nitrate	mg/1	-	11	4.44	1.76	2.56	
Total Phosphorous	mg/1	-	10	0.67	0.30	0.44	
BOD_5	mg/1	-	11	26.8	2.9	7.5	
D.O.	% Saturation		11	117.4	84.3	94.4	
D.O.	mg/1	5.0	11	14.0	7.6	10.0	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	11	1190	11	197	
TOC	mg/1	-	11	60.0	1.0	11.5	
Oil-Grease	mg/1	5	3	31.8	1.0	--	
Fecal Coliform	#/100 ml	200	9	21000	300.0	4796.0	
Fecal Strep.	#/100 ml	-	5	2300	98	403	
MBAS	mg/1	0.5	8	0.16	0.11	0.14	
Conductivity	Micromhos	-	12	760	385	647	
Turbidity	J.U.	-	11	740.0	2.80	91.80	
Total Hardness	mg/1	-	3	278	242	255	
Phenols	ug/1	10	9	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.03	0.01	--	
Chloride	mg/1	250	10	74.0	28.0	46.0	
Fluoride	mg/1	1.3	3	0.40	0.24	0.32	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	400	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	70	30	--	
Copper[5]	ug/1	*	3	60	30	--	
Total Iron	ug/1	-	2	13750	2590	8170	
Lead[5]	ug/1	40	3	120	13	53	1
Manganese[5]	ug/1	-	1	340	340	340	
Mercury[5]	ug/1	0.5	3	1.0	0.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	3	270	60	157	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	83.0	53.0	68.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Whitewater River near Hoover

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	9	25.0	2.0	12.5	
pH	S.U.	6.0-9.0	9	8.5	7.7	8.0	
NH-3-N	mg/1	-	9	0.42	0.05	0.13	
TKN-N	mg/1	-	9	5.6	0.3	0.9	
Nitrate	mg/1	-	9	3.10	1.11	1.77	
Total Phosphorous	mg/1	-	9	0.10	0.05	0.09	
BOD_5	mg/1	-	9	4.0	1.5	2.1	
D.O.	% Saturation		9	109.8	86.9	96.9	
D.O.	mg/1	5.0	9	13.8	7.3	10.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	1	73	73	73	
TOC	mg/1	-	6	13.0	1.0	.38	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	2800	14	244	5
Fecal Strep.	#/100 ml	-	6	360	11	90	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	580	425	518	
Turbidity	J.U.	-	2	28.00	10.10	19.05	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Taylor Creek Near Taylor Creek

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	7	24.0	1.0	11.4	
pH	S.U.	6.0-9.0	7	9.0	7.2	8.0	
NH-3-N	mg/1	-	7	0.60	0.06	0.23	
TKN-N	mg/1	-	7	1.3	0.3	0.6	
Nitrate	mg/1	-	7	2.70	1.48	2.06	
Total Phosphorous	mg/1	-	7	2.90	0.80	1.70	
BOD_5	mg/1	-	7	3.0	1.4	2.1	
D.O.	% Saturation		7	128.1	56.8	89.3	
D.O.	mg/1	5.0	7	16.4	4.8	10.5	1
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	-	--	--	--	
TOC	mg/1	-	4	15.0	4.0	9.5	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	8	6300	150	1109	7
Fecal Strep.	#/100 ml	-	6	2000	120	653	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	7	1150	680	829	
Turbidity	J.U.	-	-	--	--	--	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River at New Baltimore

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	10	28.0	0.0	12.7	
pH	S.U.	6.0-9.0	9	8.4	7.6	8.0	
NH-3-N	mg/1	-	9	.61	.08	.36	
TKN-N	mg/1	-	9	1.7	.6	1.1	
Nitrate	mg/1	-	9	6.30	2.36	3.87	
Total Phosphorous	mg/1	-	9	.70	.30	.48	
BOD_5	mg/1	-	9	10.0	3.0	5.6	
D.O.	% Saturation		10	111.0	43.2	88.1	
D.O.	mg/1	5.0	10	14.2	3.5	10.0	1
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	3	83	10	44	
TOC	mg/1	-	8	21.0	1.0	8.4	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	18000	1000	4459	8
Fecal Strep.	#/100 ml	-	6	2000	82	641	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	860	440	672	
Turbidity	J.U.	-	2	33.00	2.60	17.80	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Indian Creek Near Ross

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	8	25.0	4.0	13.6	
pH	S.U.	6.0-9.0	8	8.6	7.8	8.1	
NH-3-N	mg/1	-	8	0.20	0.05	0.10	
TKN-N	mg/1	-	8	1.1	0.3	0.4	
Nitrate	mg/1	-	8	5.75	0.50	1.99	
Total Phosphorous	mg/1	-	8	0.10	0.05	0.09	
BOD_5	mg/1	-	8	3.1	1.0	1.8	
D.O.	% Saturation		8	136.1	99.1	111.3	
D.O.	mg/1	5.0	8	16.2	8.9	12.0	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	2	19	10	15	
TOC	mg/1	-	7	17.0	1.0	5.8	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	8	410	25	139	5
Fecal Strep.	#/100 ml	-	6	280	10	95	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	8	630	475	560	
Turbidity	J.U.	-	2	11.00	1.30	6.15	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River at Hamilton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	9	26100	749	5167	
Temperature	°C	*	11	27.0	1.0	14.6	
pH	S.U.	6.0-9.0	10	8.3	7.2	7.9	
NH-3-N	mg/1	-	11	1.19	0.09	0.51	
TKN-N	mg/1	-	11	2.0	0.4	1.1	
Nitrate	mg/1	-	11	4.04	0.93	2.17	
Total Phosphorous	mg/1	-	10	0.70	0.30	0.47	
BOD_5	mg/1	-	11	18.0	3.1	6.6	
D.O.	% Saturation		11	125.9	85.7	100.8	
D.O.	mg/1	5.0	11	14.5	7.4	10.5	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	11	595	11	106	
TOC	mg/1	-	11	23.0	1.0	7.5	
Oil-Grease	mg/1	5	2	5.0	2.1	--	
Fecal Coliform	#/100 ml	200	10	30000	380	1773	10
Fecal Strep.	#/100 ml	-	6	1800	55	313	
MBAS	mg/1	0.5	8	0.26	0.10	0.16	
Conductivity	Micromhos	-	12	850	370	696	
Turbidity	J.U.	-	11	680.00	2.80	80.01	
Total Hardness	mg/1	-	2	278	238	258	
Phenols	ug/1	10	9	7.0	4.0	4.9	
Cyanide[5]	mg/1	0.2	9	0.20	0.01	--	1
Chloride	mg/1	250	9	71.0	25.0	48.7	
Fluoride	mg/1	1.3	2	0.43	0.23	0.33	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	400	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	90	30	--	
Copper[5]	ug/1	*	2	60	30	--	
Total Iron	ug/1	-	2	13400	1040	7220	
Lead[5]	ug/1	40	2	130	24	77	1
Manganese[5]	ug/1	-	1	450	450	450	
Mercury[5]	ug/1	0.5	2	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	370	120	245	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	74.0	49.0	61.5	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Four Mile Creek at New Miami

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	10	23.0	3.0	11.5	
pH	S.U.	6.0-9.0	10	8.7	7.3	7.9	
NH-3-N	mg/l	-	10	.38	.06	.18	
TKN-N	mg/l	-	10	.8	.3	.4	
Nitrate	mg/l	-	10	5.56	1.30	2.44	
Total Phosphorous	mg/l	-	10	.20	.06	.13	
BOD_5	mg/l	-	9	2.7	1.4	2.1	
D.O.	% Saturation		10	118.6	83.3	99.8	
D.O.	mg/l	5.0	10	14.4	7.5	11.2	
Dissolved Solids	mg/l	1500	--	--	--	--	
Suspended Solids[5]	mg/l	-	3	10	10	10	
TOC	mg/l	-	6	18.0	1.0	6.7	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	5700	28	557	5
Fecal Strep.	#/100 ml	-	7	840	72	257	
MBAS	mg/l	0.5	--	--	--	--	
Conductivity	Micromhos	-	10	670	420	567	
Turbidity	J.U.	-	3	6.00	.70	2.83	
Total Hardness	mg/l	-	--	--	--	--	
Phenols	ug/l	10	--	--	--	--	
Cyanide[5]	mg/l	0.2	--	--	--	--	
Chloride	mg/l	250	--	--	--	--	
Fluoride	mg/l	1.3	--	--	--	--	
Arsenic[5]	ug/l	50	--	--	--	--	
Barium[5]	ug/l	800	--	--	--	--	
Cadmium[5]	ug/l	5	--	--	--	--	
Total Chromium[5]	ug/l	300	--	--	--	--	
Copper[5]	ug/l	*	--	--	--	--	
Total Iron	ug/l	-	--	--	--	--	
Lead[5]	ug/l	40	--	--	--	--	
Manganese[5]	ug/l	-	--	--	--	--	
Mercury[5]	ug/l	0.5	--	--	--	--	
Selenium[5]	ug/l	5	--	--	--	--	
Silver[5]	ug/l	1	--	--	--	--	
Zinc	ug/l	*	--	--	--	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	--	--	--	--	
Hex. Chromium[5]	ug/l	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Seven Mile Creek Near Seven Mile

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	5	25.0	5.0	13.2	
pH	S.U.	6.0-9.0	6	8.5	8.0	8.2	
NH-3-N	mg/1	-	6	0.20	0.01	0.10	
TKN-N	mg/1	-	6	0.5	0.3	0.3	
Nitrate	mg/1	-	6	4.81	0.60	1.85	
Total Phosphorous	mg/1	-	6	0.10	0.05	0.09	
BOD_5	mg/1	-	6	2.2	1.4	1.8	
D.O.	% Saturation		5	121.4	100.0	112.3	
D.O.	mg/1	5.0	5	14.8	10.0	12.2	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	-	--	--	--	
TOC	mg/1	-	4	11.0	1.0	4.2	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	9	12000	7	197	6
Fecal Strep.	#/100 ml	-	7	2000	22	209	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	6	650	455	545	
Turbidity	J.U.	-	-	--	--	--	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Dicks Creek near Excello

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	12	27.0	3.0	17.3	
pH	S.U.	6.0-9.0	11	8.3	6.7	7.8	
NH-3-N	mg/l	-	12	0.98	0.24	0.53	
TKN-N	mg/l	-	12	1.6	0.3	1.1	
Nitrate	mg/l	-	12	2.07	0.45	1.31	
Total Phosphorous	mg/l	-	11	1.30	0.20	0.45	
BOD_5	mg/l	-	12	8.8	2.0	3.9	
D.O.	% Saturation		12	107.0	75.2	88.7	
D.O.	mg/l	5.0	12	13.0	6.4	8.8	
Dissolved Solids	mg/l	1500	--	--	--	--	
Suspended Solids[5]	mg/l	-	12	2060	31	264	
TOC	mg/l	-	12	18.0	1.0	6.1	
Oil-Grease	mg/l	5	10	5.0	0.7	--	
Fecal Coliform	#/100 ml	200	10	9200	1	116	5
Fecal Strep.	#/100 ml	-	6	320	13	100	
MBAS	mg/l	0.5	8	0.34	0.12	0.22	
Conductivity	Micromhos	-	14	1450	440	995	
Turbidity	J.U.	-	13	33.0	3.50	19.46	
Total Hardness	mg/l	-	11	474	300	387	
Phenols	ug/l	10	12	67.0	4.0	19.5	7
Cyanide[5]	mg/l	0.2	12	0.02	0.01	--	
Chloride	mg/l	250	10	360.0	43.0	140.3	1
Fluoride	mg/l	1.3	9	15.50	0.64	3.82	6
Arsenic[5]	ug/l	50	2	10.0	10.0	--	
Barium[5]	ug/l	800	2	200	200	--	
Cadmium[5]	ug/l	5	10	20	10	--	1
Total Chromium[5]	ug/l	300	11	60	30	--	
Copper[5]	ug/l	*	11	70	30	--	
Total Iron	ug/l	-	6	25500	30	6307	
Lead[5]	ug/l	40	12	220	10	--	5
Manganese[5]	ug/l	-	2	620	280	450	
Mercury[5]	ug/l	0.5	4	1.0	0.5	--	
Selenium[5]	ug/l	5	2	10	10	--	
Silver[5]	ug/l	1	2	30	30	--	
Zinc	ug/l	*	11	7200	270	2952	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	2	167.0	91.0	129.0	
Hex. Chromium[5]	ug/l	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Great Miami River at Middletown

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	30.0	2.0	13.4	
pH	S.U.	6.0-9.0	7	8.4	7.6	8.0	
NH-3-N	mg/1	-	7	1.22	0.10	0.42	
TKN-N	mg/1	-	7	1.5	0.7	1.1	
Nitrate	mg/1	-	7	4.42	1.34	2.49	
Total Phosphorous	mg/1	-	7	0.71	0.20	0.53	
BOD_5	mg/1	-	7	9.0	3.6	6.1	
D.O.	% Saturation		8	107.8	69.1	95.1	
D.O.	mg/1	5.0	8	13.8	5.6	10.5	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	--	--	--	--	
TOC	mg/1	-	5	25.0	6.0	11.2	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	26000	590	2974	7
Fecal Strep.	#/100 ml	-	5	520	35	173	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	7	840	425	681	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	2	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.05	0.01	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	5	10	5	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	5	30	30	--	
Total Iron	ug/1	-	3	840	600	733	
Lead[5]	ug/1	40	5	22	10	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	1	0.05	0.05	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	5	50	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Twin Creek near Franklin

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	-
Temperature	°C	*	11	26.0	0.0	12.5	
pH	S.U.	6.0-9.0	11	8.5	7.8	8.2	
NH-3-N	mg/1	-	13	0.48	0.05	0.16	
TKN-N	mg/1	-	11	1.1	0.3	0.5	
Nitrate	mg/1	-	12	7.10	0.53	2.33	
Total Phosphorous	mg/1	-	11	0.14	0.10	0.11	
BOD_5	mg/1	-	12	4.6	1.0	2.4	
D.O.	% Saturation		11	122.1	69.3	98.0	
D.O.	mg/1	5.0	11	14.4	6.1	10.8	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	12	51	10	23	
TOC	mg/1	-	11	22.0	1.0	5.6	
Oil-Grease	mg/1	5	1	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	10	14000	730	2979	10
Fecal Strep.	#/100 ml	-	6	2300	75	443	
MBAS	mg/1	0.5	8	0.18	0.05	0.10	
Conductivity	Micromhos	-	13	750	340	599	
Turbidity	J.U.	-	12	28.00	1.00	9.47	
Total Hardness	mg/1	-	2	364	308	336	
Phenols	ug/1	10	9	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.01	0.01	--	
Chloride	mg/1	250	9	44.0	25.0	30.8	
Fluoride	mg/1	1.3	2	0.31	0.28	0.29	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	30	30	--	
Total Iron	ug/1	-	2	790	120	455	
Lead[5]	ug/1	40	2	10	10	--	
Manganese[5]	ug/1	-	1	30	30	--	
Mercury[5]	ug/1	0.5	2	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	10		
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	69.0	53.0	61.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River at Miamisburg

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	4330	1310	2730	
Temperature	°C	*	11.0	25.0	0.5	13.7	
pH	S.U.	6.0-9.0	10	8.9	7.7	8.1	
NH-3-N	mg/1	-	11	0.88	0.24	0.64	
TKN-N	mg/1	-	11	1.9	0.7	1.2	
Nitrate	mg/1	-	11	4.41	0.87	2.13	
Total Phosphorous	mg/1	-	10	1.27	0.40	0.73	
BOD_5	mg/1	-	11	13.2	4.5	7.0	
D.O.	% Saturation		11	109.4	51.2	86.7	
D.O.	mg/1	5.0	11	14.4	4.3	9.4	1
Dissolved Solids	mg/1	1500	--	--	---	--	
Suspended Solids[5]	mg/1	-	11	182	10	61	
TOC	mg/1	-	11	26.0	1.0	7.3	
Oil-Grease	mg/1	5	11	5.0	5.0	5.0	
Fecal Coliform	#/100 ml	200	10	190000	300	9520	10
Fecal Strep.	#/100 ml	-	6	22000	510	2609	
MBAS	mg/1	0.5	8	0.19	0.05	0.13	
Conductivity	Micromhos	-	11	810	250	651	
Turbidity	J.U.	-	10	46.0	1.80	15.02	
Total Hardness	mg/1	-	2	354	298	326	
Phenols	ug/1	10	9	8.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.01	0.01	--	
Chloride	mg/1	250	9	72.0	29.0	47.3	
Fluoride	mg/1	1.3	3	0.45	0.32	0.39	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	60	30	--	
Total Iron	ug/1	-	3	1240	240	577	
Lead[5]	ug/1	40	3	21	10	--	
Manganese[5]	ug/1	-	1	40	40	40	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	3	1290	60	473	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	79.0	76.0	77.5	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Wolf Creek at Trotwood

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	9	20.0	0.0	10.4	
pH	S.U.	6.0-9.0	9	8.5	7.5	7.9	
NH-3-N	mg/l	-	8	0.40	0.05	0.19	
TKN-N	mg/l	-	7	0.5	0.3	0.4	
Nitrate	mg/l	-	6	5.30	0.06	1.50	
Total Phosphorous	mg/l	-	8	0.96	0.10	0.49	
BOD_5	mg/l	-	8	3.2	1.1	2.0	
D.O.	% Saturation		9	105.6	63.0	86.7	
D.O.	mg/l	5.0	9	13.2	6.8	10.0	
Dissolved Solids	mg/l	1500	--	--	--	--	
Suspended Solids[5]	mg/l	-	4	132	10	42	
TOC	mg/l	-	7	13.0	1.0	4.3	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	6200	39	543	6
Fecal Strep.	#/100 ml	-	8	120000	47	1433	
MBAS	mg/l	0.5	--	--	--	--	
Conductivity	Micromhos	-	8	1050	455	692	
Turbidity	J.U.	-	1	2.20	2.20	2.20	
Total Hardness	mg/l	-	--	--	--	--	
Phenols	ug/l	10	---	--	--	--	
Cyanide[5]	mg/l	0.2	--	--	--	--	
Chloride	mg/l	250	--	--	--	--	
Fluoride	mg/l	1.3	--	--	--	--	
Arsenic[5]	ug/l	50	--	--	--	--	
Barium[5]	ug/l	800	--	--	--	--	
Cadmium[5]	ug/l	5	--	--	--	--	
Total Chromium[5]	ug/l	300	--	--	--	--	
Copper[5]	ug/l	*	--	--	--	--	
Total Iron	ug/l	-	--	--	--	--	
Lead[5]	ug/l	40	--	--	--	--	
Manganese[5]	ug/l	-	--	--	--	--	
Mercury[5]	ug/l	0.5	--	--	--	--	
Selenium[5]	ug/l	5	--	--	--	--	
Silver[5]	ug/l	1	--	--	--	--	
Zinc	ug/l	*	--	--	--	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	--	--	--	--	
Hex. Chromium[5]	ug/l	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

North Branch-Wolf Creet at Trotwood

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	8	19.5	4.0	12.2	
pH	S.U.	6.0-9.0	9	8.2	7.5	7.8	
NH-3-N	mg/1	-	8	0.30	0.05	0.15	
TKN-N	mg/1	-	7	1.1	0.3	0.4	
Nitrate	mg/1	-	6	4.36	0.29	1.63	
Total Phosphorous	mg/1	-	8	0.14	0.07	0.10	
BOD_5	mg/1	-	8	5.1	1.5	2.4	
D.O.	% Saturation		8	103.4	80.4	88.6	
D.O.	mg/1	5.0	9	12.0	7.8	9.9	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	4	70	10	28	
TOC	mg/1	-	7	19.0	0.1	4.6	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	8	2400	11	317	5
Fecal Strep.	#/100 ml	-	7	95000	14	664	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	8	880	475	635	
Turbidity	J.U.	-	1	3.00	3.00	3.00	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mad River near Dayton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	9	691	308	483	
Temperature	°C	*	11	25.0	3.0	14.5	
pH	S.U.	6.0-9.0	11	8.2	7.6	7.9	
NH-3-N	mg/1	-	11	0.77	0.06	0.31	
TKN-N	mg/1	-	9	1.5	0.3	0.7	
Nitrate	mg/1	-	11	3.52	1.59	2.38	
Total Phosphorous	mg/1	-	10	0.50	0.10	0.29	
BOD_5	mg/1	-	11	6.3	1.0	2.9	
D.O.	% Saturation		11	140.4	75.7	103.7	
D.O.	mg/1	5.0	11	14.6	8.4	10.8	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	10	54	10	20	
TOC	mg/1	-	11	23.0	1.0	5.1	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	10	9800	36	356	5
Fecal Strep.	#/100 ml	-	8	130000	12	754	
MBAS	mg/1	0.5	7	0.14	0.08	0.10	
Conductivity	Micromhos	-	10	850	620	745	
Turbidity	J.U.	-	11	23.00	1.20	7.39	
Total Hardness	mg/1	-	5	414	292	358	
Phenols	ug/1	10	8	6.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.08	0.01	--	
Chloride	mg/1	250	9	39.0	20.0	30.0	
Fluoride	mg/1	1.3	5	0.26	0.23	0.24	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	5	10	10	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	5	60	30	--	
Total Iron	ug/1	-	4	2000	270	--	
Lead[5]	ug/1	40	5	24	10	--	
Manganese[5]	ug/1	-	4	120	50	75	
Mercury[5]	ug/1	0.5	5	1.0	0.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	5	330	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	75.0	59.0	66.4	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mad River below Springfield

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	1	23.0	23.0	23.0	
pH	S.U.	6.0-9.0	1	7.7	7.7	7.7	
NH-3-N	mg/1	-	2	0.36	0.29	0.32	
TKN-N	mg/1	-	1	0.8	0.8	0.8	
Nitrate	mg/1	-	1	2.22	2.22	2.22	
Total Phosphorous	mg/1	-	1	0.40	0.40	0.40	
BOD_5	mg/1	-	2	5.0	2.0	3.5	
D.O.	% Saturation		1	89.6	89.6	89.6	
D.O.	mg/1	5.0	1	7.8	7.8	7.8	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	2	12	10	11	
TOC	mg/1	-	1	6.0	6.0	6.0	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	5500	280	1039	3
Fecal Strep.	#/100 ml	-	2	760	110	289	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	2	720	590	655	
Turbidity	J.U.	-	1	3.20	3.20	3.20	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	---	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Buck Creek At Springfield

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	4	18.0	13.0	15.5	
pH	S.U.	6.0-9.0	4	8.4	7.6	7.9	
NH-3-N	mg/1	-	6	0.30	0.05	0.13	
TKN-N	mg/1	-	5	1.0	0.3	0.4	
Nitrate	mg/1	-	4	1.17	1.05	0.09	
Total Phosphorous	mg/1	-	5	0.19	0.05	0.11	
BOD_5	mg/1	-	6	5.3	1.1	3.1	
D.O.	% Saturation		5	173.6	82.1	113.3	
D.O.	mg/1	5.0	4	18.4	7.8	11.5	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	2	10	10	10	
TOC	mg/1	-	4	12.0	1.0	5.5	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	8	30000	64	647	7
Fecal Strep.	#/100 ml	-	7	91000	25	529	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	6	660	440	575	
Turbidity	J.U.	-	1	3.20	3.20	3.20	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mad River near Urbana

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	9	566	92	183	
Temperature	°C	*	9	18	4.0	12.1	
pH	S.U.	6.0-9.0	9	8.0	7.6	7.8	
NH-3-N	mg/1	-	10	0.27	0.00	0.12	
TKN-N	mg/1	-	9	0.3	0.3	0.3	
Nitrate	mg/1	-	7	8.31	1.60	3.26	
Total Phosphorous	mg/1	-	9	0.11	0.05	0.10	
BOD_5	mg/1	-	10	2.3	0.3	1.6	
D.O.	% Saturation		8	143.5	74.6	101.6	
D.O.	mg/1	5.0	8	15.5	8.5	11.1	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	4	60	0	20	
TOC	mg/1	-	6	18.0	1.0	4.2	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	5800	4	239	7
Fecal Strep.	#/100 ml	-	8	8400	26	550	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	10	830	450	655	
Turbidity	J.U.	-	2	1.20	0.50	0.85	
Total Hardness	mg/1	-	1	380	380	380	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	15.0	15.0	15.0	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Stillwater River at Dayton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	5	1055	118	467	
Temperature	°C	*	10	25.0	2.0	13.2	
pH	S.U.	6.0-9.0	11	8.4	7.4	8.0	
NH-3-N	mg/1	-	11	.31	.05	.15	
TKN-N	mg/1	-	10	1.2	.3	.6	
Nitrate	mg/1	-	11	6.60	.35	2.24	
Total Phosphorous	mg/1	-	10	.78	.10	.31	
BOD_5	mg/1	-	10	5.5	1.7	3.0	
D.O.	% Saturation		10	104.6	62.0	87.1	
D.O.	mg/1	5.0	10	13.7	6.2	9.3	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	10	419	10	74	
TOC	mg/1	-	10	24.0	1.0	6.7	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	9	3700	180	827	8
Fecal Strep.	#/100 ml	-	7	17000	270	838	
MBAS	mg/1	0.5	6	.15	.09	.11	
Conductivity	Micromhos	-	10	860	540	665	
Turbidity	J.U.	-	11	60.00	2.40	14.21	
Total Hardness	mg/1	-	5	362	276	320	
Phenols	ug/1	10	8	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	8	.07	.01	--	
Chloride	mg/1	250	9	74.0	24.0	39.1	
Fluoride	mg/1	1.3	5	.28	.23	.25	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	5	10	10	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	5	60	30	--	
Total Iron	ug/1	-	4	6850	250	2353	
Lead[5]	ug/1	40	5	10	10	--	
Manganese[5]	ug/1	-	4	100	30	--	
Mercury[5]	ug/1	0.5	5	1.0	.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	70.0	55.0	62.4	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Greenville Creek Near Covington

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	5	1020	32	269	
Temperature	°C	*	8	21.0	1.0	12.2	
pH	S.U.	6.0-9.0	9	8.7	7.4	7.9	
NH-3-N	mg/1	-	11	.34	.05	.20	
TKN-N	mg/1	-	9	.8	.3	.5	
Nitrate	mg/1	-	7	11.80	.69	3.19	
Total Phosphorous	mg/1	-	10	.60	.10	.30	
BOD_5	mg/1	-	9	5.8	1.5	3.2	
D.O.	% Saturation		8	118.0	80.0	95.6	
D.O.	mg/1	5.0	8	12.2	8.5	10.4	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	6	230	10	60	
TOC	mg/1	-	7	19.0	1.0	6.0	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	2500	18	246	5
Fecal Strep.	#/100 ml	-	7	35000	8	445	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	10	850	395	611	
Turbidity	J.U.	-	2	7.00	4.80	5.90	
Total Hardness	mg/1	-	1	354	354	354	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	27.0	27.0	27.0	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	1	11	11	11	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	1	1.0	1.0	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Stillwater River At Covington

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	8	21.0	2.0	12.7	
pH	S.U.	6.0-9.0	9	8.3	7.5	7.9	
NH-3-N	mg/1	-	10	0.42	0.05	0.23	
TKN-N	mg/1	-	9	0.8	0.3	0.6	
Nitrate	mg/1	-	7	5.88	0.05	1.09	
Total Phosphorous	mg/1	-	10	0.30	0.10	0.18	
BOD_5	mg/1	-	8	6.5	1.8	3.3	
D.O.	% Saturation		8	96.6	63.0	83.0	
D.O.	mg/1	5.0	8	12.0	6.3	9.0	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	4	450	10	125	
TOC	mg/1	-	7	19.0	1.0	8.0	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	9	2300	43	251	6
Fecal Strep.	#/100 ml	-	8	55000	22	686	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	9	900	300	686	
Turbidity	J.U.	-	2	7.00	5.60	6.30	
Total Hardness	mg/1	-	1	420	420	420	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	1	33.0	33.0	33.0	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	1	10	10	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	1	1.0	1.0	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River at Dayton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	11	27.0	0.0	11.5	
pH	S.U.	6.0-9.0	11	8.8	7.8	8.1	
NH-3-N	mg/1	-	11	1.01	0.05	0.32	
TKN-N	mg/1	-	10	2.7	0.3	1.0	
Nitrate	mg/1	-	11	5.77	0.06	2.06	
Total Phosphorous	mg/1	-	9	0.60	0.10	0.38	
BOD_5	mg/1	-	11	12.2	2.4	4.4	
D.O.	% Saturation		11	103.5	64.4	86.8	
D.O.	mg/1	5.0	11	13.9	7.6	9.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	9	161	10	38	
TOC	mg/1	-	11	24.0	1.0	6.5	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	9	2700	39	597	7
Fecal Strep.	#/100 ml	-	6	7300	160	953	
MBAS	mg/1	0.5	7	0.14	0.08	0.11	
Conductivity	Micromhos	-	10	770	550	683	
Turbidity	J.U.	-	11	48	1.70	12.91	
Total Hardness	mg/1	-	5	350	230	297	
Phenols	ug/1	10	9	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.01	0.01	--	
Chloride	mg/1	250	9	46.0	22.0	34.0	
Fluoride	mg/1	1.3	5	0.41	0.25	0.35	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	5	10	10	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	5	50	30	--	
Total Iron	ug/1	-	4	5550	290	1865	
Lead[5]	ug/1	40	5	11	10	--	
Manganese[5]	ug/1	-	4	90	40	70	
Mercury[5]	ug/1	0.5	5	1.0	0.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	5	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	75.0	55.0	65.6	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River Below Piqua

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	11	26.0	0.0	12.4	
pH	S.U.	6.0-9.0	11	8.5	7.8	8.0	
NH-3-N	mg/1	-	11	1.72	.20	.67	
TKN-N	mg/1	-	10	2.6	0.0	1.2	
Nitrate	mg/1	-	11	14.30	.13	2.62	
Total Phosphorous	mg/1	-	10	1.35	.10	.55	
BOD_5	mg/1	-	11	12.4	1.7	4.4	
D.O.	% Saturation		11	110.9	67.2	88.3	
D.O.	mg/1	5.0	11	14.2	6.0	9.8	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	10	111	10	40	
TOC	mg/1	-	11	26.0	1.0	7.2	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	9	12000	36	555	6
Fecal Strep.	#/100 ml	-	8	15000	10	643	
MBAS	mg/1	0.5	7	.24	.08	.11	
Conductivity	Micromhos	-	10	800	540	661	
Turbidity	J.U.	-	11	61.00	1.50	17.41	
Total Hardness	mg/1	-	5	322	244	294	
Phenols	ug/1	10	9	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	.01	.01	--	
Chloride	mg/1	250	9	45.0	18.0	29.8	
Fluoride	mg/1	1.3	5	.41	.24	.34	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	5	10	10	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	5	60	30	--	
Total Iron	ug/1	-	4	4300	380	1955	
Lead[5]	ug/1	40	5	17	10	--	
Manganese[5]	ug/1	-	4	120	40	75	
Mercury[5]	ug/1	0.5	5	1.0	.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	5	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	82.0	58.0	68.6	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Loramie Creek - Hardin-Wapakoneta Road

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	7	313	11	106	
Temperature	°C	*	8	24.5	0.5	13.5	
pH	S.U.	6.0-9.0	8	8.3	7.6	7.9	
NH-3-N	mg/1	-	8	0.83	0.05	0.23	
TKN-N	mg/1	-	9	1.1	0.4	0.7	
Nitrate	mg/1	-	8	14.40	0.46	2.88	
Total Phosphorous	mg/1	-	8	0.20	0.07	0.16	
BOD_5	mg/1	-	8	5.1	1.0	3.2	
D.O.	% Saturation		8	115.9	74.4	94.8	
D.O.	mg/1	5.0	8	12.5	8.5	10.0	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	8	92	10	43	
TOC	mg/1	-	8	28.0	1.0	8.9	
Oil-Grease	mg/1	5	3	7.3	5.0	--	1
Fecal Coliform	#/100 ml	200	9	4600	50	496	5
Fecal Strep.	#/100 ml	-	7	36000	20	686	
MBAS	mg/1	0.5	5	0.26	0.08	0.13	
Conductivity	Micromhos	-	7	820	580	707	
Turbidity	J.U.	-	8	63.00	2.30	19.67	
Total Hardness	mg/1	-	3	292	266	277	
Phenols	ug/1	10	7	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.05	0.01	--	
Chloride	mg/1	250	7	49.0	20.0	32.7	
Fluoride	mg/1	1.3	3	0.26	0.22	0.24	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	60	30	--	
Total Iron	ug/1	-	3	3300	1700	2580	
Lead[5]	ug/1	40	3	16	10	--	
Manganese[5]	ug/1	-	3	160	70	123	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	80	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	76	67	71.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River below Quincy

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-		--	--	--	
Temperature	°C	*	1	23.0	23.0	23.0	
pH	S.U.	6.0-9.0	1	7.9	7.9	7.9	
NH-3-N	mg/1	-	2	0.20	0.05	0.12	
TKN-N	mg/1	-	1	0.3	0.3	0.3	
Nitrate	mg/1	-	1	0.60	0.60	0.60	
Total Phosphorous	mg/1	-	1	0.19	0.19	0.19	
BOD_5	mg/1	-	2	5.7	3.2	4.4	
D.O.	% Saturation		1	109.2	109.2	109.2	
D.O.	mg/1	5.0	1	9.5	9.5	9.5	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	2	32	25	29	
TOC	mg/1	-	1	11.0	11.0	11.0	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	460	110	187	1
Fecal Strep.	#/100 ml	-	2	690	47	180	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	2	740	550	645	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Stoney Creek Near DeGraff

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	3	120	43	73	
Temperature	°C	*	8	19.0	6.0	12.9	
pH	S.U.	6.0-9.0	8	8.5	7.6	7.9	
NH-3-N	mg/1	-	9	0.26	0.04	0.11	
TKN-N	mg/1	-	7	0.6	0.3	0.4	
Nitrate	mg/1	-	7	3.90	0.65	1.75	
Total Phosphorous	mg/1	-	8	1.00	0.05	0.21	
BOD_5	mg/1	-	9	4.0	1.1	2.2	
D.O.	% Saturation		8	118.0	73.6	96.9	
D.O.	mg/1	5.0	8	13.2	8.6	10.3	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	4	85	10	37	
TOC	mg/1	-	7	27.0	1.0	6.9	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	8	4700	18	441	6
Fecal Strep.	#/100 ml	-	7	15000	52	1055	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	9	820	395	627	
Turbidity	J.U.	-	2	6.00	3.10	4.55	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	1	10.0	10.0	10.0	
Fluoride	mg/1	1.3	1	0.39	0.39	0.39	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	1	75.0	75.0	75.0	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Miami River at Lakeview

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	11	25.0	2.0	12.5	
pH	S.U.	6.0-9.0	11	8.6	7.6	8.0	
NH-3-N	mg/1	-	11	0.59	0.05	0.24	
TKN-N	mg/1	-	9	1.3	0.4	0.8	
Nitrate	mg/1	-	11	11.64	0.10	2.15	
Total Phosphorous	mg/1	-	10	0.29	0.10	0.13	
BOD_5	mg/1	-	11	6.0	1.6	3.1	
D.O.	% Saturation		11	102.7	44.8	84.8	
D.O.	mg/1	5.0	11	12.6	3.9	9.4	1
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	10	93	10	38	
TOC	mg/1	-	11	23.0	1.0	7.5	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	10	4900	13	552	7
Fecal Strep.	#/100 ml	-	8	26000	22	1312	
MBAS	mg/1	0.5	7	0.22	0.05	0.10	
Conductivity	Micromhos	-	10	780	450	581	
Turbidity	J.U.	-	11	63.00	1.60	16.38	
Total Hardness	mg/1	-	4	332	266	300	
Phenols	ug/1	10	8	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	8	0.01	0.01	--	
Chloride	mg/1	250	9	38.0	16.0	22.7	
Fluoride	mg/1	1.3	5	0.35	0.25	0.29	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	10	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	50	30	--	
Total Iron	ug/1	-	4	3540	420	2165	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	120	70	85	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	40	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	5	87.0	66.0	75.0	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mill Creek At Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	12.	25.0	0.5	14.7	
pH	S.U.	6.0-9.0	11	8.3	7.1	7.4	
NH-3-N	mg/1	-	12	15.30	1.07	3.55	
TKN-N	mg/1	-	11	20.2	1.6	5.8	
Nitrate	mg/1	-	12	1.33	0.05	0.56	
Total Phosphorous	mg/1	-	10	3.90	0.48	1.54	
BOD_5	mg/1	-	11	210.0	2.2	47.5	
D.O.	% Saturation		12	91.9	9.3	36.3	
D.O.	mg/1	5.0	12	13.0	0.8	4.1	9
Dissolved Solids	mg/1	1500	2	520	433	477	
Suspended Solids[5]	mg/1	-	12	211	10	56	
TOC	mg/1	-	12	80.0	10.0	25.3	
Oil-Grease	mg/1	5	5	4900	2.7	113.8	4
Fecal Coliform	#/100 ml	200	10	1100000	23000	425139	10
Fecal Strep.	#/100 ml	-	5	210000	6800	59899	
MBAS	mg/1	0.5	10	2.20	0.22	0.61	3
Conductivity	Micromhos	-	13	1050	292	702	
Turbidity	J.U.	-	12	65.00	4.00	18.97	
Total Hardness	mg/1	-	8	344	152	258	
Phenols	ug/1	10	9	155.0	4.0	49.4	7
Cyanide[5]	mg/1	0.2	9	0.07	0.01	0.03	
Chloride	mg/1	250	10	125.0	38.0	68.7	
Fluoride	mg/1	1.3	10	0.46	0.05	0.29	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	8	10	5	--	
Total Chromium[5]	ug/1	300	8	250	30	--	
Copper[5]	ug/1	*	8	310	30	--	
Total Iron	ug/1	-	4	4060	1140	2302	
Lead[5]	ug/1	40	8	690	10	--	3
Manganese[5]	ug/1	-	2	290	220	255	
Mercury[5]	ug/1	0.5	8	1.0	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	8	740	40	225	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	5	111.0	78.0	93.4	
Hex. Chromium[5]	ug/1	50	2	40	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mill Creek near Cumminsville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	3	23.0	15.0	20.0	
pH	S.U.	6.0-9.0	3	7.80	7.7	7.7	
NH-3-N	mg/1	-	4	1.90	1.13	1.51	
TKN-N	mg/1	-	3	2.3	1.8	2.1	
Nitrate	mg/1	-	3	0.68	0.37	0.55	
Total Phosphorous	mg/1	-	3	0.97	0.51	0.75	
BOD_5	mg/1	-	4	15.2	3.5	6.7	
D.O.	% Saturation		3	114.9	42.0	71.3	
D.O.	mg/1	5.0	3	10.0	3.7	6.5	1
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	3	10	10	10	
TOC	mg/1	-	3	9.0	4.0	7.0	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	65000	30000	38819	3
Fecal Strep.	#/100 ml	-	2	37000	10000	19235	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	4	770	660	690	
Turbidity	J.U.	-	1	4.90	4.90	4.90	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mill Creek At Carthage

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	300	300	300	
Temperature	°C	*	11	24.0	1.0	14.6	
pH	S.U.	6.0-9.0	9	8.6	7.3	7.9	
NH-3-N	mg/1	-	11	0.61	0.09	0.28	
TKN-N	mg/1	-	11	1.0	0.3	0.7	
Nitrate	mg/1	-	9	0.76	0.13	0.43	
Total Phosphorous	mg/1	-	11	0.62	0.17	0.38	
BOD_5	mg/1	-	11	33.0	2.3	7.0	
D.O.	% Saturation		11	129.3	66.7	90.9	
D.O.	mg/1	5.0	11	15.0	5.8	9.7	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	4	216	10	92	
TOC	mg/1	-	11	22.0	1.0	9.7	
Oil-Grease	mg/1	5	2	6.9	3.8	5.3	1
Fecal Coliform	#/100 ml	200	10	86000	500	4453	10
Fecal Strep.	#/100 ml	-	4	2000	300	743	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	11	3000	254	814	
Turbidity	J.U.	-	2	60.00	3.00	31.50	
Total Hardness	mg/1	-	1	182	182	182	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	1	0.19	0.19	0.19	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	1	130	130	130	1
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	1	1.0	1.0	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	1	90	90	90	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

West Fork-Mill Creek At Arlington Ht.

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	12	22.0	0.5	12.6	
pH	S.U.	6.0-9.0	10	8.6	7.4	7.9	
NH-3-N	mg/1	-	11	0.69	0.05	0.23	
TKN-N	mg/1	-	11	1.1	0.3	0.7	
Nitrate	mg/1	-	9	0.82	0.01	0.33	
Total Phosphorous	mg/1	-	11	0.80	0.10	0.26	
BOD_5	mg/1	-	11	18.6	1.4	5.0	
D.O.	% Saturation		12	115.6	45.2	86.2	
D.O.	mg/1	5.0	12	15.0	4.6	9.6	2
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	4	326	10	135	
TOC	mg/1	-	11	20.0	1.0	7.5	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	9	11000	680	4147	9
Fecal Strep.	#/100 ml	-	6	14000	190	1053	
MBAS	mg/1	0.5	1	0.80	0.80	0.80	1
Conductivity	Micromhos	-	10	620	270	457	
Turbidity	J.U.	-	3	155.00	5.00	57.33	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	1	21.00	21.00	21.00	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Sharon Creek At Sharonville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	9	25.0	1.0	15.4	
pH	S.U.	6.0-9.0	8	8.8	7.7	8.2	
NH-3-N	mg/1	-	9	0.52	0.08	0.24	
TKN-N	mg/1	-	9	1.7	0.3	0.7	
Nitrate	mg/1	-	7	0.28	0.05	0.10	
Total Phosphorous	mg/1	-	9	0.40	0.10	0.28	
BOD_5	mg/1	-	9	8.1	2.5	4.3	
D.O.	% Saturation		9	163.6	85.6	107.4	
D.O.	mg/1	5.0	9	15.0	7.5	11.1	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	3	113	19	64	
TOC	mg/1	-	9	22.0	4.0	9.4	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	10	4300	4	85	5
Fecal Strep.	#/100 ml	-	5	310	13	98	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	9	730	168	505	
Turbidity	J.U.	-	1	13.00	13.00	13.00	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mill Creek At Sharonville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	10	20.0	0.0	11.1	
pH	S.U.	6.0-9.0	10	8.3	7.6	7.9	
NH-3-N	mg/1	-	12	0.61	0.12	0.31	
TKN-N	mg/1	-	12	2.0	0.3	1.0	
Nitrate	mg/1	-	12	1.70	0.23	1.13	
Total Phosphorous	mg/1	-	10	2.30	0.30	1.05	
BOD_5	mg/1	-	11	13.0	2.1	4.9	
D.O.	% Saturation		10	138.9	52.9	92.4	
D.O.	mg/1	5.0	10	15.0	5.4	10.5	
Dissolved Solids	mg/1	1500	4	434	335	385	
Suspended Solids[5]	mg/1	-	12	766	10	90	
TOC	mg/1	-	12	29.0	1.0	9.2	
Oil-Grease	mg/1	5	3	10.1	1.9	--	1
Fecal Coliform	#/100 ml	200	10	3900	330	1013	10
Fecal Strep.	#/100 ml	-	6	9400	71	1341	
MBAS	mg/1	0.5	7	0.27	0.09	0.15	
Conductivity	Micromhos	-	10	890	200	646	
Turbidity	J.U.	-	11	340.00	2.70	48.10	
Total Hardness	mg/1	-	6	330	104	261	
Phenols	ug/1	10	9	19.0	2.0	--	1
Cyanide[5]	mg/1	0.2	9	0.01	0.01	--	
Chloride	mg/1	250	10	87.0	13.0	49.1	
Fluoride	mg/1	1.3	6	1.05	0.15	0.51	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	3	400	200	--	
Cadmium[5]	ug/1	5	6	10	5	--	
Total Chromium[5]	ug/1	300	6	50	30	--	
Copper[5]	ug/1	*	6	40	30	--	
Total Iron	ug/1	-	4	1280	460	798	
Lead[5]	ug/1	40	6	170	10	--	1
Manganese[5]	ug/1	-	3	770	100	340	
Mercury[5]	ug/1	0.5	5	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	6	200	30	--	
Alumium	ug/1	-	1	300	300	300	
Sulfate[5]	mg/1	-	5	80.0	28.0	64.6	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

East Fork Mill Creek near West Chester

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	23.0	1.0	13.4	
pH	S.U.	6.0-9.0	8	8.5	7.8	8.0	
NH-3-N	mg/1	-	9	0.52	0.07	0.17	
TKN-N	mg/1	-	8	1.1	0.3	0.5	
Nitrate	mg/1	-	6	1.18	0.07	0.33	
Total Phosphorous	mg/1	-	7	0.40	0.28	0.33	
BOD_5	mg/1	-	9	2.2	1.1	1.6	
D.O.	% Saturation		8	129.3	85.1	102.8	
D.O.	mg/1	5.0	8	15.0	8.0	11.1	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	2	21	11	16	
TOC	mg/1	-	8	24.0	1.0	6.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	11	850	36	182	6
Fecal Strep.	#/100 ml	-	5	2100	100	430	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	10	850	310	618	
Turbidity	J.U.	-	1	5.60	5.60	5.60	
Total Hardness	mg/1	-	--	--	--		
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mill Creek Near Hamilton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	9	27.0	1.0	16.8	
pH	S.U.	6.0-9.0	7	8.4	7.5	8.0	
NH-3-N	mg/1	-	9	0.38	0.10	0.18	
TKN-N	mg/1	-	8	2.0	0.3	0.9	
Nitrate	mg/1	-	7	0.74	0.05	0.27	
Total Phosphorous	mg/1	-	9	0.40	0.10	0.19	
BOD_5	mg/1	-	9	10.6	1.5	4.5	
D.O.	% Saturation		9	176.5	81.5	129.0	
D.O.	mg/1	5.0	9	18.0	6.6	12.2	
Dissolved Solids	mg/1	1500	-	--	--	--	
Suspended Solids[5]	mg/1	-	5	378	25	105	
TOC	mg/1	-	9	29.0	1.0	10.2	
Oil-Grease	mg/1	5	-	--	--	--	
Fecal Coliform	#/100 ml	200	10	69000	1	448	7
Fecal Strep.	#/100 ml	-	5	1600	43	289	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	10	850	240	518	
Turbidity	J.U.	-	1	24.00	24.00	24.00	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	-	--	--	--	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Miami River at Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	28.0	5.0	14.4	
pH	S.U.	6.0-9.0	10	8.3	7.8	8.0	
NH-3-N	mg/1	-	8	0.52	0.00	0.23	
TKN-N	mg/1	-	8	1.8	0.3	0.6	
Nitrate	mg/1	-	6	2.74	0.13	1.46	
Total Phosphorous	mg/1	-	8	0.74	0.10	0.36	
BOD_5	mg/1	-	8	8.4	0.8	3.6	
D.O.	% Saturation		8	137.0	75.8	94.8	
D.O.	mg/1	5.0	8	12.0	7.4	9.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	--	--	--	--	
TOC	mg/1	-	8	22.0	1.0	5.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	4500	32	239	4
Fecal Strep.	#/100 ml	-	4	1600	26	181	
MBAS	mg/1	0.5	1	0.15	0.15	0.15	
Conductivity	Micromhos	-	7	770	275	524	
Turbidity	J.U.	-	1	17.0	17.0	17.0	
Total Hardness	mg/1	-	1	336	336	336	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	56.0	56.0	56.0	
Fluoride	mg/1	1.3	1	0.21	0.21	0.21	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	670	670	670	
Lead[5]	ug/1	40	1	12	12	12	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	1	1.0	1.0	1.0	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	56.0	56.0	56.0	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Duck Creek at Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	8	28.0	0.0	14.3	
pH	S.U.	6.0-9.0	10	9.1	7.0	7.7	1
NH-3-N	mg/1	-	9	6.15	0.00	1.38	
TKN-N	mg/1	-	8	16.7	0.4	4.0	
Nitrate	mg/1	-	6	3.34	.05	.98	
Total Phosphorous	mg/1	-	8	2.60	.20	1.15	
BOD_5	mg/1	-	9	244.0	2.1	32.1	
D.O.	% Saturation		8	147.1	14.8	70.7	
D.O.	mg/1	5.0	8	15.0	1.6	7.5	3
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	2	90	10	50	
TOC	mg/1	-	8	168.0	1.0	29.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	730000	14	2650	7
Fecal Strep.	#/100 ml	-	4	14000	55	691	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	8	1800	590	879	
Turbidity	J.U.	-	1	1.90	1.90	1.90	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	130.0	130.0	130.0	
Fluoride	mg/1	1.3	1	.24	.24	.24	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	145.0	145.0	145.0	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

East Fork Little Miami River near Milford

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	11	26.0	1.0	13.8	
pH	S.U.	6.0-9.0	12	8.0	5.7	7.5	1
NH-3-N	mg/1	-	11	0.64	0.03	0.29	
TKN-N	mg/1	-	9	1.3	0.3	0.5	
Nitrate	mg/1	-	10	2.65	0.47	1.15	
Total Phosphorous	mg/1	-	9	2.64	0.20	0.65	
BOD_5	mg/1	-	10	4.0	1.1	2.6	
D.O.	% Saturation		11	134.1	79.2	96.1	
D.O.	mg/1	5.0	11	14.2	8.1	10.2	
Dissolved Solids	mg/1	1500	1	276	276	276	
Suspended Solids[5]	mg/1	-	9	130	10	46	
TOC	mg/1	-	10	29.0	1.0	8.7	
Oil-Grease	mg/1	5	4	5.0	0.3	--	
Fecal Coliform	#/100 ml	200	9	2900	25	348	5
Fecal Strep.	#/100 ml	-	7	1100	28	191	
MBAS	mg/1	0.5	8	0.11	0.06	0.09	
Conductivity	Micromhos	-	10	750	170	471	
Turbidity	J.U.	-	10	92.0	1.40	26.78	
Total Hardness	mg/1	-	4	292	236	260	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	9	0.01	0.01	--	
Chloride	mg/1	250	10	31.0	10.0	22.8	
Fluoride	mg/1	1.3	5	0.22	0.15	0.18	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	10	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	5	70	30	--	
Total Iron	ug/1	-	5	1350	500	810	
Lead[5]	ug/1	40	4	20	10	--	
Manganese[5]	ug/1	-	5	150	80	114	
Mercury[5]	ug/1	0.5	4	0.5	0.5	0.5	
Selenium[5]	ug/1	5	5	10	10	--	
Silver[5]	ug/1	1	5	30	30	--	
Zinc	ug/1	*	5	70	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	72.0	53.0	61.8	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Miami River at Milford

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	10	2800	198	659	
Temperature	°C	*	11	26.0	0.5	14.8	
pH	S.U.	6.0-9.0	11	8.5	7.5	7.9	
NH-3-N	mg/1	-	10	0.43	0.08	0.27	
TKN-N	mg/1	-	9	1.8	0.3	0.6	
Nitrate	mg/1	-	11	4.25	0.44	2.09	
Total Phosphorous	mg/1	-	10	1.89	0.10	0.56	
BOD_5	mg/1	-	8	6.3	1.0	2.8	
D.O.	% Saturation		11	140.2	68.0	99.9	
D.O.	mg/1	5.0	11	14.6	6.6	10.3	
Dissolved Solids	mg/1	1500	1	404	404	404	
Suspended Solids[5]	mg/1	-	9	66	10	29	
TOC	mg/1	-	10	28.0	1.0	5.8	
Oil-Grease	mg/1	5	4	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	9	2700	4	153	5
Fecal Strep.	#/100 ml	-	8	780	42	287	
MBAS	mg/1	0.5	8	0.15	0.06	0.10	
Conductivity	Micromhos	-	9	900	245	671	
Turbidity	J.U.	-	10	32	2.20	11.28	
Total Hardness	mg/1	-	4	350	304	331	
Phenols	ug/1	10	9	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.05	0.01	--	
Chloride	mg/1	250	10	65.0	26.0	44.0	
Fluoride	mg/1	1.3	5	0.41	0.20	0.26	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	300	200	--	
Cadmium[5]	ug/1	5	4	10	10	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	310	30	--	
Total Iron	ug/1	-	4	820	130	513	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	100	40	60	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	60.0	54.0	56.2	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Miami River near Morrow

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--			
Temperature	°C	*	4	28.0	13.0	20.5	
pH	S.U.	6.0-9.0	6	8.3	7.8	8.1	
NH-3-N	mg/1	-	4	0.27	0.10	0.17	
TKN-N	mg/1	-	4	0.9	0.4	0.5	
Nitrate	mg/1	-	4	1.80	1.03	1.52	
Total Phosphorous	mg/1	-	4	0.50	0.20	0.39	
BOD_5	mg/1	-	4	6.3	2.0	4.0	
D.O.	% Saturation		4	134.2	76.0	112.7	
D.O.	mg/1	5.0	4	13.0	7.6	10.3	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	--	--	--	--	
TOC	mg/1	-	4	27.0	6.0	12.5	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	190	18	85	
Fecal Strep.	#/100 ml	-	2	620	200	352	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	4	740	425	645	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40 --	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Miami River near Foster

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	5	25.0	13.0	20.4	
pH	S.U.	6.0-9.0	4	8.4	7.9	8.1	
NH-3-N	mg/1	-	5	0.46	0.07	0.18	
TKN-N	mg/1	-	4	1.3	0.3	0.6	
Nitrate	mg/1	-	5	3.52	1.44	1.91	
Total Phosphorous	mg/1	-	5	0.61	0.05	0.32	
BOD_5	mg/1	-	3	4.3	2.2	3.0	
D.O.	% Saturation		5	138.1	88.7	118.3	
D.O.	mg/1	5.0	5	11.6	9.4	10.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	5	34	11	22	
TOC	mg/1	-	5	25.0	1.0	14.2	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	4	1400	18	371	3
Fecal Strep.	#/100 ml	-	3	620	130	285	
MBAS	mg/1	0.5	4	0.13	0.05	0.08	
Conductivity	Micromhos	-	5	900	700	786	
Turbidity	J.U.	-	5	17.0	1.60	9.06	
Total Hardness	mg/1	-	2	344	332	338	
Phenols	ug/1	10	5	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	5	0.01	0.01	--	
Chloride	mg/1	250	5	53.0	41.0	47.2	
Fluoride	mg/1	1.3	2	0.26	0.19	0.22	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	30	30	--	
Total Iron	ug/1	-	2	370	310	340	
Lead[5]	ug/1	40	2	10	10	--	
Manganese[5]	ug/1	-	2	50	40	45	
Mercury[5]	ug/1	0.5	2	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	64.0	46.0	55.0	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Todd Fork at Morrow

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	29.0	3.0	14.9	
pH	S.U.	6.0-9.0	10	8.5	7.7	8.0	
NH-3-N	mg/1	-	8	0.70	0.00	0.23	
TKN-N	mg/1	-	8	0.8	0.3	0.5	
Nitrate	mg/1	-	6	2.58	0.05	0.63	
Total Phosphorous	mg/1	-	8	0.60	0.10	0.30	
BOD_5	mg/1	-	8	5.5	0.7	3.1	
D.O.	% Saturation		8	124.4	85.0	103.6	
D.O.	mg/1	5.0	8	14.0	7.6	10.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	--	--	--	--	
TOC	mg/1	-	8	12.0	1.0	5.6	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	280	1	62	3
Fecal Strep.	#/100 ml	-	4	3100	4	215	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	7	600	218	426	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Caesar Creek near Oregonia

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	9	27.0	2.0	14.5	
pH	S.U.	6.0-9.0	11	8.3	7.4	8.0	
NH-3-N	mg/l	-	9	0.60	0.00	0.19	
TKN-N	mg/l	-	9	0.9	0.3	0.4	
Nitrate	mg/l	-	7	2.93	0.10	0.78	
Total Phosphorous	mg/l	-	9	0.10	0.05	1.08	
BOD_5	mg/l	-	9	3.2	0.8	1.8	
D.O.	% Saturation		9	122.2	83.0	103.1	
D.O.	mg/l	5.0	9	15.0	8.4	10.8	
Dissolved Solids	mg/l	1500	--	--	--	--	
Suspended Solids[5]	mg/l	-	1	34	34	34	
TOC	mg/l	-	9	13.0	1.0	4.3	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	230	18	66	1
Fecal Strep.	#/100 ml	-	4	290	77	145	
MBAS	mg/l	0.5	--	--	--	--	
Conductivity	Micromhos	-	8	650	250	479	
Turbidity	J.U.	-	1	8.10	8.10	8.10	
Total Hardness	mg/l	-	--	--	--	--	
Phenols	ug/l	10	--	--	--	--	
Cyanide[5]	mg/l	0.2	--	--	--	--	
Chloride	mg/l	250	1	22.0	22.0	22.0	
Fluoride	mg/l	1.3	1	0.22	0.22	0.22	
Arsenic[5]	ug/l	50	--	--	--	--	
Barium[5]	ug/l	800	--	--	--	--	
Cadmium[5]	ug/l	5	--	--	--	--	
Total Chromium[5]	ug/l	300	--	--	--	--	
Copper[5]	ug/l	*	--	--	--	--	
Total Iron	ug/l	-	--	--	--	--	
Lead[5]	ug/l	40	--	--	--	--	
Manganese[5]	ug/l	-	--	--	--	--	
Mercury[5]	ug/l	0.5	--	--	--	--	
Selenium[5]	ug/l	5	--	--	--	--	
Silver[5]	ug/l	1	--	--	--	--	
Zinc	ug/l	*	--	--	--	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	1	50.0	50.0	50.0	
Hex. Chromium[5]	ug/l	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Miami River Near Spring Valley

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	8	1090	110	318	
Temperature	°C	*	11	21.0	2.0	13.5	
pH	S.U.	6.0-9.0	11	8.3	7.5	7.9	
NH-3-N	mg/1	-	11	.94	.07	.41	
TKN-N	mg/1	-	10	1.5	.3	.8	
Nitrate	mg/1	-	11	3.64	1.62	2.78	
Total Phosphorous	mg/1	-	10	1.13	.30	.61	
BOD_5	mg/1	-	10	6.2	1.0	2.9	
D.O.	% Saturation		11	124.2	77.8	89.7	
D.O.	mg/1	5.0	11	13.0	7.0	9.5	
Dissolved Solids	mg/1	1500	1	484	484	484	
Suspended Solids[5]	mg/1	-	9	1100	10	142	
TOC	mg/1	-	10	24.0	.1	9.5	
Oil-Grease	mg/1	5	4	5.0	.5	--	
Fecal Coliform	#/100 ml	200	8	22000	130	956	7
Fecal Strep.	#/100 ml	-	7	11000	86	806	
MBAS	mg/1	0.5	8	.15	.05	.11	
Conductivity	Micromhos	-	9	980	300	716	
Turbidity	J.U.	-	9	620.00	1.80	75.62	
Total Hardness	mg/1	-	4	396	190	332	
Phenols	ug/1	10	9	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	.01	.01	--	
Chloride	mg/1	250	9	60.0	25.0	47.9	
Fluoride	mg/1	1.3	4	.25	.20	.21	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	5	10	10	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	5	40	30	--	
Total Iron	ug/1	-	5	33000	30	6834	
Lead[5]	ug/1	40	5	16	10	--	
Manganese[5]	ug/1	-	4	790	30	--	
Mercury[5]	ug/1	0.5	5	1.0	.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	5	130	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	69.0	31.0	53.7	
Hex. Chromium[5]	ug/1	50	4	65	30	--	1

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Beaver Creek Near Alpha

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	24.0	5.0	13.8	
pH	S.U.	6.0-9.0	9	8.1	7.6	7.7	
NH-3-N	mg/1	-	7	4.53	1.50	3.91	
TKN-N	mg/1	-	7	5.9	2.3	4.5	
Nitrate	mg/1	-	6	1.21	.74	1.05	
Total Phosphorous	mg/1	-	7	4.62	2.20	3.43	
BOD_5	mg/1	-	7	15.4	2.9	9.8	
D.O.	% Saturation		7	90.6	50.9	79.1	
D.O.	mg/1	5.0	7	11.6	5.4	8.1	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	--	--	--	--	
TOC	mg/1	-	7	30.0	1.0	10.6	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	5100	1	234	5
Fecal Strep.	#/100 ml	-	5	12000	12	177	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	8	1140	600	881	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Beaver Creek near Alpha

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	10.0	22.0	3.0	14.0	
pH	S.U.	6.0-9.0	10	8.2	7.4	7.8	
NH-3-N	mg/1	-	10	4.02	0.60	2.46	
TKN-N	mg/1	-	9	5.1	0.9	3.2	
Nitrate	mg/1	-	10	2.90	1.14	1.88	
Total Phosphorous	mg/1	-	9	3.15	0.30	1.80	
BOD_5	mg/1	-	10	11.2	1.0	5.2	
D.O.	% Saturation		10	100.0	74.5	85.8	
D.O.	mg/1	5.0	10	12.4	7.0	9.0	
Dissolved Solids	mg/1	1500	1	10	10	10	
Suspended Solids[5]	mg/1	-	8	664	10	95	
TOC	mg/1	-	10	33.0	0.1	8.8	
Oil-Grease	mg/1	5	4	5.0	0.5	3.9	
Fecal Coliform	#/100 ml	200	9	830	4	28	1
Fecal Strep.	#/100 ml	-	7	1100	5	51	
MBAS	mg/1	0.5	7	0.44	0.12	0.25	
Conductivity	Micromhos	-	11	1300	520	912	
Turbidity	J.U.	-	9	7.60	1.40	4.80	
Total Hardness	mg/1	-	4	400	234	325	
Phenols	ug/1	10	8	8.0	2.0	--	
Cyanide[5]	mg/1	0.2	8	0.09	0.01	--	
Chloride	mg/1	250	9	141.0	40.0	107.4	
Fluoride	mg/1	1.3	5	0.25	0.20	0.22	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	10	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	30	30	--	
Total Iron	ug/1	-	4	1610	130	700	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	120	30	--	
Mercury[5]	ug/1	0.5	4	0.5	0.5	0.5	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	70	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	84.0	56.0	68.2	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Massie Creek near Oldtown

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	22	22	22	
Temperature	°C	*	9	24.0	2.0	12.8	
pH	S.U.	6.0-9.0	12	8.3	7.2	7.8	
NH-3-N	mg/1	-	10	0.45	0.01	0.14	
TKN-N	mg/1	-	9	2.2	0.3	0.6	
Nitrate	mg/1	-	8	4.46	1.70	2.60	
Total Phosphorous	mg/1	-	9	0.60	0.07	0.17	
BOD_5	mg/1	-	10	3.5	1.0	2.1	
D.O.	% Saturation		9	115.3	75.9	101.6	
D.O.	mg/1	5.0	9	14.0	8.2	11.0	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	1	10	10	10	
TOC	mg/1	-	9	20.0	0.1	4.0	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	1100	300	616	8
Fecal Strep.	#/100 ml	-	5	440	150	270	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	680	265	512	
Turbidity	J.U.	-	2	2.00	0.90	1.45	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	29.0	29.0	29.0	
Fluoride	mg/1	1.3	1	0.23	0.23	0.23	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	7800	7800	7800	
Lead[5]	ug/1	40	1	10	10	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	68.0	68.0	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Miami River near Oldtown

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	965	29	227	
Temperature	°C	*	11	20.0	0.0	12.4	
pH	S.U.	6.0-9.0	11	8.8	7.3	8.0	
NH-3-N	mg/1	-	11	0.36	0.00	0.19	
TKN-N	mg/1	-	10	0.8	0.3	0.4	
Nitrate	mg/1	-	11	4.10	1.73	2.63	
Total Phosphorous	mg/1	-	10	0.20	0.09	0.13	
BOD_5	mg/1	-	10	6.6	1.0	1.6	
D.O.	% Saturation		11	123.6	89.7	100.4	
D.O.	mg/1	5.0	11	15.0	8.7	11.0	
Dissolved Solids	mg/1	1500	2	457	449	453	
Suspended Solids[5]	mg/1	-	10	30	10	15	
TOC	mg/1	-	11	31.0	1.0	6.8	
Oil-Grease	mg/1	5	4	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	9	4100	7	190	5
Fecal Strep.	#/100 ml	-	7	2900	63	439	
MBAS	mg/1	0.5	8	0.16	0.05	0.09	
Conductivity	Micromhos	-	10	1600	210	686	
Turbidity	J.U.	-	11	8.30	1.30	4.25	
Total Hardness	mg/1	-	5	408	310	353	
Phenols	ug/1	10	9	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	0.01	0.01	--	
Chloride	mg/1	250	10	26.0	5.0	22.0	
Fluoride	mg/1	1.3	5	0.29	0.23	0.25	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	300	200	--	
Cadmium[5]	ug/1	5	4	10	10	--	
Total Chromium[5]	ug/1	300	4	30	30	-	
Copper[5]	ug/1	*	4	70	30	--	
Total Iron	ug/1	-	4	1280	90	508	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	4	50	30	--	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	6	71.0	52.0	63.2	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Muddy Creek Near Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	23.0	0.0	11.4	
pH	S.U.	6.0-9.0	7	8.8	7.7	8.2	
NH-3-N	mg/1	-	7	.55	.07	.17	
TKN-N	mg/1	-	7	1.2	.3	.5	
Nitrate	mg/1	-	7	1.72	.05	.66	
Total Phosphorous	mg/1	-	7	.60	.20	.43	
BOD_5	mg/1	-	7	2.7	.9	1.9	
D.O.	% Saturation		7	126.6	67.8	96.8	
D.O.	mg/1	5.0	7	16.2	5.9	11.3	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	--	--	--	--	
TOC	mg/1	-	5	20.0	1.0	7.4	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	8600	130	529	7
Fecal Strep.	#/100 ml	-	6	1600	110	352	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	7	1300	550	723	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Five Mile Creek Near Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	23.0	6.5	14.9	
pH	S.U.	6.0-9.0	8	9.0	7.2	8.1	1
NH-3-N	mg/1	-	7	.46	.10	.18	
TKN-N	mg/1	-	7	2.1	.3	.8	
Nitrate	mg/1	-	7	2.48	.40	1.31	
Total Phosphorous	mg/1	-	7	4.17	.40	1.85	
BOD_5	mg/1	-	6	7.6	1.1	2.7	
D.O.	% Saturation		7	172.4	60.8	104.0	
D.O.	mg/1	5.0	7	15.0	5.9	10.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	2	410	10	210	
TOC	mg/1	-	7	16.0	1.0	6.4	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	8	36000	110	947	7
Fecal Strep.	#/100 ml	-	1	92	92	91	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	8	980	365	607	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Four Mile Creek Near Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	0	0	0	
Temperature	°C	*	4	20.0	6.0	13.0	
pH	S.U.	6.0-9.0	5	8.6	7.7	8.1	
NH-3-N	mg/1	-	4	.27	.10	.17	
TKN-N	mg/1	-	4	2.3	.3	.8	
Nitrate	mg/1	-	4	.74	.05	.35	
Total Phosphorous	mg/1	-	4	.54	.10	.21	
BOD_5	mg/1	-	4	3.6	1.2	2.0	
D.O.	% Saturation		4	120.0	96.7	107.6	
D.O.	mg/1	5.0	4	15.0	8.9	11.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	1	275	275	275	
TOC	mg/1	-	4	12.0	1.0	6.5	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	58000	64	1253	2
Fecal Strep.	#/100 ml	-	--	--	--	--	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	6	670	342	479	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Eight Mile Creek Near Cincinnati

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	18.5	1.0	12.1	
pH	S.U.	6.0-9.0	9	8.8	7.1	7.8	
NH-3-N	mg/1	-	8	.44	.08	.16	
TKN-N	mg/1	-	8	1.1	.3	.5	
Nitrate	mg/1	-	7	.86	.10	.37	
Total Phosphorous	mg/1	-	8	.51	.10	.21	
BOD_5	mg/1	-	7	4.5	.8	1.9	
D.O.	% Saturation		8	120.0	27.4	82.6	
D.O.	mg/1	5.0	8	15.0	2.6	9.4	2
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	3	115	10	45	
TOC	mg/1	-	8	17.0	1.0	4.4	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	16000	4	79	2
Fecal Strep.	#/100 ml	-	3	150	10	44	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	890	325	544	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Nine Mile Creek near Palestine

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	19.0	5.0	13.0	
pH	S.U.	6.0-9.0	7	8.6	7.8	8.1	
NH-3-N	mg/l	-	7	0.36	0.10	0.16	
TKN-N	mg/l	-	6	1.4	0.3	0.5	
Nitrate	mg/l	-	6	0.70	0.09	0.36	
Total Phosphorous	mg/l	-	5	4.31	0.17	1.02	
BOD_5	mg/l	-	6	6.8	1.0	2.4	
D.O.	% Saturation		6	117.2	83.2	99.7	
D.O.	mg/l	5.0	6	15.0	7.9	10.9	
Dissolved Solids	mg/l	1500	--	--	--	--	
Suspended Solids[5]	mg/l	-	2	2625	22	1324	
TOC	mg/l	-	6	25.0	1.0	5.8	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	7	19000	1	458	6
Fecal Strep.	#/100 ml	-	1	1500	1500	1500	
MBAS	mg/l	0.5	--	--	--	--	
Conductivity	Micromhos	-	7	800	280	538	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/l	-	--	--	--	--	
Phenols	ug/l	10	--	--	--	--	
Cyanide[5]	mg/l	0.2	--	--	--	--	
Chloride	mg/l	250	--	--	--	--	
Fluoride	mg/l	1.3	--	--	--	--	
Arsenic[5]	ug/l	50	--	--	--	--	
Barium[5]	ug/l	800	--	--	--	--	
Cadmium[5]	ug/l	5	--	--	--	--	
Total Chromium[5]	ug/l	300	--	--	--	--	
Copper[5]	ug/l	*	--	--	--	--	
Total Iron	ug/l	-	--	--	--	--	
Lead[5]	ug/l	40	--	--	--	--	
Manganese[5]	ug/l	-	--	--	--	--	
Mercury[5]	ug/l	0.5	--	--	--	--	
Selenium[5]	ug/l	5	--	--	--	--	
Silver[5]	ug/l	1	--	--	--	--	
Zinc	ug/l	*	--	--	--	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	--	--	--	--	
Hex. Chromium[5]	ug/l	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Ten Mile Creek Near Palestine

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	19.5	5.0	13.7	
pH	S.U.	6.0-9.0	8	8.3	7.6	7.9	
NH-3-N	mg/1	-	7	.24	.10	.14	
TKN-N	mg/1	-	7	.4	.3	.3	
Nitrate	mg/1	-	7	.55	.05	.15	
Total Phosphorous	mg/1	-	7	.69	.05	.17	
BOD_5	mg/1	-	6	2.6	1.0	1.6	
D.O.	% Saturation		7	110.2	80.0	95.8	
D.O.	mg/1	5.0	7	14.1	7.6	10.2	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	1	10	10	10	
TOC	mg/1	-	7	34.0	1.0	7.3	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	7	2100	110	343	4
Fecal Strep.	#/100 ml	-	1	210	210	209	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	8	640	270	467	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Twelve Mile Creek near Richmond

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	9	20.0	1.0	12.9	
pH	S.U.	6.0-9.0	10	8.1	7.5	7.8	
NH-3-N	mg/l	-	10	0.33	0.10	0.15	
TKN-N	mg/l	-	9	0.6	0.2	0.4	
Nitrate	mg/l	-	8	0.69	0.08	0.23	
Total Phosphorous	mg/l	-	8	0.74	0.05	0.17	
BOD_5	mg/l	-	8	2.8	1.2	1.8	
D.O.	% Saturation		9	104.7	48.5	87.0	
D.O.	mg/l	5.0	9	14.3	4.7	9.6	1
Dissolved Solids	mg/l	1500	--	--	--	--	
Suspended Solids[5]	mg/l	-	4	115	10	68	
TOC	mg/l	-	8	9.0	1.0	5.0	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	6800	57	603	7
Fecal Strep.	#/100 ml	-	3	710	66	284	
MBAS	mg/l	0.5	--	--	--	--	
Conductivity	Micromhos	-	10	535	220	410	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/l	-	--	--	--	--	
Phenols	ug/l	10	--	--	--	--	
Cyanide[5]	mg/l	0.2	--	--	--	--	
Chloride	mg/l	250	--	--	--	--	
Fluoride	mg/l	1.3	--	--	--	--	
Arsenic[5]	ug/l	50	--	--	--	--	
Barium[5]	ug/l	800	--	--	--	--	
Cadmium[5]	ug/l	5	--	--	--	--	
Total Chromium[5]	ug/l	300	--	--	--	--	
Copper[5]	ug/l	*	--	--	--	--	
Total Iron	ug/l	-	--	--	--	--	
Lead[5]	ug/l	40	--	--	--	--	
Manganese[5]	ug/l	-	--	--	--	--	
Mercury[5]	ug/l	0.5	--	--	--	--	
Selenium[5]	ug/l	5	--	--	--	--	
Silver[5]	ug/l	1	--	--	--	--	
Zinc	ug/l	*	--	--	--	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	--	--	--	--	
Hex. Chromium[5]	ug/l	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Indian Creek at Point Pleasant

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	22.0	1.0	12.7	
pH	S.U.	6.0-9.0	9	8.3	7.4	7.9	
NH-3-N	mg/1	-	8	0.35	0.10	0.15	
TKN-N	mg/1	-	8	0.7	0.3	0.4	
Nitrate	mg/1	-	7	0.76	0.05	0.20	
Total Phosphorous	mg/1	-	8	1.15	0.05	0.22	
BOD_5	mg/1	-	7	6.0	1.0	2.0	
D.O.	% Saturation		8	113.0	94.7	104.6	
D.O.	mg/1	5.0	8	14.3	8.9	11.4	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	3	1020	10	356	
TOC	mg/1	-	8	51.0	1.0	9.1	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	9200	14	126	3
Fecal Strep.	#/100 ml	-	3	180	32	67	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	500	212	361	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	---	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Bear Creek near Chilo

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	19.0	3.0	12.8	
pH	S.U.	6.0-9.0	8	8.3	7.5	7.9	
NH-3-N	mg/1	-	7	0.17	0.10	0.11	
TKN-N	mg/1	-	6	0.4	0.3	0.3	
Nitrate	mg/1	-	6	0.78	0.05	0.27	
Total Phosphorous	mg/1	-	6	0.20	0.06	0.12	
BOD_5	mg/1	-	7	2.1	1.0	1.6	
D.O.	% Saturation		6	110.2	85.3	97.9	
D.O.	mg/1	5.0	6	14.6	8.1	10.7	
Dissolved Solids	mg/1	1500	--	--	--	--	
Suspended Solids[5]	mg/1	-	1	10	10	10	
TOC	mg/1	-	6	8.0	1.0	3.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	7	1200	1	76	3
Fecal Strep.	#/100 ml	-	1	51	51	51	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	590	220	472	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3 -	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Bullskin Creek near Rural

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	21.0	0.0	11.9	
pH	S.U.	6.0-9.0	8	8.4	7.6	7.9	
NH-3-N	mg/1	-	7	0.31	0.10	0.16	
TKN-N	mg/1	-	7	0.5	0.3	0.4	
Nitrate	mg/1	-	6	0.84	0.05	0.27	
Total Phosphorous	mg/1	-	7	0.10	0.05	0.08	
BOD_5	mg/1	-	7	2.1	0.9	1.4	
D.O.	% Saturation		7	116.8	93.8	105.0	
D.O.	mg/1	5.0	7	14.6	8.6	11.7	
Dissolved Solids	mg/1	1500 -	--	--	--	--	
Suspended Solids[5]	mg/1	-	2	10	10	10	
TOC	mg/1	-	7	9.0	1.0	2.9	
Oil-Grease	mg/1	5	--	---	--	--	
Fecal Coliform	#/100 ml	200	8	2600	4	98	3
Fecal Strep.	#/100 ml	-	2	270	166	211	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	9	525	180	360	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	---	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Maumee River at Waterville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	25	68500	169	23142	
Temperature	°C	*	15	29.0	0.0	8.7	
pH	S.U.	6.0-9.0	10	11.9	7.4	8.7	2
NH-3-N	mg/1	-	22	1.59	0.06	0.48	
TKN-N	mg/1	-	21	2.2	0.3	1.1	
Nitrate	mg/1	-	22	9.85	0.95	3.54	
Total Phosphorous	mg/1	-	22	0.70	0.06	0.30	
BOD_5	mg/1	-	11	12.4	4.2	6.8	
D.O.	% Saturation		14	175.3	81.6	104.9	
D.O.	mg/1	5.0	14	17.0	10.2	12.1	
Dissolved Solids	mg/1	1500	22	469	205	321	
Suspended Solids[5]	mg/1	-	23	720	21	213	
TOC	mg/1	-	10	19.0	8.0	12.4	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	12	2000	1	108	5
Fecal Strep.	#/100 ml	-	6	9100	70	305	
MBAS	mg/1	0.5	10	0.38	0.05	0.18	
Conductivity	Micromhos	-	12	709	401	581	
Turbidity	J.U.	-	10	168.00	2.80	43.88	
Total Hardness	mg/1	-	4	322	174	263	
Phenols	ug/1	10	1	3.0	3.0	3.0	
Cyanide[5]	mg/1	0.2	1	0.01	0.01	--	
Chloride	mg/1	250	22	48.0	19.0	30.1	
Fluoride	mg/1	1.3	8	0.46	0.17	0.29	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	60	30	--	
Total Iron	ug/1	-	10	26000	610	13532	
Lead[5]	ug/1	40	3	18	10	--	
Manganese[5]	ug/1	-	3	110	60	83	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	70	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	7	110.0	38.0	77.9	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Maumee River At Florida-County Rd. 18

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	1020	1020	1020	
Temperature	°C	*	10	25.0	0.0	11.9	
pH	S.U.	6.0-9.0	9	8.7	7.3	7.9	
NH-3-N	mg/1	-	12	0.79	0.05	0.26	
TKN-N	mg/1	-	11	2.6	0.3	1.0	
Nitrate	mg/1	-	12	17.50	0.99	4.70	
Total Phosphorous	mg/1	-	11	0.90	0.10	0.29	
BOD_5	mg/1	-	10	10.0	2.4	4.3	
D.O.	% Saturation		9	109.6	75.3	90.2	
D.O.	mg/1	5.0	9	13.0	6.4	10.4	
Dissolved Solids	mg/1	1500	12	494	200	376	
Suspended Solids[5]	mg/1	-	12	268	28	91	
TOC	mg/1	-	11	21.0	5.0	12.0	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	11	1800	1	110	5
Fecal Strep.	#/100 ml	-	6	720	1	113	
MBAS	mg/1	0.5	11	0.42	0.05	0.19	
Conductivity	Micromhos	-	11	740	317	589	
Turbidity	J.U.	-	11	180.00	7.50	54.74	
Total Hardness	mg/1	-	4	298	186	252	
Phenols	ug/1	10	2	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	8	42.0	21.0	33.1	
Fluoride	mg/1	1.3	8	0.59	0.16	0.32	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	50	30	--	
Total Iron	ug/1	-	4	11400	1870	4590	
Lead[5]	ug/1	40	4	13	10	--	
Manganese[5]	ug/1	-	4	120	90	105	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	60	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	4	91.0	49.0	76.5	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Auglaize River near Defiance

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	11	1170	42	378	
Temperature	°C	*	11	22.0	2.0	10.7	
pH	S.U.	6.0-9.0	8	8.7	7.4	7.9	
NH-3-N	mg/1	-	20	0.60	0.06	0.37	
TKN-N	mg/1	-	19	2.4	0.3	1.2	
Nitrate	mg/1	-	20	13.50	0.98	4.68	
Total Phosphorous	mg/1	-	20	1.00	0.10	0.33	
BOD_5	mg/1	-	9	10.1	2.4	5.5	
D.O.	% Saturation		11	168.4	39.8	97.8	
D.O.	mg/1	5.0	11	16.0	3.5	10.9	1
Dissolved Solids	mg/1	1500	19	626	208	381	
Suspended Solids[5]	mg/1	-	19	1300	10	309	
TOC	mg/1	-	11	27	3.0	10.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	2030	20	76	2
Fecal Strep.	#/100 ml	-	6	10000	1	142	
MBAS	mg/1	0.5	11	1.10	0.10	0.27	1
Conductivity	Micromhos	-	11	1200	283	721	
Turbidity	J.U.	-	10	248	7.30	45.03	
Total Hardness	mg/1	-	6	388	134	285	
Phenols	ug/1	10	2	4.0	4.0	4.0	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	18	84.0	19.0	35.9	
Fluoride	mg/1	1.3	4	0.70	0.16	0.42	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	40	30	--	
Copper[5]	ug/1	*	5	70	30	--	
Total Iron	ug/1	-	10	34000	700	14923	
Lead[5]	ug/1	40	4	18	10	--	
Manganese[5]	ug/1	-	4	400	60	155	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	5	160	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	179.0	42.0	119.5	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Auglaize River at Oakwood

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	4	22.0	10.3	15.3	
pH	S.U.	6.0-9.0	5	8.7	7.80	8.3	
NH-3-N	mg/1	-	3	.16	.06	.12	
TKN-N	mg/1	-	3	.8	.6	.7	
Nitrate	mg/1	-	3	6.75	2.50	5.01	
Total Phosphorous	mg/1	-	3	0.22	0.20	0.21	
BOD_5	mg/1	-	5	10.8	3.7	6.5	
D.O.	% Saturation		4	122.6	78.0	92.2	
D.O.	mg/1	5.0	4	13.0	7.0	9.4	
Dissolved Solids	mg/1	1500	5	744	430	516	
Suspended Solids[5]	mg/1	-	5	72	30	55	
TOC	mg/1	-	3	12.0	1.0	4.7	
Oil-Grease	mg/1	5					
Fecal Coliform	#/100 ml	200	5	120	30	75	
Fecal Strep.	#/100 ml	-	4	80	20	41	
MBAS	mg/1	0.5	3	0.29	0.05	0.15	
Conductivity	Micromhos	-	5	1180	685	890	
Turbidity	J.U.	-	3	11.0	4.60	7.33	
Total Hardness	mg/1	-	1	319	319	319	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	2	43.0	36.0	39.5	
Fluoride	mg/1	1.3	1	0.34	0.34	0.34	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	2150	2150	2150	
Lead[5]	ug/1	40	1	15	15	15	
Manganese[5]	ug/1	-	1	100	100	100	
Mercury[5]	ug/1	0.5	1	0.5	0.5	--	
Selenium[5]	ug/1	5	1	10	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	1	40	40	--	
Alumium	ug/1	-	---	---	---	---	
Sulfate[5]	mg/1	-	1	108.0	108.0	108.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Blanchard River above DuPont

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	9	22.0	1.0	10.1	
pH	S.U.	6.0-9.0	9	8.50	6.50	7.81	
NH-3-N	mg/1	-	14	1.50	0.05	0.40	
TKN-N	mg/1	-	14	2.9	0.3	0.9	
Nitrate	mg/1	-	14	6.25	0.05	3.71	
Total Phosphorous	mg/1	-	14	0.80	0.20	0.42	
BOD_5	mg/1	-	11	11.0	2.3	5.3	
D.O.	% Saturation		9	125.5	65.7	83.9	
D.O.	mg/1	5.0	9	13.3	6.7	9.6	
Dissolved Solids	mg/1	1500	14	740	168	427	
Suspended Solids[5]	mg/1	-	14	752	10	189	
TOC	mg/1	-	11	20.0	1.0	9.3	
Oil-Grease	mg/1	5	--	--	--	---	
Fecal Coliform	#/100 ml	200	9	1070	50	119	2
Fecal Strep.	#/100 ml	-	7	60000	30	279	
MBAS	mg/1	0.5	11	0.31	0.09	0.17	
Conductivity	Micromhos	-	11	950	283	697	
Turbidity	J.U.	-	11	130.0	1.40	39.90	
Total Hardness	mg/1	-	4	406	270	329	
Phenols	ug/1	10	2	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	11	47	21.0	34.4	
Fluoride	mg/1	1.3	5	0.83	0.20	0.44	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	30	30	--	
Total Iron	ug/1	-	6	33400	490	12675	
Lead[5]	ug/1	40	4	32	10	--	
Manganese[5]	ug/1	-	4	340	50	140	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-					
Sulfate[5]	mg/1	-	4	165.0	85.0	122.7	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Blanchard River near Findlay

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	14	3380	13	599	
Temperature	°C	*	11	23.8	1.0	12.7	
pH	S.U.	6.0-9.0	9	7.9	6.8	7.5	
NH-3-N	mg/1	-	12	6.30	0.22	1.95	
TKN-N	mg/1	-	12	8.1	0.7	3.1	
Nitrate	mg/1	-	12	7.90	1.74	4.62	
Total Phosphorous	mg/1	-	12	3.75	0.10	1.28	
BOD_5	mg/1	-	10	15.8	2.0	8.2	
D.O.	% Saturation		11	96.7	24.7	70.9	
D.O.	mg/1	5.0	11	12.6	2.1	8.1	3
Dissolved Solids	mg/1	1500	12	1198	136	566	
Suspended Solids[5]	mg/1	-	12	232	10	62	
TOC	mg/1	-	11	14.0	1.0	9.9	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	10	10000	90	480	6
Fecal Strep.	#/100 ml	-	7	10000	30	307	
MBAS	mg/1	0.5	11	0.56	0.13	0.25	1
Conductivity	Micromhos	-	11	960	173	734	
Turbidity	J.U.	-	11	68.00	1.90	18.92	
Total Hardness	mg/1	-	6	402	270	325	
Phenols	ug/1	10	2	7.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.02	0.01	--	
Chloride	mg/1	250	9	60.0	20.0	41.1	
Fluoride	mg/1	1.3	6	1.08	0.20	0.52	
Arsenic[5]	ug/1	50	4	10	10	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	5	30	30	--	
Total Iron	ug/1	-	3	1490	460	947	
Lead[5]	ug/1	40	4	11	10	--	
Manganese[5]	ug/1	-	4	180	50	110	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	5	50	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	215.0	105.0	170.7	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Auglaize River at Cloverdale

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.		
Flow	cfs	-					
Temperature	°C	*	8	22.0	2.6	11.8	
pH	S.U.	6.0-9.0	7	8.50	7.20	8.0	
NH-3-N	mg/1	-	12	2.75	0.06	0.82	
TKN-N	mg/1	-	11	4.0	0.5	1.7	
Nitrate	mg/1	-	12	6.77	3.20	4.65	
Total Phosphorous	mg/1	-	12	1.10	0.10	0.49	
BOD_5	mg/1	-	9	13.2	4.5	7.2	
D.O.	% Saturation		8	116.9	40.9	82.5	
D.O.	mg/1	5.0	8	12.7	3.6	9.2	1
Dissolved Solids	mg/1	1500	11	860	223	536	
Suspended Solids	mg/1	-	11	720	10	165	
TOC	mg/1	-	9	29.0	1.0	9.6	
Oil-Grease	mg/1	5					
Fecal Coliform	#/100 ml	200	9	1600	30	241	6
Fecal Strep.	#/100 ml	-	6	10000	20	366	
MBAS	mg/1	0.5	10	0.47	0.12	0.24	
Conductivity	Micromhos	-	9	1258	269	933	
Turbidity	J.U.	-	10	488	4.30	68.75	
Total Hardness	mg/1	-	6	422	112	322	
Phenols	ug/1	10	2	7.0	6.0	6.5	
Cyanide	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	10	130.0	20.0	65.1	
Fluoride	mg/1	1.3	4	0.85	0.17	0.51	
Arsenic	ug/1	50	4	18.0	10.0	--	
Barium	ug/1	800	4	200	200	--	
Cadmium	ug/1	5	4	10	5	--	
Total Chromium	ug/1	300	4	40	30	--	
Copper	ug/1	*	5	60	30	--	
Total Iron	ug/1	-	5	32000	800	11702	
Lead	ug/1	40	4	29	10	--	
Manganese	ug/1	-	4	410	60	190	
Mercury	ug/1	0.5	4	0.5	0.5	--	
Selenium	ug/1	5	4	10	5	--	
Silver	ug/1	1	4	30	30	--	
Zinc	ug/1	*	5	150	30	--	
Alumium	ug/1	-					
Sulfate	mg/1	-	4	201.0	42.0	137.7	
Hex. Chromium	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation

* Variable - refer to Water Quality Standards Section

Ottawa River at Kalida

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	11	25.5	2.0	13.2	
pH	S.U.	6.0-9.0	9	8.5	6.3	7.7	
NH-3-N	mg/1	-	14	3.58	0.24	0.84	
TKN-N	mg/1	-	14	6.0	0.4	1.7	
Nitrate	mg/1	-	14	11.33	1.47	5.79	
Total Phosphorous	mg/1	-	14	0.80	0.20	0.42	
BOD_5	mg/1	-	11	11.8	2.2	6.5	
D.O.	% Saturation		11	111.3	51.7	80.1	
D.O.	mg/1	5.0	11	11.0	4.5	8.6	2
Dissolved Solids	mg/1	1500	14	1030	152	527	
Suspended Solids[5]	mg/1	-	14	595	10	118	
TOC	mg/1	-	11	13.0	3.0	9.5	
Oil-Grease	mg/1	5	--	---	---	---	
Fecal Coliform	#/100 ml	200	9	1670.0	70	344	6
Fecal Strep.	#/100 ml	-	8	36000	30	317	
MBAS	mg/1	0.5	1	.500	.500	.500	
Conductivity	Micromhos	-	11	1510	237	978	
Turbidity	J.U.	-	11	80.0	1.70	24.35	
Total Hardness	mg/1	-	5	404	286	336	
Phenols	ug/1	10	5	9.0	2.0	---	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	---	
Chloride	mg/1	250	10	176.0	21.0	89.4	
Fluoride	mg/1	1.3	5	0.86	0.27	0.52	
Arsenic[5]	ug/1	50	5	10.0	10.0	---	
Barium[5]	ug/1	800	4	200	200	---	
Cadmium[5]	ug/1	5	5	10	5	---	
Total Chromium[5]	ug/1	300	5	40	30	---	
Copper[5]	ug/1	*	5	40	30	---	
Total Iron	ug/1	-	6	25000	280	7820	
Lead[5]	ug/1	40	4	10	10	---	
Manganese[5]	ug/1	-	4	130	50	78	
Mercury[5]	ug/1	0.5	4	0.5	0.5	---	
Selenium[5]	ug/1	5	4	10	5	---	
Silver[5]	ug/1	1	4	30	30	---	
Zinc	ug/1	*	5	60	30	---	
Alumium	ug/1	-	--	--	--	---	
Sulfate[5]	mg/1	-	4	270.0	119.0	221.2	
Hex. Chromium[5]	ug/1	50	2	32	30	---	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Ottawa River at Allentown

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	10	127	24	54	
Temperature	°C	*	11	25	3.0	14.3	
pH	S.U.	6.0-9.0	9	8.1	6.7	7.6	
NH-3-N	mg/1	-	11	16.80	1.22	9.23	
TKN-N	mg/1	-	11	21.5	2.3	11.6	
Nitrate	mg/1	-	11	10.75	2.31	5.67	
Total Phosphorous	mg/1	-	11	1.30	0.10	0.64	
BOD_5	mg/1	-	11	36.0	5.8	10.9	
D.O.	% Saturation		11	123	34.5	74.2	
D.O.	mg/1	5.0	11	12.8	2.9	8.0	3
Dissolved Solids	mg/1	1500	11	1190	176	688	
Suspended Solids[5]	mg/1	-	10	145	10	32	
TOC	mg/1	-	11	15.0	5.0	9.5	
Oil-Grease	mg/1	5	1	0.5	0.5	----	
Fecal Coliform	#/100 ml	200	10	4300	90	510	6
Fecal Strep.	#/100 ml	-	8	71000	30	216	
MBAS	mg/1	0.5	11	0.94	0.18	0.43	3
Conductivity	Micromhos	-	11	1876	277	1297	
Turbidity	J.U.	-	10	58.0	1.70	14.83	
Total Hardness	mg/1	-	6	480	308	377	
Phenols	ug/1	10	5	17.0	3.0	8.4	2
Cyanide[5]	mg/1	0.2	2	0.03	0.02	----	
Chloride	mg/1	250	8	230.0	98.0	160.7	
Fluoride	mg/1	1.3	5	1.25	0.36	0.75	
Arsenic[5]	ug/1	50	4	10.0	10.0	----	
Barium[5]	ug/1	800	4	200	200	----	
Cadmium[5]	ug/1	5	4	10	5	----	
Total Chromium[5]	ug/1	300	5	230	100	144	
Copper[5]	ug/1	*	5	40	30	----	
Total Iron	ug/1	-	3	1350	220	597	
Lead[5]	ug/1	40	4	10	10	----	
Manganese[5]	ug/1	-	4	140	110	128	
Mercury[5]	ug/1	0.5	3	0.5	0.5	----	
Selenium[5]	ug/1	5	4	10	5	----	
Silver[5]	ug/1	1	4	30	30	----	
Zinc	ug/1	*	5	130	40	82	
Alumium	ug/1	-	----	----	-----	----	
Sulfate[5]	mg/1	-	4	540	184	346	
Hex. Chromium[5]	ug/1	50	2	141	103	122	2

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Ottawa River above Lima

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	25.0	7.5	17.0	
pH	S.U.	6.0-9.0	7	8.3	8.0	8.0	
NH-3-N	mg/1	-	3	0.25	0.07	0.17	
TKN-N	mg/1	-	3	0.7	0.4	0.5	
Nitrate	mg/1	-	3	6.01	1.65	3.54	
Total Phosphorous	mg/1	-	3	0.2	0.1	0.1	
BOD_5	mg/1	-	7	7.8	2.0	4.0	
D.O.	% Saturation		--	--	--	--	
D.O.	mg/1	5.0	7	12.3	3.9	7.6	
Dissolved Solids	mg/1	1500	7	686	400	552	
Suspended Solids[5]	mg/1	-	7	36	10	20	
TOC	mg/1	-	3	3	1	--	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	7	310	30	133	
Fecal Strep.	#/100 ml	-	6	600	20	235	
MBAS	mg/1	0.5	3	0.14	0.07	0.11	
Conductivity	Micromhos	-	7	1050	648	848	
Turbidity	J.U.	-	3	11	2.1	5.6	
Total Hardness	mg/1	-	1	422	422	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	3	40	30	36	
Fluoride	mg/1	1.3	1	0.44	0.44	--	
Arsenic[5]	ug/1	50	1	10	10	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	330	330	--	
Lead[5]	ug/1	40	1	10	10	--	
Manganese[5]	ug/1	-	1	30	30	--	
Mercury[5]	ug/1	0.5	1	0.5	0.5	--	
Selenium[5]	ug/1	5	1	10	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	151	151	--	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Auglaize River near Fort Jennings

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	14	6150	1	1244	
Temperature	°C	*	8	22	2.6	12.8	
pH	S.U.	6.0-9.0	7	8.6	7.9	8.3	
NH-3-N	mg/1	-	13	0.47	0.05	0.21	
TKN-N	mg/1	-	13	1.4	0.3	0.7	
Nitrate	mg/1	-	12	11.36	0.05	3.06	
Total Phosphorous	mg/1	-	13	0.67	0.20	0.39	
BOD_5	mg/1	-	8	10.8	3.2	5.6	
D.O.	% Saturation		8	106.5	50.0	84.6	
D.O.	mg/1	5.0	8	13.8	4.4	9.2	1
Dissolved Solids	mg/1	1500	11	688	234	470	
Suspended Solids[5]	mg/1	-	11	465	10	116	
TOC	mg/1	-	11	27.0	1.0	10.0	
Oil-Grease	mg/1	5					
Fecal Coliform	#/100 ml	200	8	1900	30	263	4
Fecal Strep.	#/100 ml	-	6	10000	1	153	
MBAS	mg/1	0.5	11	0.24	0.07	0.13	
Conductivity	Micromhos	-	9	1600	616	905	
Turbidity	J.U.	-	10	240	3.70	41.86	
Total Hardness	mg/1	-	6	420	118	325	
Phenols	ug/1	10	2	3.0	2.0	---	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	---	
Chloride	mg/1	250	11	63.0	19.0	37.9	
Fluoride	mg/1	1.3	4	0.74	0.17	0.44	
Arsenic[5]	ug/1	50	4	10.0	10.0		
Barium[5]	ug/1	800	4	200	200	---	
Cadmium[5]	ug/1	5	4	10	5	---	
Total Chromium[5]	ug/1	300	4	30	30	---	
Copper[5]	ug/1	*	5	60	30	---	
Total Iron	ug/1	-	4	29000	1800	13183	
Lead[5]	ug/1	40	3	10	10	---	
Manganese[5]	ug/1	-	4	390	70	183	
Mercury[5]	ug/1	0.5	4	0.5	0.5	---	
Selenium[5]	ug/1	5	4	10	5	---	
Silver[5]	ug/1	1	4	30	30	---	
Zinc	ug/1	*	5	140	30	---	
Alumium	ug/1	-	-	--	--	---	
Sulfate[5]	mg/1	-	4	130.0	40.0	100.2	
Hex. Chromium[5]	ug/1	50	2	30	30	---	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tiffin River near Defiance

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	15	24.0	0.0	12.4	
pH	S.U.	6.0-9.0	11	8.1	7.5	7.8	
NH-3-N	mg/1	-	22	0.73	0.05	0.31	
TKN-N	mg/1	-	22	3.1	0.3	0.9	
Nitrate	mg/1	-	22	5.70	0.11	2.92	
Total Phosphorous	mg/1	-	21	0.50	0.10	0.30	
BOD_5	mg/1	-	10	4.5	2.2	3.3	
D.O.	% Saturation		14	105.8	42.5	76.7	
D.O.	mg/1	5.0	14	12.0	3.7	8.8	1
Dissolved Solids	mg/1	1500	23	514	199	339	
Suspended Solids[5]	mg/1	-	23	416	16	163	
TOC	mg/1	-	14	26	1.0	11.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	12	1800	20	240	7
Fecal Strep.	#/100 ml	-	6	2300	1	133	
MBAS	mg/1	0.5	13	0.35	0.06	0.14	
Conductivity	Micromhos	-	13	2000	378	713	
Turbidity	J.U.	-	12	240	9.20	61.60	
Total Hardness	mg/1	-	7	348	172	263	
Phenols	ug/1	10	2	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	17	42.0	18.0	27.4	
Fluoride	mg/1	1.3	5	0.38	0.15	0.26	
Arsenic[5]	ug/1	50	5	10.0	10.0	--	
Barium[5]	ug/1	800	5	200	200		
Cadmium[5]	ug/1	5	5	10	5	--	
Total Chromium[5]	ug/1	300	5	30	30	--	
Copper[5]	ug/1	*	6	60	30	--	
Total Iron	ug/1	-	11	21500	1590	12526	
Lead[5]	ug/1	40	5	35	10	--	
Manganese[5]	ug/1	-	5	230	100	142	
Mercury[5]	ug/1	0.5	5.0	0.8	0.5	--	1
Selenium[5]	ug/1	5	5	10	5	--	
Silver[5]	ug/1	1	5	30	30		
Zinc	ug/1	*	6	120	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	81.0	41.0	64.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Maumee River at Defiance

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	--
Temperature	°C	*	11	24	4.0	13.0	
pH	S.U.	6.0-9.0	10	8.70	7.10	7.35	
NH-3-N	mg/1	-	21	0.93	0.04	0.30	
TKN-N	mg/1	-	21	2.0	0.3	0.8	
Nitrate	mg/1	-	21	20.90	0.50	3.75	
Total Phosphorous	mg/1	-	21	0.50	0.10	0.26	
BOD_5	mg/1	-	10	7.5	1.5	4.1	
D.O.	% Saturation		9	116.3	56.5	91.9	
D.O.	mg/1	5.0	9	12.1	4.8	10.1	1
Dissolved Solids	mg/1	1500	21	710	215	357	
Suspended Solids[5]	mg/1	-	20	458	10	157	
TOC	mg/1	-	12	24.0	1.0	12.2	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	11	1300	1	121	4
Fecal Strep.	#/100 ml	-	5	220	10	58	
MBAS	mg/1	0.5	12	0.45	0.06	0.20	
Conductivity	Micromhos	-	12	1700	378	705	
Turbidity	J.U.	-	11	180.0	7.30	49.21	
Total Hardness	mg/1	-	6	320	170	263	
Phenols	ug/1	10	2	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	17	50.0	17.0	26.3	
Fluoride	mg/1	1.3	8	0.52	0.15	0.30	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	5	60	30	--	
Total Iron	ug/1	-	10	19500	1160	9333	
Lead[5]	ug/1	40	4	20	10	--	
Manganese[5]	ug/1	-	4	110	19	80	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	50	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	107.0	45.0	77.2	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Maumee River at Antwerp

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	20	17700	122	5999	
Temperature	°C	*	13	23.0	0.0	10.3	
pH	S.U.	6.0-9.0	9	8.4	7.20	7.80	
NH-3-N	mg/1	-	19	0.96	0.05	0.34	
TKN-N	mg/1	-	18	1.5	0.6	1.0	
Nitrate	mg/1	-	19	18	1.03	3.65	
Total Phosphorous	mg/1	-	19	0.50	0.10	0.26	
BOD_5	mg/1	-	9	7.8	2.7	4.8	
D.O.	% Saturation		12	90.8	50.6	79.7	
D.O.	mg/1	5.0	12	12.2	4.4	9.5	1
Dissolved Solids	mg/1	1500	19	652	200	351	
Suspended Solids[5]	mg/1	-	19	614	10	161	
TOC	mg/1	-	12	25.0	1.0	13.4	
Oil-Grease	mg/1	5	---	---	----	---	
Fecal Coliform	#/100 ml	200	10	2570.0	70	337	7
Fecal Strep.	#/100 ml	-	6	4100	1	129	
MBAS	mg/1	0.5	12	0.41	0.05	0.18	
Conductivity	Micromhos	-	12	1550	362	683	
Turbidity	J.U.	-	11	144.0	13.0	40.18	
Total Hardness	mg/1	-	6	338	184	269	
Phenols	ug/1	10	2	2.0	2.0	---	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	---	
Chloride	mg/1	250	14	43.0	17.0	27.8	
Fluoride	mg/1	1.3	8	0.57	0.16	0.31	
Arsenic[5]	ug/1	50	3	10.0	10.0	---	
Barium[5]	ug/1	800	4	200	200	---	
Cadmium[5]	ug/1	5	4	10	5	---	
Total Chromium[5]	ug/1	300	4	30	30	---	
Copper[5]	ug/1	*	5	60	30	---	
Total Iron	ug/1	-	7	20400	1790	10297	
Lead[5]	ug/1	40	3	12	10	---	
Manganese[5]	ug/1	-	4	150	110	128	
Mercury[5]	ug/1	0.5	4	0.5	0.5	---	
Selenium[5]	ug/1	5	4	10	5	---	
Silver[5]	ug/1	1	4	30	30	---	
Zinc	ug/1	*	5	60	30	---	
Alumium	ug/1	-	---	---	---	---	
Sulfate[5]	mg/1	-	4	93.0	48.0	76.2	
Hex. Chromium[5]	ug/1	50	2	30	30	---	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

St. Marys River at Willshire

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	4	823	25	231	
Temperature	°C	*	10	21.6	0.0	9.5	
pH	S.U.	6.0-9.0	10	7.9	7.2	7.7	
NH-3-N	mg/1	-	8	.58	.05	.21	
TKN-N	mg/1	-	8	.9	.5	.7	
Nitrate	mg/1	-	8	4.90	.85	2.44	
Total Phosphorous	mg/1	-	8	.40	.10	.26	
BOD_5	mg/1	-	11	6.1	2.4	4.6	
D.O.	% Saturation		10	99.2	52.3	81.4	
D.O.	mg/1	5.0	10	13.0	4.6	9.6	1
Dissolved Solids	mg/1	1500	11	557	310	445	
Suspended Solids[5]	mg/1	-	11	504	27	124	
TOC	mg/1	-	8	24.0	1.0	9.6	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	11	10200	200	782	11
Fecal Strep.	#/100 ml	-	4	10000	110	1486	
MBAS	mg/1	0.5	8	.39	.05	.16	
Conductivity	Micromhos	-	10	763	258	644	
Turbidity	J.U.	-	8	360.00	8.00	70.89	
Total Hardness	mg/1	-	3	358	118	267	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	4	43.0	20.0	35.5	
Fluoride	mg/1	1.3	3	.32	.15	.26	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	40	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	28700	1160	11520	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	280	100	193	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	130	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	121.0	35.0	92.3	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Portage River at Woodville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	12	3370	10	613	
Temperature	°C	*	11	26.2	0.0	11.7	
pH	S.U.	6.0-9.0	9	8.80	7.4	8.10	
NH-3-N	mg/1	-	10	1.00	0.07	0.30	
TKN-N	mg/1	-	10	1.9	0.5	1.0	
Nitrate	mg/1	-	10	4.30	0.05	2.21	
Total Phosphorous	mg/1	-	10	0.60	0.10	0.28	
BOD_5	mg/1	-	10	22.4	1.5	8.1	
D.O.	% Saturation		11	169.4	76.7	96.4	
D.O.	mg/1	5.0	11	14.4	6.7	10.6	
Dissolved Solids	mg/1	1500	11	688	338	524	
Suspended Solids[5]	mg/1	-	11	984	10	113	
TOC	mg/1	-	10	23.0	1.0	12.2	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	11	5000	15	206	5
Fecal Strep.	#/100 ml	-	8	1600	10	72	
MBAS	mg/1	0.5	10	0.37	0.07	0.18	
Conductivity	Micromhos	-	10	1020	491	809	
Turbidity	J.U.	-	10	330.0	1.3	42.55	
Total Hardness	mg/1	-	4	388	264	337	
Phenols	ug/1	10	2	6.0	4.0	5.0	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	10	109.0	34.0	62.5	
Fluoride	mg/1	1.3	3	0.54	0.30	0.40	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	40	30	--	
Total Iron	ug/1	-	3	470	180	280	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	120	30	--	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	143.0	120.0	131.3	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

North Branch Portage River at Pemberville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	24.0	6.0	16.4	
pH	S.U.	6.0-9.0	6	8.70	7.30	8.1	
NH-3-N	mg/1	-	3	0.43	0.16	0.29	
TKN-N	mg/1	-	3	1.0	0.4	0.7	
Nitrate	mg/1	-	3	5.46	4.29	5.05	
Total Phosphorous	mg/1	-	3	0.30	0.10	0.23	
BOD_5	mg/1	-	6	6.4	2.0	4.2	
D.O.	% Saturation		6	117.6	72.8	91.1	
D.O.	mg/1	5.0	6	12.7	7.4	9.1	
Dissolved Solids	mg/1	1500	6	626	374	538	
Suspended Solids[5]	mg/1	-	6	184	10	39	
TOC	mg/1	-	3	13.0	6.0	9.3	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	6	3200	130	669	5
Fecal Strep.	#/100 ml	-	5	500	60	202	
MBAS	mg/1	0.5	3	0.21	0.12	0.15	
Conductivity	Micromhos	-	5	967	563	830	
Turbidity	J.U.	-	3	128.00	1.40	44.27	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	2	67.0	66.0	66.5	
Fluoride	mg/1	1.3	1	0.36	0.36	0.36	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	280	280	280	
Lead[5]	ug/1	40	1	10	10	--	
Manganese[5]	ug/1	-	1	40	40	40	
Mercury[5]	ug/1	0.5	1	0.5	0.5	--	
Selenium[5]	ug/1	5	1	10	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	145.0	145.0	145.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Sandusky River near Fremont

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	13	5220	4	696	
Temperature	°C	*	10	24.5	0.0	9.7	
pH	S.U.	6.0-9.0	9	8.6	7.6	8.0	
NH-3-N	mg/1	-	12	0.60	0.05	0.27	
TKN-N	mg/1	-	12	1.3	0.3	0.6	
Nitrate	mg/1	-	12	16.76	0.05	3.07	
Total Phosphorous	mg/1	-	12	0.23	0.10	0.13	
BOD_5	mg/1	-	11	6.4	1.4	3.8	
D.O.	% Saturation		10	121.0	51.2	94.2	
D.O.	mg/1	5.0	10	14.6	4.3	11.2	1
Dissolved Solids	mg/1	1500	11	566	268	462	
Suspended Solids[5]	mg/1	-	11	118	10	42	
TOC	mg/1	-	12	22.0	1.0	8.9	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	10	3000	20	219	4
Fecal Strep.	#/100 ml	-	7	1670	90	461	
MBAS	mg/1	0.5	12	0.40	0.05	0.12	
Conductivity	Micromhos	-	10	835	417	705	
Turbidity	J.U.	-	12	96.00	2.20	20.23	
Total Hardness	mg/1	-	3	406	288	349	
Phenols	ug/1	10	4	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	12	53.0	18.0	35.2	
Fluoride	mg/1	1.3	4	0.44	0.28	0.36	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	50	30	--	
Total Iron	ug/1	-	3	550	370	457	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	140	30	--	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	163.0	116.0	135.7	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Sandusky River near Mexico

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	13	6800	49	1042	
Temperature	°C	*	9	23.16	0.0	8.4	
pH	S.U.	6.0-9.0	9	8.1	7.6	7.8	
NH-3-N	mg/1	-	12	0.57	0.05	0.29	
TKN-N	mg/1	-	12	1.2	0.4	0.7	
Nitrate	mg/1	-	12	12.52	0.30	3.45	
Total Phosphorous	mg/1	-	12	0.30	0.07	0.16	
BOD_5	mg/1	-	11	7.2	1.3	3.8	
D.O.	% Saturation		9	142.6	62.7	93.4	
D.O.	mg/1	5.0	9	17.4	6.4	11.3	
Dissolved Solids	mg/1	1500	10	612	376	484	
Suspended Solids[5]	mg/1	-	10	113	10	44	
TOC	mg/1	-	12	16.0	1.0	7.2	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	10	830	1	53	3
Fecal Strep.	#/100 ml	-	8	1700	20	139	
MBAS	mg/1	0.5	12	0.33	0.06	0.15	
Conductivity	Micromhos	-	10	851	428	716	
Turbidity	J.U.	-	12	96.00	3.70	27.43	
Total Hardness	mg/1	-	4	410	230	346	
Phenols	ug/1	10	2	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	8	40.0	14.0	26.7	
Fluoride	mg/1	1.3	4	0.43	0.32	0.37	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	30	30	--	
Total Iron	ug/1	-	4	3100	300	1600	
Lead[5]	ug/1	40	4	13	10	--	
Manganese[5]	ug/1	-	4	130	40	85	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	169.0	89.0	132.7	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tymochtee Creek at Crawford-S.R. 199

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	12	71	2	33	
Temperature	°C	*	10	25.8	0.0	10.1	
pH	S.U.	6.0-9.0	9	8.0	7.50	7.75	
NH-3-N	mg/1	-	11	0.57	0.05	0.27	
TKN-N	mg/1	-	11	1.1	0.3	0.6	
Nitrate	mg/1	-	11	24.62	0.10	4.67	
Total Phosphorous	mg/1	-	11	0.20	0.10	0.12	
BOD_5	mg/1	-	11	7.2	1.0	3.8	
D.O.	% Saturation		10	105.2	41.5	81.3	
D.O.	mg/1	5.0	10	13.0	3.4	9.6	1
Dissolved Solids	mg/1	1500	10	722	286	520	
Suspended Solids[5]	mg/1	-	10	157	10	50	
TOC	mg/1	-	11	20.0	2.0	10.4	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	10	2000	30	128	3
Fecal Strep.	#/100 ml	-	8	4700	20	174	
MBAS	mg/1	0.5	12	0.44	0.05	0.13	
Conductivity	Micromhos	-	10	965	394	741	
Turbidity	J.U.	-	11	180.00	4.20	40.02	
Total Hardness	mg/1	-	4	490	326	405	
Phenols	ug/1	10	2	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	8	39.0	12.0	26.0	
Fluoride	mg/1	1.3	4	0.50	0.31	0.42	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	40	30	--	
Total Iron	ug/1	-	4	2490	580	1340	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	110	50	80	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	230.0	123.0	190.5	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Sandusky River below Upper Sandusky

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	8	166	17	93	
Temperature	°C	*	5	25.0	7.5	15.9	
pH	S.U.	6.0-9.0	6	8.5	7.8	8.1	
NH-3-N	mg/1	-	4	0.29	0.06	0.18	
TKN-N	mg/1	-	4	0.8	0.3	0.6	
Nitrate	mg/1	-	4	4.01	1.11	2.57	
Total Phosphorous	mg/1	-	4	0.31	0.10	0.20	
BOD_5	mg/1	-	6	8.8	1.4	4.0	
D.O.	% Saturation		5	96.5	51.2	78.9	
D.O.	mg/1	5.0	5	11.2	4.3	8.1	1
Dissolved Solids	mg/1	1500	6	496	329	421	
Suspended Solids[5]	mg/1	-	6	96	10	53	
TOC	mg/1	-	4	14.0	1.0	7.7	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	5	1100	30	220	3
Fecal Strep.	#/100 ml	-	4	2330	40	443	
MBAS	mg/1	0.5	4	0.18	0.06	0.10	
Conductivity	Micromhos	-	5	747	507	659	
Turbidity	J.U.	-	4	54.00	3.00	16.02	
Total Hardness	mg/1	-	1	306	306	306	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	3	39.0	17.0	28.3	
Fluoride	mg/1	1.3	1	0.37	0.37	0.37	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	2070	2070	2070	
Lead[5]	ug/1	40	1	10	10	10	
Manganese[5]	ug/1	-	1	80	80	80	
Mercury[5]	ug/1	0.5	1	0.5	0.5	--	
Selenium[5]	ug/1	5	1	10	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	93.0	93.0	93.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Huron River below Milan-Mud Brook Rd.

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	11	4970	5	584	
Temperature	°C	*	9	27.0	0.0	13.0	
pH	S.U.	6.0-9.0	10	8.2	7.1	7.8	
NH-3-N	mg/l	-	10	0.71	0.06	0.25	
TKN-N	mg/l	-	7	1.3	0.3	0.7	
Nitrate	mg/l	-	10	6.30	0.29	1.98	
Total Phosphorous	mg/l	-	10	0.60	0.08	0.29	
BOD_5	mg/l	-	10	9.3	0.8	3.1	
D.O.	% Saturation		9	115.7	66.7	91.2	
D.O.	mg/l	5.0	9	14.0	6.0	10.1	
Dissolved Solids	mg/l	1500	9	540	210	424	
Suspended Solids[5]	mg/l	-	10	290	10	47	
TOC	mg/l	-	10	17.0	1.0	7.2	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	7	2800	110	533	6
Fecal Strep.	#/100 ml	-	5	4600	40	441	
MBAS	mg/l	0.5	10	0.21	0.05	0.12	
Conductivity	Micromhos	-	10	820	300	649	
Turbidity	J.U.	-	10	250.00	1.80	35.97	
Total Hardness	mg/l	-	6	354	120	269	
Phenols	ug/l	10	2	2.0	2.0	--	
Cyanide[5]	mg/l	0.2	2	0.01	0.01	--	
Chloride	mg/l	250	10	44.0	20.0	32.5	
Fluoride	mg/l	1.3	4	0.28	0.16	0.23	
Arsenic[5]	ug/l	50	4	10.0	10.0	--	
Barium[5]	ug/l	800	4	200	200	--	
Cadmium[5]	ug/l	5	4	10	5	--	
Total Chromium[5]	ug/l	300	5	30	30	--	
Copper[5]	ug/l	*	5	40	30	--	
Total Iron	ug/l	-	4	11400	270	3295	
Lead[5]	ug/l	40	4	10	10	--	
Manganese[5]	ug/l	-	4	240	30	--	
Mercury[5]	ug/l	0.5	5	0.6	0.5		1
Selenium[5]	ug/l	5	4	10	5	--	
Silver[5]	ug/l	1	4	30	30	--	
Zinc	ug/l	*	5	50	30	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	4	150.0	50.0	115.7	
Hex. Chromium[5]	ug/l	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

East Branch Huron River below Norwalk

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	5	25.0	4.3	16.3	
pH	S.U.	6.0-9.0	5	8.6	7.8	8.3	
NH-3-N	mg/1	-	3	0.19	0.05	0.13	
TKN-N	mg/1	-	3	0.9	0.3	0.5	
Nitrate	mg/1	-	3	5.65	0.12	2.59	
Total Phosphorous	mg/1	-	3	0.10	0.05	0.08	
BOD_5	mg/1	-	5	4.5	1.2	2.6	
D.O.	% Saturation		5	166.7	84.8	114.5	
D.O.	mg/1	5.0	5	14.0	7.8	11.4	
Dissolved Solids	mg/1	1500	5	436	326	380	
Suspended Solids[5]	mg/1	-	5	26	10	13	
TOC	mg/1	-	3	3.0	1.0	3.3	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	4	1400	70	374	3
Fecal Strep.	#/100 ml	-	2	760	370	530	
MBAS	mg/1	0.5	3	0.15	0.06	0.10	
Conductivity	Micromhos	-	5	750	492	625	
Turbidity	J.U.	-	3	28.00	3.30	11.70	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	3	32.0	22.0	27.7	
Fluoride	mg/1	1.3	1	0.21	0.21	0.21	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	340	340	--	
Lead[5]	ug/1	40	1	10	10	--	
Manganese[5]	ug/1	-	1	30	30	--	
Mercury[5]	ug/1	0.5	1	0.5	0.5	--	
Selenium[5]	ug/1	5	1	10	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	1	78.0	78.0	78.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Vermilion River near Vermilion

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	13	13600	14	1243	
Temperature	°C	*	11	27.0	0.0	11.7	
pH	S.U.	6.0-9.0	11	8.7	7.4	8.0	
NH-3-N	mg/1	-	11	0.80	0.05	0.25	
TKN-N	mg/1	-	11	1.8	0.3	0.8	
Nitrate	mg/1	-	11	3.60	0.04	1.07	
Total Phosphorous	mg/1	-	10	0.20	0.05	0.10	
BOD_5	mg/1	-	11	6.7	0.9	3.4	
D.O.	% Saturation		11	109.5	70.6	97.0	
D.O.	mg/1	5.0	11	14.0	6.0	11.0	
Dissolved Solids	mg/1	1500	10	482	150	335	
Suspended Solids[5]	mg/1	-	11	208	10	44	
TOC	mg/1	-	11	15.0	3.0	8.6	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	9	7600	1	125	4
Fecal Strep.	#/100 ml	-	7	1000	30	554	
MBAS	mg/1	0.5	11	0.16	0.05	0.09	
Conductivity	Micromhos	-	11	741	334	570	
Turbidity	J.U.	-	11	150.00	1.70	32.18	
Total Hardness	mg/1	-	4	314	130	230	
Phenols	ug/1	10	2	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	2	0.01	0.01	--	
Chloride	mg/1	250	11	67.0	16.0	30.0	
Fluoride	mg/1	1.3	4	0.26	0.15	0.20	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	---	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	40	30	--	
Total Iron	ug/1	-	4	76000	260	19493	
Lead[5]	ug/1	40	4	10	10	--	
Manganese[5]	ug/1	-	4	200	30	--	
Mercury[5]	ug/1	0.5	4	0.7	0.5	--	1
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	4	30	30	--	
Zinc	ug/1	*	4	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	123.0	47.0	88.7	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Black River at Elyria

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	562	39	169	
Temperature	°C	*	6	24.8	1.9	9.5	
pH	S.U.	6.0-9.0	2	8.0	6.5	7.2	
NH-3-N	mg/1	-	9	4.19	0.59	1.85	
TKN-N	mg/1	-	7	3.1	0.8	2.1	
Nitrate	mg/1	-	9	1.84	0.67	1.38	
Total Phosphorous	mg/1	-	9	0.30	0.10	0.16	
BOD_5	mg/1	-	4	7.0	1.9	4.3	
D.O.	% Saturation		5	81.6	51.4	65.6	
D.O.	mg/1	5.0	5	10.2	4.4	7.5	1
Dissolved Solids	mg/1	1500	4	446	274	361	
Suspended Solids[5]	mg/1	-	6	38	10	18	
TOC	mg/1	-	8	20.0	6.0	11.4	
Oil-Grease	mg/1	5	2	5	5	--	
Fecal Coliform	#/100 ml	200	5	17000	660	3308	5
Fecal Strep.	#/100 ml	-	6	11000	460	1351	
MBAS	mg/1	0.5	9	4.00	0.06	0.56	1
Conductivity	Micromhos	-	5	620	305	442	
Turbidity	J.U.	-	8	36.00	4.20	16.34	
Total Hardness	mg/1	-	3	328	238	279	
Phenols	ug/1	10	8	6.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	.01	.01	--	
Chloride	mg/1	250	9	101.0	29.0	53.6	
Fluoride	mg/1	1.3	2	0.35	0.26	0.30	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	70	30	--	
Total Iron	ug/1	-	2	780	660	720	
Lead[5]	ug/1	40	4	16	10	--	
Manganese[5]	ug/1	-	3	100	60	80	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	183.0	81.0	142.0	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Rocky River near Berea

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	7	515	96	292	
Temperature	°C	*	9	23.8	0.5	9.6	
pH	S.U.	6.0-9.0	3	7.8	7.0	7.5	
NH-3-N	mg/l	-	9	1.45	0.38	0.83	
TKN-N	mg/l	-	9	15.6	0.5	2.7	
Nitrate	mg/l	-	9	1.70	0.51	1.19	
Total Phosphorous	mg/l	-	9	1.15	0.20	0.62	
BOD_5	mg/l	-	9	5.6	2.3	4.4	
D.O.	% Saturation		8	101.7	76.1	86.3	
D.O.	mg/l	5.0	8	12.4	6.6	10.0	
Dissolved Solids	mg/l	1500	11	546	298	407	
Suspended Solids[5]	mg/l	-	11	50	9	29	
TOC	mg/l	-	9	10.0	1.0	6.2	
Oil-Grease	mg/l	5	3	5.0	0.5	---	
Fecal Coliform	#/100 ml	200	9	22000	400	2844	9
Fecal Strep.	#/100 ml	-	9	5200	168	839	
MBAS	mg/l	0.5	8	0.28	0.05	0.16	
Conductivity	Micromhos	-	7	750	335	462	
Turbidity	J.U.	-	8	20.00	2.70	10.16	
Total Hardness	mg/l	-	6	256	204	234	
Phenols	ug/l	10	8	10.0	2.0	---	1
Cyanide[5]	mg/l	0.2	6	0.01	0.01	---	
Chloride	mg/l	250	9	100.0	54.0	73.3	
Fluoride	mg/l	1.3	4	0.34	0.15	0.25	
Arsenic[5]	ug/l	50	4	10.0	10.0	---	
Barium[5]	ug/l	800	4	200	200	---	
Cadmium[5]	ug/l	5	5	10	5	---	
Total Chromium[5]	ug/l	300	5	30	30	---	
Copper[5]	ug/l	*	6	50	30	---	
Total Iron	ug/l	-	4	1140	680	888	
Lead[5]	ug/l	40	6	13	10	---	
Manganese[5]	ug/l	-	3	100	70	87	
Mercury[5]	ug/l	0.5	5	0.5	0.5		
Selenium[5]	ug/l	5	4	10	5	---	
Silver[5]	ug/l	1	3	30	30	---	
Zinc	ug/l	*	6	70	30		
Alumium	ug/l	-	---	---	---	---	
Sulfate[5]	mg/l	-	6	114	55.0	98.7	
Hex. Chromium[5]	ug/l	50	3	30	30	---	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

West Branch Rocky River below Medina

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	---	--	
Temperature	°C	*	7	23.0	2.0	10.1	
pH	S.U.	6.0-9.0	3	7.7	7.0	7.4	
NH-3-N	mg/1	-	7	4.09	0.33	1.64	
TKN-N	mg/1	-	7	8.7	0.5	3.1	
Nitrate	mg/1	-	7	1.04	0.05	0.40	
Total Phosphorous	mg/1	-	7	1.0	0.10	0.37	
BOD_5	mg/1	-	6	24.0	4.4	14.0	
D.O.	% Saturation		6	86.2	6.6	41.8	
D.O.	mg/1	5.0	6	11.9	0.7	5.1	3
Dissolved Solids	mg/1	1500	8	1002	354	615	
Suspended Solids[5]	mg/1	-	8	52	10	24	
TOC	mg/1	-	7	19.0	1.0	7.6	
Oil-Grease	mg/1	5	3	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	8	50000	100	2868	6
Fecal Strep.	#/100 ml	-	9	43000	68	2759	
MBAS	mg/1	0.5	7	0.70	0.06	0.28	2
Conductivity	Micromhos	-	5	1200	380	624	
Turbidity	J.U.	-	6	21.0	4.20	10.05	
Total Hardness	mg/1	-	4	312	84	235	
Phenols	ug/1	10	7	11.0	2.0	5.1	1
Cyanide[5]	mg/1	0.2	5	0.07	0.07	--	
Chloride	mg/1	250	7	330.0	63.0	147.6	1
Fluoride	mg/1	1.3	4	0.41	0.17	0.27	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	4	300	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	2000	640	1223	
Lead[5]	ug/1	40	4	12	10	--	
Manganese[5]	ug/1	-	3	240	120	197	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	110	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	190.0	64.0	122.5	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Cuyahoga River at West 3rd St. Bridge

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	10	27.8	2.5	17.0	
pH	S.U.	6.0-9.0	9	7.5	6.9	7.3	
NH-3-N	mg/1	-	10	7.51	1.31	4.49	
TKN-N	mg/1	-	10	8.9	1.7	5.1	
Nitrate	mg/1	-	10	2.00	0.46	1.39	
Total Phosphorous	mg/1	-	11	0.30	0.08	0.18	
BOD_5	mg/1	-	7	8.0	3.1	5.1	
D.O.	% Saturation		8	86.9	13.0	51.4	
D.O.	mg/1	5.0	8	11.5	1.1	5.6	4
Dissolved Solids	mg/1	1500	10	602	266	456	
Suspended Solids[5]	mg/1	-	9	34	10	23	
TOC	mg/1	-	9	17.0	3.0	9.1	
Oil-Grease	mg/1	5	3	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	6	13000	2000	5400	6
Fecal Strep.	#/100 ml	-	8	4900	73	1085	
MBAS	mg/1	0.5	11	0.58	0.09	0.32	2
Conductivity	Micromhos	-	8	940	400	697	
Turbidity	J.U.	-	10	17.00	0.80	6.99	
Total Hardness	mg/1	-	5	280	208	243	
Phenols	ug/1	10	11	130.0	5.0	37.2	9
Cyanide[5]	mg/1	0.2	10	0.19	0.06	0.11	
Chloride	mg/1	250	11	190.0	63.0	137.3	
Fluoride	mg/1	1.3	5	1.46	0.55	1.00	2
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	5	30	30	--	
Total Iron	ug/1	-	3	2810	66	1769	
Lead[5]	ug/1	40	4	20	10	--	
Manganese[5]	ug/1	-	2	240	230	235	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	5	150	70	100	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	124.0	86.0	109.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Cuyahoga River at Lower Harvard Ave.

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	10	22.8	2.0	13.5	
pH	S.U.	6.0-9.0	8	7.8	7.0	7.4	
NH-3-N	mg/l	-	9	3.97	0.93	1.96	
TKN-N	mg/l	-	8	4.8	1.4	2.6	
Nitrate	mg/l	-	10	2.30	0.88	1.44	
Total Phosphorous	mg/l	-	10	0.80	0.20	0.41	
BOD_5	mg/l	-	7	14.0	3.2	6.4	
D.O.	% Saturation		8	89.8	60.2	73.6	
D.O.	mg/l	5.0	8	12.4	5.3	8.1	
Dissolved Solids	mg/l	1500	10	628	294	449	
Suspended Solids[5]	mg/l	-	9	305	15	85	
TOC	mg/l	-	9	18.0	6.0	10.6	
Oil-Grease	mg/l	5	2	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	6	12000	1200	4016	6
Fecal Strep.	#/100 ml	-	7	3600	180	905	
MBAS	mg/l	0.5	10	0.42	0.11	0.24	
Conductivity	Micromhos	-	8	860	300	595	
Turbidity	J.U.	-	9	23.00	4.20	8.41	
Total Hardness	mg/l	-	4	262	210	235	
Phenols	ug/l	10	10	16.0	4.0	8.7	3
Cyanide[5]	mg/l	0.2	9	0.12	0.01	--	
Chloride	mg/l	250	10	202.0	56.0	133.4	
Fluoride	mg/l	1.3	4	0.77	0.29	0.52	
Arsenic[5]	ug/l	50	3	10.0	10.0	--	
Barium[5]	ug/l	800	3	200	200	--	
Cadmium[5]	ug/l	5	3	10	10	--	
Total Chromium[5]	ug/l	300	3	30	30	--	
Copper[5]	ug/l	*	4	40	30	--	
Total Iron	ug/l	-	3	3040	1140	2160	
Lead[5]	ug/l	40	4	60	10	--	1
Manganese[5]	ug/l	-	2	200	180	190	
Mercury[5]	ug/l	0.5	3	0.5	0.5	--	
Selenium[5]	ug/l	5	3	10	10	--	
Silver[5]	ug/l	1	3	30	30	--	
Zinc	ug/l	*	4	150	80	113	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	3	112.0	85.0	96.3	
Hex. Chromium[5]	ug/l	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Cuyahoga River at Independence

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	12	2847	298	1146	
Temperature	°C	*	12	23.3	2.2	12.4	
pH	S.U.	6.0-9.0	11	8.3	7.1	7.7	
NH-3-N	mg/1	-	11	1.31	0.23	0.57	
TKN-N	mg/1	-	9	1.2	0.6	1.0	
Nitrate	mg/1	-	11	2.40	0.95	1.61	
Total Phosphorous	mg/1	-	12	0.70	0.20	0.40	
BOD_5	mg/1	-	9	13.6	1.3	4.8	
D.O.	% Saturation		10	89.9	63.3	77.5	
D.O.	mg/1	5.0	10	12.4	6.2	8.4	
Dissolved Solids	mg/1	1500	9	684	238	436	
Suspended Solids[5]	mg/1	-	11	272	10	73	
TOC	mg/1	-	10	20.0	2.0	9.8	
Oil-Grease	mg/1	5	3	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	8	42000	760	6302	8
Fecal Strep.	#/100 ml	-	8	11000	340	1757	
MBAS	mg/1	0.5	12	0.48	0.08	0.23	
Conductivity	Micromhos	-	12	1200	254	549	
Turbidity	J.U.	-	10	50	3.30	11.34	
Total Hardness	mg/1	-	6	246	179	224	
Phenols	ug/1	10	12	12.0	2.0	--	2
Cyanide[5]	mg/1	0.2	10	0.12	0.01	--	
Chloride	mg/1	250	12	232.0	44.0	123.1	
Fluoride	mg/1	1.3	4	0.52	0.22	0.35	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	5	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	7	50	30	--	
Total Iron	ug/1	-	5	5520	690	2006	
Lead[5]	ug/1	40	7	15	0	--	
Manganese[5]	ug/1	-	3	200	120	157	
Mercury[5]	ug/1	0.5	5	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	7	50	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5.0	107.0	73.0	93.0	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tinkers Creek at Bedford

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	9	340	28	139	
Temperature	°C	*	9	21.0	.2	11.8	
pH	S.U.	6.0-9.0	8	7.8	6.9	7.2	
NH-3-N	mg/1	-	8	1.43	.28	.73	
TKN-N	mg/1	-	9	2.0	.6	1.2	
Nitrate	mg/1	-	9	2.23	.48	1.12	
Total Phosphorous	mg/1	-	9	2.08	.10	.77	
BOD_5	mg/1	-	7	7.2	2.9	4.5	
D.O.	% Saturation		8	92.3	78.0	87.0	
D.O.	mg/1	5.0	8	12.8	7.5	9.8	
Dissolved Solids	mg/1	1500	9	520	264	408	
Suspended Solids[5]	mg/1	-	9	81	10	31	
TOC	mg/1	-	9	19.0	1.0	8.9	
Oil-Grease	mg/1	5	3	5.0	.5	--	
Fecal Coliform	#/100 ml	200	7	7800	300	886	7
Fecal Strep.	#/100 ml	-	7	3100	100	646	
MBAS	mg/1	0.5	9	.27	.07	.16	
Conductivity	Micromhos	-	7	750	300	514	
Turbidity	J.U.	-	9	62.00	3.70	13.97	
Total Hardness	mg/1	-	3	258	204	224	
Phenols	ug/1	10	9	90.0	3.0	17.7	3
Cyanide[5]	mg/1	0.2	9	.01	.01	--	
Chloride	mg/1	250	9	160.0	71.0	104.8	
Fluoride	mg/1	1.3	3	.56	.25	.36	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	80	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	12400	660	4770	
Lead[5]	ug/1	40	3	60	10	--	1
Manganese[5]	ug/1	-	2	340	120	230	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	630	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	105.0	90.0	96.7	
Hex. Chromium[5]	ug/1	50	3	68	30	--	1

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Chagrin River at Willoughby

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	10	840	72	321	
Temperature	°C	*	9	23.7	.5	9.4	
pH	S.U.	6.0-9.0	6	7.5	6.9	7.3	
NH-3-N	mg/1	-	10	.56	.05	.22	
TKN-N	mg/1	-	10	.7	.3	.4	
Nitrate	mg/1	-	10	1.00	.10	.47	
Total Phosphorous	mg/1	-	10	.30	.05	.12	
BOD_5	mg/1	-	6	5.0	1.3	3.2	
D.O.	% Saturation		7	92.6	75.7	87.7	
D.O.	mg/1	5.0	8	13.1	7.4	10.3	
Dissolved Solids	mg/1	1500	10	331	218	281	
Suspended Solids[5]	mg/1	-	10	112	9	32	
TOC	mg/1	-	9	16.0	1.0	5.8	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	8300	70	553	4
Fecal Strep.	#/100 ml	-	7	5100	48	340	
MBAS	mg/1	0.5	10	.16	.05	.08	
Conductivity	Micromhos	-	9	500	233	312	
Turbidity	J.U.	-	9	19.00	1.40	7.82	
Total Hardness	mg/1	-	5	206	166	185	
Phenols	ug/1	10	9	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	9	.01	.01	--	
Chloride	mg/1	250	10	82.0	26.0	49.7	
Fluoride	mg/1	1.3	3	.18	.12	.16	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	4	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	5	50	30	--	
Total Iron	ug/1	-	3	6500	920	2780	
Lead[5]	ug/1	40	4	18	10	--	
Manganese[5]	ug/1	-	4	200	60	100	
Mercury[5]	ug/1	0.5	4	.5	.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	5	67.0	43.0	59.8	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Grand River at Painesville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	24.2	.5	10.9	
pH	S.U.	6.0-9.0	6	7.6	7.2	7.5	
NH-3-N	mg/1	-	9	2.24	.36	.94	
TKN-N	mg/1	-	7	1.7	.5	1.1	
Nitrate	mg/1	-	9	.97	.20	.48	
Total Phosphorous	mg/1	-	9	.21	.02	.09	
BOD_5	mg/1	-	6	5.0	2.2	3.5	
D.O.	% Saturation		8	82.3	41.2	72.2	
D.O.	mg/1	5.0	8	11.2	3.5	8.4	1
Dissolved Solids	mg/1	1500	6	3840	622	2129	3
Suspended Solids[5]	mg/1	-	6	50	10	37	
TOC	mg/1	-	8	18.0	2.0	8.6	
Oil-Grease	mg/1	5	2	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	5	11000	830	2006	5
Fecal Strep.	#/100 ml	-	4	2100	19	376	
MBAS	mg/1	0.5	9	1.68	.25	.54	2
Conductivity	Micromhos	-	7	5500	600	2596	
Turbidity	J.U.	-	6	27.00	2.40	13.03	
Total Hardness	mg/1	-	4	1780	276	1097	
Phenols	ug/1	10	9	50.0	2.0	--	7
Cyanide[5]	mg/1	0.2	7	.02	.01	--	
Chloride	mg/1	250	10	2500	310	1251	10
Fluoride	mg/1	1.3	4	.18	.11	.15	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	5	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	4	100	30	--	
Total Iron	ug/1	-	4	2030	890	1478	
Lead[5]	ug/1	40	4	22	14	17	
Manganese[5]	ug/1	-	2	90	90	90	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	4	90	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	83.0	39.0	55.2	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Grand River Near Painesville - RT 84

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	8	2768	84	1009	
Temperature	°C	*	9	25.4	.2	11.2	
pH	S.U.	6.0-9.0	6	7.8	6.8	7.2	
NH-3-N	mg/1	-	10	.31	.05	.18	
TKN-N	mg/1	-	8	.7	.3	.4	
Nitrate	mg/1	-	10	1.06	.05	.41	
Total Phosphorous	mg/1	-	10	.16	.05	.10	
BOD_5	mg/1	-	9	3.3	1.0	1.7	
D.O.	% Saturation		9	87.5	72.0	80.8	
D.O.	mg/1	5.0	9	12.4	6.8	9.2	
Dissolved Solids	mg/1	1500	7	214	136	186	
Suspended Solids[5]	mg/1	-	10	178	10	41	
TOC	mg/1	-	9	11.0	4.0	7.0	
Oil-Grease	mg/1	5	2	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	9	630	17	103	4
Fecal Strep.	#/100 ml	-	9	2100	8	130	
MBAS	mg/1	0.5	10	.13	.05	.09	
Conductivity	Micromhos	-	5	350	130	204	
Turbidity	J.U.	-	7	23.00	1.50	12.67	
Total Hardness	mg/1	-	5	140	80	107	
Phenols	ug/1	10	9	8.0	2.0	--	
Cyanide[5]	mg/1	0.2	8	.01	.01	--	
Chloride	mg/1	250	10	69.0	19.0	31.0	
Fluoride	mg/1	1.3	4	.14	.09	.12	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	5	10	5	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	40	30	--	
Total Iron	ug/1	-	2	2210	1470	1840	
Lead[5]	ug/1	40	2	280	26	153	1
Manganese[5]	ug/1	-	2	110	70	90	
Mercury[5]	ug/1	0.5	4	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	80	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	50.0	35.0	41.5	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Ashtabula River in Ashtabula - 5th ST

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	8	20.0	3.5	11.2	
pH	S.U.	6.0-9.0	8	7.9	6.7	7.5	
NH-3-N	mg/1	-	8	.38	.13	.20	
TKN-N	mg/1	-	8	.7	.3	.5	
Nitrate	mg/1	-	8	.65	.20	.37	
Total Phosphorous	mg/1	-	8	.10	.05	.09	
BOD_5	mg/1	-	6	3.6	1.5	2.3	
D.O.	% Saturation		8	80.4	29.0	62.7	
D.O.	mg/1	5.0	8	10.2	3.8	7.0	1
Dissolved Solids	mg/1	1500	6	472	103	320	
Suspended Solids[5]	mg/1	-	6	21	10	13	
TOC	mg/1	-	8	15.0	1.0	8.0	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	4	9300	230	1021	4
Fecal Strep.	#/100 ml	-	6	3000	39	396	
MBAS	mg/1	0.5	8	.17	.07	.12	
Conductivity	Micromhos	-	6	800	190	480	
Turbidity	J.U.	-	7	14.00	3.30	7.04	
Total Hardness	mg/1	-	5	314	116	194	
Phenols	ug/1	10	7	6.0	2.0	--	
Cyanide[5]	mg/1	0.2	8	.01	.01	--	
Chloride	mg/1	250	8	280.0	56.0	121.6	1
Fluoride	mg/1	1.3	3	.17	.13	.15	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	5	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	4	30	30	--	
Total Iron	ug/1	-	4	1310	520	830	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	160	90	137	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	5	90	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	94.0	49.0	69.2	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Fields Brook in Ashtabula

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	2	23	17	20	
Temperature	°C	*	10	26.0	.7	12.5	
pH	S.U.	6.0-9.0	13	9.3	7.0	7.7	1
NH-3-N	mg/1	-	10	.98	.05	.44	
TKN-N	mg/1	-	9	1.4	.3	1.0	
Nitrate	mg/1	-	10	11.50	.05	1.60	
Total Phosphorous	mg/1	-	10	.88	.05	.21	
BOD_5	mg/1	-	7	16.8	2.8	9.2	
D.O.	% Saturation		10	134.1	73.2	87.2	
D.O.	mg/1	5.0	10	11.0	8.0	9.3	
Dissolved Solids	mg/1	1500	8	1996	918	1564	5
Suspended Solids[5]	mg/1	-	9	74	10	35	
TOC	mg/1	-	11	87.0	1.0	14.2	
Oil-Grease	mg/1	5	3	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	4	140	2	16	
Fecal Strep.	#/100 ml	-	4	110	2	21	
MBAS	mg/1	0.5	12	.92	.22	.45	4
Conductivity	Micromhos	-	11	3100	1050	2064	
Turbidity	J.U.	-	8	30.00	1.90	14.39	
Total Hardness	mg/1	-	10	976	30	391	
Phenols	ug/1	10	12	50.0	10.0	26.7	12
Cyanide[5]	mg/1	0.2	9	.06	.01	--	
Chloride	mg/1	250	12	1000	400	728.3	12
Fluoride	mg/1	1.3	8	.27	.16	.22	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	4	300	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	9	130	30	--	
Total Iron	ug/1	-	10	6600	470	1860	
Lead[5]	ug/1	40	9	360	10	--	1
Manganese[5]	ug/1	-	9	1940	210	949	
Mercury[5]	ug/1	0.5	10	32.5	.5	--	3
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	9	120	40	76	
Alumium	ug/1	-	2	800	700	750	
Sulfate[5]	mg/1	-	4	153.0	108.0	133.2	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Conneaut Creek at Conneaut

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	1092	14	239	
Temperature	°C	*	9	17.0	.2	7.4	
pH	S.U.	6.0-9.0	8	9.3	7.4	7.8	1
NH-3-N	mg/1	-	9	.34	.05	.18	
TKN-N	mg/1	-	8	1.1	.3	.4	
Nitrate	mg/1	-	9	.79	.04	.35	
Total Phosphorous	mg/1	-	9	.10	.05	.09	
BOD_5	mg/1	-	8	4.0	1.0	1.7	
D.O.	% Saturation		9	98.0	69.1	80.8	
D.O.	mg/1	5.0	9	11.2	6.7	9.9	
Dissolved Solids	mg/1	1500	10	1340	89	262	
Suspended Solids[5]	mg/1	-	8	89	10	36	
TOC	mg/1	-	9	15.0	1.0	5.6	
Oil-Grease	mg/1	5	3	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	9	900	18	75	3
Fecal Strep.	#/100 ml	-	9	2900	9	70	
MBAS	mg/1	0.5	8	.59	.05	.13	1
Conductivity	Micromhos	-	8	1400	100	345	
Turbidity	J.U.	-	6	32.00	2.00	13.33	
Total Hardness	mg/1	-	6	270	86	139	
Phenols	ug/1	10	7	17.0	2.0	--	1
Cyanide[5]	mg/1	0.2	7	.03	.01	--	
Chloride	mg/1	250	8	19.0	11.0	15.4	
Fluoride	mg/1	1.3	5	.23	.09	.13	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	300	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	4	40	30	--	
Total Iron	ug/1	-	3	3600	810	2570	
Lead[5]	ug/1	40	4	100	16	44	1
Manganese[5]	ug/1	-	4	1120	40	328	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	4	10	5	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	4	120	30	--	
Alumium	ug/1	-	2	1900	200	--	
Sulfate[5]	mg/1	-	6	153.0	32.0	61.7	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Beaver Creek Near E. Liverpool

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	5	1805	337	852	
Temperature	°C	*	6	17.0	.2	5.8	
pH	S.U.	6.0-9.0	6	7.7	7.3	7.5	
NH-3-N	mg/1	-	6	.61	.08	.32	
TKN-N	mg/1	-	6	.6	.3	.4	
Nitrate	mg/1	-	6	1.65	.39	1.13	
Total Phosphorous	mg/1	-	6	.10	.05	.08	
BOD_5	mg/1	-	6	6.5	1.0	2.8	
D.O.	% Saturation		6	93.8	59.3	78.1	
D.O.	mg/1	5.0	6	12.0	7.0	9.9	
Dissolved Solids	mg/1	1500	6	487	306	396	
Suspended Solids[5]	mg/1	-	8	117	10	35	
TOC	mg/1	-	6	10.0	1.0	6.5	
Oil-Grease	mg/1	5	3	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	7	5200	58	804	5
Fecal Strep.	#/100 ml	-	6	6500	9	327	
MBAS	mg/1	0.5	6	.13	.05	.07	
Conductivity	Micromhos	-	5	600	225	424	
Turbidity	J.U.	-	6	7.20	2.70	4.98	
Total Hardness	mg/1	-	3	298	256	280	
Phenols	ug/1	10	6	4.0	2.0	--	
Cyanide[5]	mg/1	0.2	6	.01	.01	--	
Chloride	mg/1	250	6	56.0	25.0	42.8	
Fluoride	mg/1	1.3	3	.22	.15	.18	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	600	440	513	
Lead[5]	ug/1	40	3	11	10	--	
Manganese[5]	ug/1	-	3	570	160	347	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	3	80	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	176.0	55.0	124.0	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mahoning River at Lowellville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	10	3250	510	1330	
Temperature	°C	*	10	30.6	5.8	19.4	
pH	S.U.	6.0-9.0	5	7.7	7.3	7.4	
NH-3-N	mg/1	-	10	3.96	0.92	2.54	
TKN-N	mg/1	-	10	5.0	1.2	3.4	
Nitrate	mg/1	-	10	1.09	0.18	0.53	
Total Phosphorous	mg/1	-	10	1.03	0.20	0.46	
BOD_5	mg/1	-	10	9.2	3.2	5.9	
D.O.	% Saturation		10	97.6	43.4	67.7	
D.O.	mg/1	5.0	10	12.2	3.3	6.9	5
Dissolved Solids	mg/1	1500	9	414	205	317	
Suspended Solids[5]	mg/1	-	11	62	11	30	
TOC	mg/1	-	9	14.0	4.0	9.9	
Oil-Grease	mg/1	5	4	5.1	0.5		
Fecal Coliform	#/100 ml	200	11	6000	660	8308	11
Fecal Strep.	#/100 ml	-	11	7000	220	2010	
MBAS	mg/1	0.5	10	0.93	0.10	0.29	1
Conductivity	Micromhos	-	8	700	220	453	
Turbidity	J.U.	-	9	17	5.40	10.70	
Total Hardness	mg/1	-	4	182	142	162	
Phenols	ug/1	10	10	247.0	5.0	43.1	6
Cyanide[5]	mg/1	0.2	9	0.20	0.03	0.09	1
Chloride	mg/1	250	10	78.0	36.0	53.9	
Fluoride	mg/1	1.3	3	0.76	0.32	0.47	
Arsenic[5]	ug/1	50	3	10.0	10.0		
Barium[5]	ug/1	800	3	200	200		
Cadmium[5]	ug/1	5	3	10	10		
Total Chromium[5]	ug/1	300	3	50	30		
Copper[5]	ug/1	*	4	60	30		
Total Iron	ug/1	-	3	4700	2710	3437	
Lead[5]	ug/1	40	4	30	15	24	
Manganese[5]	ug/1	-	3	430	300	360	
Mercury[5]	ug/1	0.5	3	0.5	0.5		
Selenium[5]	ug/1	5	3	10	10		
Silver[5]	ug/1	1	3	30	30		
Zinc	ug/1	*	4	390	130	218	
Alumium	ug/1	-					
Sulfate[5]	mg/1	-	4	111.0	77.0	93.0	
Hex. Chromium[5]	ug/1	50	3	30	30		

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mahoning River at Struthers

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	10	33.1	5.5	20.8	
pH	S.U.	6.0-9.0	5	7.7	6.9	7.3	
NH-3-N	mg/1	-	10	4.51	0.66	2.53	
TKN-N	mg/1	-	10	5.9	0.8	3.3	
Nitrate	mg/1	-	10	1.08	0.07	0.52	
Total Phosphorous	mg/1	-	10	.92	.20	0.48	
BOD_5	mg/1	-	8	13.0	4.8	7.4	
D.O.	% Saturation		10	98.3	53.3	69.8	
D.O.	mg/1	5.0	10	11.5	4.0	6.8	5
Dissolved Solids	mg/1	1500	8	418	230	323	
Suspended Solids[5]	mg/1	-	10	69	18	42	
TOC	mg/1	-	10	17.0	7.0	10.5	
Oil-Grease	mg/1	5	4	5.0	3.9	4.4	
Fecal Coliform	#/100 ml	200	6	21000	71	4109	5
Fecal Strep.	#/100 ml	-	7	9500	71	2928	
MBAS	mg/1	0.5	10	0.47	0.11	0.23	
Conductivity	Micromhos	-	8	1400	260	572	
Turbidity	J.U.	-	8	27.00	7.90	14.21	
Total Hardness	mg/1	-	4	174	140	159	
Phenols	ug/1	10	10	163.0	14.0	39.3	10
Cyanide[5]	mg/1	0.2	9	0.25	0.02	0.11	1
Chloride	mg/1	250	10	76.0	34.0	54.8	
Fluoride	mg/1	1.3	3	0.81	0.32	0.49	
Arsenic[5]	ug/1	50	3	10.0	10.0		
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	10	--	
Total Chromium[5]	ug/1	300	3	40	30	--	
Copper[5]	ug/1	*	4	50	30	--	
Total Iron	ug/1	-	3	4570	3400	4023	
Lead[5]	ug/1	40	4	30	22	28	
Manganese[5]	ug/1	-	3	650	280	420	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	4	370	180	250	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	117.00	76.0	91.2	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mahoning River At Niles

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	10	25.0	2.0	15.4	
pH	S.U.	6.0-9.0	5	7.6	7.3	7.5	
NH-3-N	mg/1	-	10	1.70	0.43	1.02	
TKN-N	mg/1	-	10	2.7	0.8	1.4	
Nitrate	mg/1	-	10	2.13	0.14	0.61	
Total Phosphorous	mg/1	-	10	0.30	0.10	0.18	
BOD_5	mg/1	-	9	7.9	3.2	5.4	
D.O.	% Saturation		9	98.6	52.4	78.1	
D.O.	mg/1	5.0	9	13.6	4.4	8.1	1
Dissolved Solids	mg/1	1500	9	296	184	259	
Suspended Solids[5]	mg/1	-	10	42	15	25	
TOC	mg/1	-	10	14.0	2.0	8.7	
Oil-Grease	mg/1	5	3	5.0	0.5		
Fecal Coliform	#/100 ml	200	8	2000.	9	569	7
Fecal Strep.	#/100 ml	-	8	640	73	234	
MBAS	mg/1	0.5	10	0.33	0.08	0.14	
Conductivity	Micromhos	-	8	500	200	339	
Turbidity	J.U.	-	9	14.00	3.60	9.89	
Total Hardness	mg/1	-	4	150	138	144	
Phenols	ug/1	10	10	93.0	2.0		
Cyanide[5]	mg/1	0.2	9	0.41	0.01	0.10	2
Chloride	mg/1	250	10	59.0	28.0	39.8	
Fluoride	mg/1	1.3	3	0.36	0.18	0.25	
Arsenic[5]	ug/1	50	3	10.0	10.0		
Barium[5]	ug/1	800	3	200	200		
Cadmium[5]	ug/1	5	3	10	10		
Total Chromium[5]	ug/1	300	3	30	30		
Copper[5]	ug/1	*	4	30	30		
Total Iron	ug/1	-	3	3900	3300	3633	
Lead[5]	ug/1	40	4	20	13	16	
Manganese[5]	ug/1	-	3	430	240	323	
Mercury[5]	ug/1	0.5	3	0.5	0.5		
Selenium[5]	ug/1	5	3	10	10		
Silver[5]	ug/1	1	3	30	30		
Zinc	ug/1	*	4	420	140	228	
Alumium	ug/1	-					
Sulfate[5]	mg/1	-	4	92.0	70.0	78.7	
Hex. Chromium[5]	ug/1	50	3	30	30		

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mahoning River at Warren

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	#[4]
Flow	cfs	-	7	2400	300	943	
Temperature	°C	*	11	22.0	0.0	12.6	
pH	S.U.	6.0-9.0	5	7.9	7.3	7.6	
NH-3-N	mg/1	-	11	0.59	0.05	0.24	
TKN-N	mg/1	-	10	2.5	0.3	0.6	
Nitrate	mg/1	-	11	1.47	0.21	0.59	
Total Phosphorous	mg/1	-	11	0.40	0.05	0.13	
BOD_5	mg/1	-	11	4.4	1.1	2.1	
D.O.	% Saturation		10	107.4	78.8	91.8	
D.O.	mg/1	5.0	10	12.2	8.2	9.9	
Dissolved Solids	mg/1	1500	11	278	160	230	
Suspended Solids[5]	mg/1	-	12	46	10	17	
TOC	mg/1	-	10	9.0	1.0	5.7	
Oil-Grease	mg/1	5	4	5.0	0.5		
Fecal Coliform	#/100 ml	200	8	1300	590	814	8
Fecal Strep.	#/100 ml	-	8	270	91	183	
MBAS	mg/1	0.5	10	0.16	0.07	0.09	
Conductivity	Micromhos	-	9	370	90	262	
Turbidity	J.U.	-	10	23.00	1.40	8.43	
Total Hardness	mg/1	-	5	144	110	134	
Phenols	ug/1	10	11	10.0	2.0	--	
Cyanide[5]	mg/1	0.2	10	0.02	0.01	--	
Chloride	mg/1	250	11	35.0	21.0	27.7	
Fluoride	mg/1	1.3	4	0.23	0.15	0.19	
Arsenic[5]	ug/1	50	4	10.0	10.0	--	
Barium[5]	ug/1	800	4	200	200	--	
Cadmium[5]	ug/1	5	4	10	10	--	
Total Chromium[5]	ug/1	300	4	30	30	--	
Copper[5]	ug/1	*	5	60	30	--	
Total Iron	ug/1	-	4	3200	370	1655	
Lead[5]	ug/1	40	5	19	10	--	
Manganese[5]	ug/1	-	4	330	190	263	
Mercury[5]	ug/1	0.5	4	0.5	0.5	--	
Selenium[5]	ug/1	5	4	10	10	--	
Silver[5]	ug/1	1	4	30	30	---	
Zinc	ug/1	*	5	180	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	5	84.0	65.0	73.8	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mahoning River At Alliance

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	5	325	11	83	
Temperature	°C	*	5	21.0	14.0	18.9	
pH	S.U.	6.0-9.0	1	7.7	7.7	7.7	
NH-3-N	mg/1	-	5	0.17	0.04	0.08	
TKN-N	mg/1	-	5	1.3	0.3	0.6	
Nitrate	mg/1	-	5	0.51	0.05	0.23	
Total Phosphorous	mg/1	-	5	0.20	0.08	0.12	
BOD_5	mg/1	-	6	5.5	2.5	3.8	
D.O.	% Saturation		5	96.7	26.7	65.1	
D.O.	mg/1	5.0	5	9.4	2.4	6.2	2
Dissolved Solids	mg/1	1500	6	542	378	460	
Suspended Solids[5]	mg/1	-	6	40	10	23	
TOC	mg/1	-	5	13.0	1.3	8.3	
Oil-Grease	mg/1	5	1	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	5	3500	230	683	5
Fecal Strep.	#/100 ml	-	6	27000	70	445	
MBAS	mg/1	0.5	5	0.14	0.06	0.09	
Conductivity	Micromhos	-	4	710	475	589	
Turbidity	J.U.	-	5	18.00	2.10	7.58	
Total Hardness	mg/1	-	1	344	344	344	
Phenols	ug/1	10	5	69.0	2.0	--	3
Cyanide[5]	mg/1	0.2	5	0.01	0.01	--	
Chloride	mg/1	250	5	34.0	24.0	27.0	
Fluoride	mg/1	1.3	1	0.42	0.42	0.42	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	1	200	200	--	
Cadmium[5]	ug/1	5	1	10	10	--	
Total Chromium[5]	ug/1	300	1	30	30	--	
Copper[5]	ug/1	*	1	30	30	--	
Total Iron	ug/1	-	1	10	10	10	
Lead[5]	ug/1	40	1	10	10	--	
Manganese[5]	ug/1	-	1	570	570	570	
Mercury[5]	ug/1	0.5	1	0.5	0.5	--	
Selenium[5]	ug/1	5	1	10	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	1	221.0	221.0	221.0	
Hex. Chromium[5]	ug/1	50	1	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Muskingum River Below Beverly

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	6	27.0	1.1	16.8	
pH	S.U.	6.0-9.0	11	8.5	7.2	7.7	
NH-3-N	mg/1	-	5	0.59	0.06	0.30	
TKN-N	mg/1	-	5	0.6	0.2	0.4	
Nitrate	mg/1	-	6	1.40	0.23	0.74	
Total Phosphorous	mg/1	-	4	0.70	0.05	0.24	
BOD_5	mg/1	-	5	3.0	1.2	2.0	
D.O.	% Saturation		6	106.5	74.1	93.9	
D.O.	mg/1	5.0	6	13.5	6.0	9.6	
Dissolved Solids	mg/1	1500	6	547	322	442	
Suspended Solids[5]	mg/1	-	6	70	13	32	
TOC	mg/1	-	6	10.0	1.0	4.2	
Oil-Grease	mg/1	5	3	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	7	580	40	143	3
Fecal Strep.	#/100 ml	-	7	1000	15	63	
MBAS	mg/1	0.5	6	0.12	0.05	0.08	
Conductivity	Micromhos	-	6	780	650	723	
Turbidity	J.U.	-	6	36.00	2.70	10.38	
Total Hardness	mg/1	-	3	298	210	261	
Phenols	ug/1	10	6	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	6	0.01	0.01	--	
Chloride	mg/1	250	6	79.0	43.0	65.3	
Fluoride	mg/1	1.3	3	0.24	0.17	0.21	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	40	30	--	
Total Iron	ug/1	-	2	2790	1000	1895	
Lead[5]	ug/1	40	2	12	10	--	
Manganese[5]	ug/1	-	3	470	270	353	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	3	155.0	117.0	135.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Muskingum River at McConnelsville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	20	20	20	
Temperature	°C	*	7	23.0	.6	13.4	
pH	S.U.	6.0-9.0	13	8.4	6.8	7.6	
NH-3-N	mg/1	-	7	.44	.05	.19	
TKN-N	mg/1	-	6	.6	.3	.4	
Nitrate	mg/1	-	7	1.40	.05	.70	
Total Phosphorous	mg/1	-	5	.10	.05	.08	
BOD_5	mg/1	-	6	4.2	1.1	2.6	
D.O.	% Saturation		7	108.5	56.3	90.8	
D.O.	mg/1	5.0	7	15.4	6.9	9.8	
Dissolved Solids	mg/1	1500	7	541	324	453	
Suspended Solids[5]	mg/1	-	7	33	12	21	
TOC	mg/1	-	7	10.0	1.0	4.7	
Oil-Grease	mg/1	5	3	5.0	.5	--	
Fecal Coliform	#/100 ml	200	7	1400	16	173	4
Fecal Strep.	#/100 ml	-	6	230	4	19	
MBAS	mg/1	0.5	7	.11	.05	.08	
Conductivity	Micromhos	-	6	890	660	781	
Turbidity	J.U.	-	7	18.00	2.30	8.66	
Total Hardness	mg/1	-	4	294	214	261	
Phenols	ug/1	10	7	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	.01	.01	--	
Chloride	mg/1	250	7	112.0	43.0	77.3	
Fluoride	mg/1	1.3	3	.25	.18	.22	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	40	30	--	
Total Iron	ug/1	-	2	1460	1360	1410	
Lead[5]	ug/1	40	2	18	10	--	
Manganese[5]	ug/1	-	3	530	220	360	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	161.0	119.0	139.5	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Licking River near Newark

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	418	418	418	
Temperature	°C	*	7	22.0	1.0	15.3	
pH	S.U.	6.0-9.0	11	8.1	7.3	7.8	
NH-3-N	mg/1	-	7	3.04	0.49	1.31	
TKN-N	mg/1	-	7	1.8	0.3	1.3	
Nitrate	mg/1	-	7	4.25	0.77	1.80	
Total Phosphorous	mg/1	-	5	0.40	0.10	0.27	
BOD_5	mg/1	-	7	6.1	2.0	3.8	
D.O.	% Saturation		5	91.7	70.1	81.6	
D.O.	mg/1	5.0	5	10.6	6.8	8.1	
Dissolved Solids	mg/1	1500	7	544	214	396	
Suspended Solids[5]	mg/1	-	7	70	10	23	
TOC	mg/1	-	6	34.0	1.0	9.0	
Oil-Grease	mg/1	5	3	5.0	1.0		
Fecal Coliform	#/100 ml	200	7	2700	210	804	7
Fecal Strep.	#/100 ml	-	4	220	20	57	
MBAS	mg/1	0.5	7	.24	.05	.11	
Conductivity	Micromhos	-	7	1150	345	613	
Turbidity	J.U.	-	7	33.00	1.60	10.07	
Total Hardness	mg/1	-	4	292	156	252	
Phenols	ug/1	10	7	2.0	2.0		
Cyanide[5]	mg/1	0.2	7	0.01	0.01		
Chloride	mg/1	250	7	95.0	19.0	50.4	
Fluoride	mg/1	1.3	3	0.31	0.13	0.24	
Arsenic[5]	ug/1	50	3	10.0	10.0		
Barium[5]	ug/1	800	3	200	200		
Cadmium[5]	ug/1	5	3	10	5		
Total Chromium[5]	ug/1	300	3	30	30		
Copper[5]	ug/1	*	3	40	30		
Total Iron	ug/1	-	3	2870	290	1313	
Lead[5]	ug/1	40	2	13	10		
Manganese[5]	ug/1	-	3	90	60	77	
Mercury[5]	ug/1	0.5	3	0.5	0.5		
Selenium[5]	ug/1	5	3	10	5		
Silver[5]	ug/1	1	3	30	30		
Zinc	ug/1	*	3	40	30		
Alumium	ug/1	-					
Sulfate[5]	mg/1	-	5	98.0	34.0	77.4	
Hex. Chromium[5]	ug/1	50	3	30	30		

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Muskingum River In Dresden - SR 208

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	2775	2775	2775	
Temperature	°C	*	6	26.	0.5	16.0	
pH	S.U.	6.0-9.0	12	8.3	7.5	7.7	
NH-3-N	mg/l	-	7	.60	.05	.26	
TKN-N	mg/l	-	6	0.7	0.3	0.5	
Nitrate	mg/l	-	7	2.22	0.37	1.06	
Total Phosphorous	mg/l	-	5	.20	0.05	0.10	
BOD_5	mg/l	-	6	4.6	1.8	3.3	
D.O.	% Saturation		5	106.4	85.4	94.5	
D.O.	mg/l	5.0	5	10.4	7.0	8.9	
Dissolved Solids	mg/l	1500	6	594	326	452	
Suspended Solids[5]	mg/l	-	7	95	11	36	
TOC	mg/l	-	7	12.0	1.0	6.3	
Oil-Grease	mg/l	5	3	5.0	0.9	--	
Fecal Coliform	#/100 ml	200	7	5700	130	894	6
Fecal Strep.	#/100 ml	-	7	450	44	156	
MBAS	mg/l	0.5	7	0.11	0.05	0.08	
Conductivity	Micromhos	-	7	900	655	763	
Turbidity	J.U.	-	7	44.00	3.00	11.19	
Total Hardness	mg/l	-	4	300	230	270	
Phenols	ug/l	10	7	6.0	2.0	--	
Cyanide[5]	mg/l	0.2	7	0.01	0.01	--	
Chloride	mg/l	250	7	92.0	13.7	63.1	
Fluoride	mg/l	1.3	3	0.23	0.16	0.20	
Arsenic[5]	ug/l	50	3	10.0	10.0	--	
Barium[5]	ug/l	800	3	200	200	--	
Cadmium[5]	ug/l	5	3	10	5	--	
Total Chromium[5]	ug/l	300	3	30	30	--	
Copper[5]	ug/l	*	3	40	30	--	
Total Iron	ug/l	-	2	4500	950	2725	
Lead[5]	ug/l	40	2	33	22	28	
Manganese[5]	ug/l	-	3	580	350	480	
Mercury[5]	ug/l	0.5	3	0.5	0.5	--	
Selenium[5]	ug/l	5	3	10	5	--	
Silver[5]	ug/l	1	3	30	30	--	
Zinc	ug/l	*	3	50	30	--	
Alumium	ug/l	-	-	--	--	--	
Sulfate[5]	mg/l	-	4	148.0	125.0	136.7	
Hex. Chromium[5]	ug/l	50	3	30	30		

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Wills Creek Below Wills Creek Dam

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	7.0	24.0	0.0	14.7	
pH	S.U.	6.0-9.0	9	7.6	6.0	7.1	1
NH-3-N	mg/1	-	7	0.38	0.05	0.20	
TKN-N	mg/1	-	6	0.9	0.3	0.4	
Nitrate	mg/1	-	7	0.54	0.05	0.26	
Total Phosphorous	mg/1	-	6	0.10	0.05	0.08	
BOD_5	mg/1	-	7	4.0	0.8	2.1	
D.O.	% Saturation		7	100.0	67.8	88.8	
D.O.	mg/1	5.0	7	13.0	6.1	9.4	
Dissolved Solids	mg/1	1500	7	472	278	341	
Suspended Solids[5]	mg/1	-	7	42	15	33	
TOC	mg/1	-	7	10.0	1.0	5.1	
Oil-Grease	mg/1	5	3	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	7	4500	52	307	4
Fecal Strep.	#/100 ml	-	7	110	30	58	
MBAS	mg/1	0.5	7	0.07	0.05	0.06	
Conductivity	Micromhos	-	8	800	250	499	
Turbidity	J.U.	-	7	27.00	8.30	16.51	
Total Hardness	mg/1	-	3	248	204	219	
Phenols	ug/1	10	7	8.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	25.0	10.0	16.1	
Fluoride	mg/1	1.3	3	0.19	0.13	0.17	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	8	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	40	30	--	
Total Iron	ug/1	-	3	2150	1380	1757	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	650	350	513	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	3	172.0	108.0	133.0	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Wills Creek Below Cambridge

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-					
Temperature	°C	*	6	23.0	0.0	15.3	
pH	S.U.	6.0-9.0	8	7.7	6.9	7.2	
NH-3-N	mg/1	-	7	1.09	0.13	0.47	
TKN-N	mg/1	-	6	0.9	0.3	0.5	
Nitrate	mg/1	-	7	0.81	0.18	0.47	
Total Phosphorous	mg/1	-	6	0.60	0.10	0.25	
BOD_5	mg/1	-	6	5.2	1.5	3.0	
D.O.	% Saturation		6	98.6	22.2	64.8	
D.O.	mg/1	5.0	6	14.4	2.0	7.1	2
Dissolved Solids	mg/1	1500	5	675	175	405	
Suspended Solids[5]	mg/1	-	5	121	31	75	
TOC	mg/1	-	7	14.0	1.0	8.9	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	12000	1200	3935	7
Fecal Strep.	#/100 ml	-	7	1200	15	243	
MBAS	mg/1	0.5	6	0.10	0.05	0.07	
Conductivity	Micromhos	-	7	1000	300	601	
Turbidity	J.U.	-	7	74.00	2.20	32.14	
Total Hardness	mg/1	-	3	326	122	246	
Phenols	ug/1	10	7	4.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	28.0	12.0	18.0	
Fluoride	mg/1	1.3	3	0.25	0.10	0.19	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	8	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	60	30	--	
Total Iron	ug/1	-	3	4500	1210	2503	
Lead[5]	ug/1	40	3	13	10	--	
Manganese[5]	ug/1	-	3	540	280	400	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	50	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	3	198.0	69.0	153.3	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Muskingum River Below Coshocton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	22.0	0.5	14.0	
pH	S.U.	6.0-9.0	11	8.0	7.1	7.5	
NH-3-N	mg/l	-	7	0.71	0.05	0.19	
TKN-N	mg/l	-	6	0.5	0.3	0.4	
Nitrate	mg/l	-	7	1.53	0.76	1.20	
Total Phosphorous	mg/l	-	5	0.17	0.10	0.13	
BOD_5	mg/l	-	7	5.1	2.0	3.2	
D.O.	% Saturation		7	104.9	80.4	91.5	
D.O.	mg/l	5.0	7	13.2	7.3	9.7	
Dissolved Solids	mg/l	1500	6	656	384	492	
Suspended Solids[5]	mg/l	-	7	220	10	69	
TOC	mg/l	-	7	20.0	3.0	10.9	
Oil-Grease	mg/l	5	3	5.0	1.0	--	
Fecal Coliform	#/100 ml	200	6	4500	140	1156	5
Fecal Strep.	#/100 ml	-	7	1600	120	452	
MBAS	mg/l	0.5	7	0.14	0.06	0.10	
Conductivity	Micromhos	-	7	1000	400	634	
Turbidity	J.U.	-	7	124.00	2.30	27.04	
Total Hardness	mg/l	-	4	320	236	278	
Phenols	ug/l	10	7	18.0	3.0	7.7	1
Cyanide[5]	mg/l	0.2	7	0.01	0.01	--	
Chloride	mg/l	250	7	143.0	59.0	87.6	
Fluoride	mg/l	1.3	3	0.26	0.14	0.22	
Arsenic[5]	ug/l	50	3	10.0	10.0	--	
Barium[5]	ug/l	800	3	200	200	--	
Cadmium[5]	ug/l	5	3	10	5	--	
Total Chromium[5]	ug/l	300	3	30	30	--	
Copper[5]	ug/l	*	3	40	30	--	
Total Iron	ug/l	-	3	8500	830	4210	
Lead[5]	ug/l	40	2	18	10	--	
Manganese[5]	ug/l	-	3	760	450	590	
Mercury[5]	ug/l	0.5	3	0.5	0.5	--	
Selenium[5]	ug/l	5	3	10	10	--	
Silver[5]	ug/l	1	3	30	30	--	
Zinc	ug/l	*	3	70	30	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	3	149.0	108.0	133.7	
Hex. Chromium[5]	ug/l	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tuscarawas River at Coshocton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	22.0	0.5	14.3	
pH	S.U.	6.0-9.0	11	8.0	7.1	7.5	
NH-3-N	mg/1	-	7	0.44	0.05	0.17	
TKN-N	mg/1	-	6	2.3	0.3	0.7	
Nitrate	mg/1	-	7	1.98	1.05	1.40	
Total Phosphorous	mg/1	-	4	0.21	0.11	0.17	
BOD_5	mg/1	-	7	37.0	2.5	8.7	
D.O.	% Saturation		7	101.9	57.4	82.9	
D.O.	mg/1	5.0	7	12.1	6.2	8.7	
Dissolved Solids	mg/1	1500	7	1050	438	638	
Suspended Solids[5]	mg/1	-	7	254	10	84	
TOC	mg/1	-	7	59.0	5.0	17.7	
Oil-Grease	mg/1	5	3	5.0	1.3	--	
Fecal Coliform	#/100 ml	200	5	8000	180	1384	4
Fecal Strep.	#/100 ml	-	7	1600	100	297	
MBAS	mg/1	0.5	7	0.23	0.05	0.11	
Conductivity	Micromhos	-	7	1320	400	754	
Turbidity	J.U.	-	7	88	2.50	32.79	
Total Hardness	mg/1	-	4	412	272	333	
Phenols	ug/1	10	7	141.0	3.0	29.3	5
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	245.0	77.0	134.9	
Fluoride	mg/1	1.3	3	0.32	0.17	0.25	
Arsenic[5]	ug/1	50	3	10.0	10.0	---	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	9850	1350	4867	
Lead[5]	ug/1	40	2	12	10	--	
Manganese[5]	ug/1	-	3	1040	610	807	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	60	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	4	226.0	156.0	181.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Stillwater Creek Below Dennison

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	24.0	4.4	16.2	
pH	S.U.	6.0-9.0	10	7.7	6.6	7.4	
NH-3-N	mg/1	-	7	0.63	0.19	0.33	
TKN-N	mg/1	-	6	0.6	0.3	0.4	
Nitrate	mg/1	-	7	0.46	0.05	0.25	
Total Phosphorous	mg/1	-	6	0.30	0.05	0.13	
BOD_5	mg/1	-	7	3.2	1.0	2.2	
D.O.	% Saturation		6	96.2	72.2	84.8	
D.O.	mg/1	5.0	6	12.6	6.6	8.9	
Dissolved Solids	mg/1	1500	7	734	370	582	
Suspended Solids[5]	mg/1	-	7	41	19	25	
TOC	mg/1	-	7	16.0	1.0	5.7	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	6	2800	340	1345	6
Fecal Strep.	#/100 ml	-	7	1200	86	289	
MBAS	mg/1	0.5	7	0.09	0.05	0.06	
Conductivity	Micromhos	-	7	1100	348	761	
Turbidity	J.U.	-	7	19.00	3.10	9.63	
Total Hardness	mg/1	-	3	420	288	369	
Phenols	ug/1	10	7	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	62.0	15.0	35.9	
Fluoride	mg/1	1.3	3	0.18	0.12	0.16	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	26	10	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	2	1120	910	1015	
Lead[5]	ug/1	40	3	29	10	--	
Manganese[5]	ug/1	-	3	840	310	537	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	4	370.0	208.0	294.5	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tuscarawas River below New Philadelphia

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	24.0	4.7	16.4	
pH	S.U.	6.0-9.0	10	7.8	6.9	7.5	
NH-3-N	mg/1	-	7	0.57	0.19	0.33	
TKN-N	mg/1	-	6	0.9	0.3	0.6	
Nitrate	mg/1	-	7	2.00	0.69	1.42	
Total Phosphorous	mg/1	-	6	0.50	0.10	0.25	
BOD_5	mg/1	-	7	4.7	1.6	3.5	
D.O.	% Saturation		6	100.8	76.3	86.3	
D.O.	mg/1	5.0	6	12.9	6.9	8.9	
Dissolved Solids	mg/1	1500	7	1271	330	751	
Suspended Solids[5]	mg/1	-	7	51	15	29	
TOC	mg/1	-	7	9.0	1.0	3.7	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	3	8000	2200	4563	3
Fecal Strep.	#/100 ml	-	6	4400	210	992	
MBAS	mg/1	0.5	7	0.21	0.07	0.13	
Conductivity	Micromhos	-	7	1700	440	1064	
Turbidity	J.U.	-	7	28.00	2.40	10.64	
Total Hardness	mg/1	-	3	430	170	310	
Phenols	ug/1	10	7	10.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	381.0	62.0	200.0	1
Fluoride	mg/1	1.3	4	0.47	0.19	0.36	
Arsenic[5]	ug/1	50	3	17.0	10.0	--	
Barium[5]	ug/1	800	3	300	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30		
Total Iron	ug/1	-	2	2720	1070	1895	
Lead[5]	ug/1	40	3	20	10	--	
Manganese[5]	ug/1	-	3	1450	700	1063	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	50	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	4	206.0	91.0	159.2	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Sugar Creek above New Philadelphia

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	157	157	157	
Temperature	°C	*	7	23.0	4.4	15.9	
pH	S.U.	6.0-9.0	10	7.8	6.8	7.5	
NH-3-N	mg/1	-	7	0.35	0.08	0.21	
TKN-N	mg/1	-	5	0.3	0.3	0.3	
Nitrate	mg/1	-	6	2.90	0.44	1.24	
Total Phosphorous	mg/1	-	6	0.20	0.05	0.11	
BOD_5	mg/1	-	7	4.1	1.0	2.2	
D.O.	% Saturation		6	105.4	58.8	87.7	
D.O.	mg/1	5.0	6	12.8	6.0	9.2	
Dissolved Solids	mg/1	1500	7	624	256	473	
Suspended Solids[5]	mg/1	-	7	48	10	29	
TOC	mg/1	-	7	6.0	1.0	2.9	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	5	780	230	374	5
Fecal Strep.	#/100 ml	-	6	15000	48	993	
MBAS	mg/1	0.5	7	0.01	0.00	0.05	
Conductivity	Micromhos	-	7	1000	325	604	
Turbidity	J.U.	-	7	28.00	1.80	11.36	
Total Hardness	mg/1	-	3	388	162	300	
Phenols	ug/1	10	7	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	40.0	16.0	27.4	
Fluoride	mg/1	1.3	3	0.27	0.17	0.23	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	13	10	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	2	2440	1100	1770	
Lead[5]	ug/1	40	3	23	10	--	
Manganese[5]	ug/1	-	3	2130	730	1220	
Mercury[5]	ug/1	0.5	3	0.5	0.5	0.5	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	289.0	102.0	220.0	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Nimishillen Creek at N.Industry

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	1	158	158	158	
Temperature	°C	*	7	21.5	6.1	15.5	
pH	S.U.	6.0-9.0	10	7.7	6.8	7.4	
NH-3-N	mg/1	-	7	5.38	1.24	2.89	
TKN-N	mg/1	-	6	6.4	1.8	3.9	
Nitrate	mg/1	-	7	2.22	.78	1.35	
Total Phosphorous	mg/1	-	6	2.20	.30	1.23	
BOD_5	mg/1	-	7	16.0	2.5	7.5	
D.O.	% Saturation		7	88.0	34.1	65.6	
D.O.	mg/1	5.0	7	11.0	3.0	6.9	1
Dissolved Solids	mg/1	1500	7	783	462	654	
Suspended Solids[5]	mg/1	-	7	27	10	15	
TOC	mg/1	-	7	15.0	3.0	7.7	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	3	2100	690	1449	3
Fecal Strep.	#/100 ml	-	5	12000	420	947	
MBAS	mg/1	0.5	7	.25	.09	.16	
Conductivity	Micromhos	-	6	850	440	876	
Turbidity	J.U.	-	7	9.20	.44	4.51	
Total Hardness	mg/1	-	3	382	330	362	
Phenols	ug/1	10	6	13.0	2.0	--	1
Cyanide[5]	mg/1	0.2	7	.02	.01	--	
Chloride	mg/1	250	7	140.0	74.0	109.4	
Fluoride	mg/1	1.3	4	1.02	.72	.87	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	40	30	--	
Copper[5]	ug/1	*	3	40	30	--	
Total Iron	ug/1	-	2	1680	990	1335	
Lead[5]	ug/1	40	3	32	14	23	
Manganese[5]	ug/1	-	3	660	530	603	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	60	50	53	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	186.0	146.0	165.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tuscarawas River at Massillon

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	22.0	1.0	14.7	
pH	S.U.	6.0-9.0	7	7.9	6.9	7.4	
NH-3-N	mg/1	-	6	2.03	0.28	1.02	
TKN-N	mg/1	-	4	2.3	1.1	1.7	
Nitrate	mg/1	-	6	3.42	1.35	2.09	
Total Phosphorous	mg/1	-	5	0.80	0.30	0.45	
BOD_5	mg/1	-	6	6.7	2.7	4.9	
D.O.	% Saturation		6	101.4	45.5	68.6	
D.O.	mg/1	5.0	6	14.4	4.0	7.4	1
Dissolved Solids	mg/1	1500	6	2247	788	1542	3
Suspended Solids[5]	mg/1	-	6	46	10	24	
TOC	mg/1	-	6	17.0	4.0	10.2	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	4	11000	140	2028	3
Fecal Strep.	#/100 ml	-	5	2100	40	424	
MBAS	mg/1	0.5	6	0.34	0.13	0.24	
Conductivity	Micromhos	-	6	2500	1400	1883	
Turbidity	J.U.	-	6	46	3.20	12.62	
Total Hardness	mg/1	-	3	600	290	457	
Phenols	ug/1	10	6	33.0	2.0	--	5
Cyanide[5]	mg/1	0.2	6	0.02	0.01	--	
Chloride	mg/1	250	6	840.0	340.0	596.7	6
Fluoride	mg/1	1.3	3	2.55	0.23	1.24	1
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	410	30	--	2
Copper[5]	ug/1	*	3	40	30	--	
Total Iron	ug/1	-	3	6000	2100	3540	
Lead[5]	ug/1	40	3	32	10	--	
Manganese[5]	ug/1	-	3	480	240	367	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	109.0	90.0	96.3	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Tuscarawas River at Clinton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	24.0	2.0	15.8	
pH	S.U.	6.0-9.0	7	8.3	7.3	7.8	
NH-3-N	mg/1	-	5	1.74	0.46	1.10	
TKN-N	mg/1	-	3	2.2	1.4	1.8	
Nitrate	mg/1	-	5	1.31	0.10	0.61	
Total Phosphorous	mg/1	-	4	0.46	0.17	0.27	
BOD_5	mg/1	-	6	3.7	1.6	2.9	
D.O.	% Saturation		6	97.1	50.6	72.1	
D.O.	mg/1	5.0	6	13.4	4.4	7.6	1
Dissolved Solids	mg/1	1500	6	5330	1922	3511	6
Suspended Solids[5]	mg/1	-	6	62	14	31	
TOC	mg/1	-	6	16.0	6.0	9.8	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	4	3700	3	232	2
Fecal Strep.	#/100 ml	-	6	1600	7	104	
MBAS	mg/1	0.5	6	0.62	0.25	0.44	4
Conductivity	Micromhos	-	6	6500	2400	4445	
Turbidity	J.U.	-	6	32.0	2.30	10.98	
Total Hardness	mg/1	-	3	800	570	673	
Phenols	ug/1	10	6	50.0	2.0	--	4
Cyanide[5]	mg/1	0.2	6	0.09	0.01	--	
Chloride	mg/1	250	6	19800.0	960.0	4646.7	6
Fluoride	mg/1	1.3	3	0.23	0.14	0.18	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	300	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	6600	1540	3320	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	270	220	250	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	1	5	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	189.0	86.0	134.0	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Killbuck Creek Below Wooster

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	22.0	.5	13.6	
pH	S.U.	6.0-9.0	7	7.8	7.1	7.4	
NH-3-N	mg/l	-	6	1.31	.29	.63	
TKN-N	mg/l	-	4	1.3	.7	1.0	
Nitrate	mg/l	-	6	3.58	.64	2.01	
Total Phosphorous	mg/l	-	5	.54	.10	.32	
BOD_5	mg/l	-	6	6.8	1.4	3.8	
D.O.	% Saturation		6	111.4	43.0	80.8	
D.O.	mg/l	5.0	6	14.4	4.3	8.7	1
Dissolved Solids	mg/l	1500	6	442	256	338	
Suspended Solids[5]	mg/l	-	6	78	18	45	
TOC	mg/l	-	6	18.0	2.0	8.5	
Oil-Grease	mg/l	5	3	5.0	3.0	--	
Fecal Coliform	#/100 ml	200	5	700	19	143	3
Fecal Strep.	#/100 ml	-	5	450	6	46	
MBAS	mg/l	0.5	6	.13	.07	.09	
Conductivity	Micromhos	-	6	600	350	434	
Turbidity	J.U.	-	6	35.00	2.90	15.43	
Total Hardness	mg/l	-	3	246	170	219	
Phenols	ug/l	10	5	8.0	4.0	5.4	
Cyanide[5]	mg/l	0.2	6	.01	.01	--	
Chloride	mg/l	250	6	55.0	35.0	42.3	
Fluoride	mg/l	1.3	3	.17	.10	.14	
Arsenic[5]	ug/l	50	2	10.0	10.0	--	
Barium[5]	ug/l	800	3	200	200	--	
Cadmium[5]	ug/l	5	3	10	5	--	
Total Chromium[5]	ug/l	300	3	30	30	--	
Copper[5]	ug/l	*	3	2950	30	1003	
Total Iron	ug/l	-	3	2810	1120	1923	
Lead[5]	ug/l	40	3	35	10	--	
Manganese[5]	ug/l	-	3	180	130	150	
Mercury[5]	ug/l	0.5	3	.5	.5	--	
Selenium[5]	ug/l	5	2	10	10	--	
Silver[5]	ug/l	1	3	30	30	--	
Zinc	ug/l	*	3	30	30	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	3	68.0	60.0	63.0	
Hex. Chromium[5]	ug/l	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Walhonding River at Nellie below Dam

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	3	560	367	441	
Temperature	°C	*	7	23.0	5.0	15.1	
pH	S.U.	6.0-9.0	9	8.7	6.8	7.6	
NH-3-N	mg/1	-	7	0.28	0.02	0.12	
TKN-N	mg/1	-	4	0.3	0.3	0.3	
Nitrate	mg/1	-	7	2.18	0.55	1.23	
Total Phosphorous	mg/1	-	6	0.20	0.08	0.12	
BOD_5	mg/1	-	7	2.2	1.1	1.6	
D.O.	% Saturation		6	100.8	66.7	85.8	
D.O.	mg/1	5.0	6	12.9	5.8	9.2	
Dissolved Solids	mg/1	1500	7	340	196	255	
Suspended Solids[5]	mg/1	-	7	42	10	21	
TOC	mg/1	-	7	6.0	1.0	3.1	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	6400	65	370	5
Fecal Strep.	#/100 ml	-	7	1600	14	110	
MBAS	mg/1	0.5	6	0.09	0.05	0.06	
Conductivity	Micromhos	-	8	500	260	376	
Turbidity	J.U.	-	7	42.0	1.10	9.33	
Total Hardness	mg/1	-	2	204	148	176	
Phenols	ug/1	10	6	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	6	0.01	0.01	--	
Chloride	mg/1	250	7	28.0	21.0	23.6	
Fluoride	mg/1	1.3	3	0.17	0.12	0.15	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	2	3400	260	1830	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	70	50	60	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	48.0	37.0	42.2	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mohican River at Greer

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	3	291	168	223	
Temperature	°C	*	7	22.0	5.5	15.0	
pH	S.U.	6.0-9.0	9	8.1	6.9	7.5	
NH-3-N	mg/1	-	7	.23	.05	.13	
TKN-N	mg/1	-	6	.4	.3	.3	
Nitrate	mg/1	-	7	2.23	.71	1.31	
Total Phosphorous	mg/1	-	6	.30	.10	.19	
BOD_5	mg/1	-	7	3.0	1.1	2.1	
D.O.	% Saturation		6	99.1	65.9	89.0	
D.O.	mg/1	5.0	6	12.2	6.2	9.5	
Dissolved Solids	mg/1	1500	7	340	205	268	
Suspended Solids[5]	mg/1	-	7	85	10	32	
TOC	mg/1	-	7	9.0	1.0	4.1	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	6000	300	703	7
Fecal Strep.	#/100 ml	-	7	6400	36	174	
MBAS	mg/1	0.5	7	.08	.05	.06	
Conductivity	Micromhos	-	8	550	280	388	
Turbidity	J.U.	-	7	42.00	1.70	12.06	
Total Hardness	mg/1	-	3	220	136	183	
Phenols	ug/1	10	7	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	.01	.01	--	
Chloride	mg/1	250	7	29.0	22.0	25.0	
Fluoride	mg/1	1.3	3	.21	.13	.17	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	70	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	2	4700	390	2545	
Lead[5]	ug/1	40	2	10	10	--	
Manganese[5]	ug/1	-	3	130	100	110	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	40	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	55.0	42.0	48.5	
Hex. Chromium[5]	ug/1	50	3	68	30	--	1

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Rocky Fork below Mansfield

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	24.0	4.0	15.8	
pH	S.U.	6.0-9.0	7	7.9	7.1	7.5	
NH-3-N	mg/1	-	6	3.49	1.04	2.56	
TKN-N	mg/1	-	4	4.7	1.0	3.3	
Nitrate	mg/1	-	6	3.06	1.31	2.00	
Total Phosphorous	mg/1	-	5	1.93	.59	1.34	
BOD_5	mg/1	-	6	20.0	5.4	10.0	
D.O.	% Saturation		6	136.5	69.3	91.2	
D.O.	mg/1	5.0	6	14.2	6.1	9.4	
Dissolved Solids	mg/1	1500	6	534	287	455	
Suspended Solids[5]	mg/1	-	6	472	10	94	
TOC	mg/1	-	6	31.0	8.0	16.5	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	4	20000	1600	6490	4
Fecal Strep.	#/100 ml	-	4	10000	660	2073	
MBAS	mg/1	0.5	6	.39	.14	.23	
Conductivity	Micromhos	-	6	800	315	534	
Turbidity	J.U.	-	6	340.00	2.40	62.50	
Total Hardness	mg/1	-	3	256	170	225	
Phenols	ug/1	10	6	25.0	6.0	10.8	1
Cyanide[5]	mg/1	0.2	6	.02	.01	--	
Chloride	mg/1	250	6	84.0	55.0	70.2	
Fluoride	mg/1	1.3	3	.42	.25	.33	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	300	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	1570	260	860	2
Copper[5]	ug/1	*	3	160	110	130	
Total Iron	ug/1	-	3	23600	1000	9433	
Lead[5]	ug/1	40	3	24	10	--	
Manganese[5]	ug/1	-	3	600	210	350	
Mercury[5]	ug/1	0.5	3	.5	.5	--	
Selenium[5]	ug/1	5	3	50	10	--	1
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	250	120	170	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	105.0	54.0	87.0	
Hex. Chromium[5]	ug/1	50	3	1290	135	561	3

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Kokosing River Below Mt. Vernon

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	7	22.0	5.0	15.6	
pH	S.U.	6.0-9.0	8	7.9	7.0	7.5	
NH-3-N	mg/1	-	6	.60	.05	.30	
TKN-N	mg/1	-	6	2.0	.03	.8	
Nitrate	mg/1	-	6	1.90	.38	1.20	
Total Phosphorous	mg/1	-	5	.20	.10	.15	
BOD_5	mg/1	-	7	3.5	1.6	2.4	
D.O.	% Saturation		6	109.7	67.8	93.2	
D.O.	mg/1	5.0	6	12.4	6.1	9.7	
Dissolved Solids	mg/1	1500	5	328	232	285	
Suspended Solids[5]	mg/1	-	7	18	5	12	
TOC	mg/1	-	7	14.0	2.0	7.0	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	6	6900	300	1386	6
Fecal Strep.	#/100 ml	-	7	2400	170	647	
MBAS	mg/1	0.5	7	.07	.05	.06	
Conductivity	Micromhos	-	8	600	270	414	
Turbidity	J.U.	-	7	2.70	.80	1.96	
Total Hardness	mg/1	-	3	252	196	226	
Phenols	ug/1	10	7	3.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	.01	.01	--	
Chloride	mg/1	250	7	24.0	16.0	18.7	
Fluoride	mg/1	1.3	3	.24	.13	.19	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	2	1030	210	620	
Lead[5]	ug/1	40	3	16	10	--	
Manganese[5]	ug/1	-	3	50	50	50	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	4	50.0	36.0	42.2	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Salt Creek near Richmondale

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	4.0	24.0	9.0	15.2	
pH	S.U.	6.0-9.0	5	8.1	7.4	7.7	
NH-3-N	mg/1	-	3	0.21	0.05	0.14	
TKN-N	mg/1	-	1	0.3	0.3	0.3	
Nitrate	mg/1	-	1	0.18	0.18	0.18	
Total Phosphorous	mg/1	-	2	0.10	0.10	0.10	
BOD_5	mg/1	-	4	1.7	1.0	1.3	
D.O.	% Saturation		4	129.4	84.5	101.2	
D.O.	mg/1	5.0	4	11.8	8.2	10.2	
Dissolved Solids	mg/1	1500	4	179	100	134	
Suspended Solids[5]	mg/1	-	4	62	10	24	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	3	13.7	5.0	7.9	3
Fecal Coliform	#/100 ml	200	6	900	200	324	6
Fecal Strep.	#/100 ml	-	6	180	27	75	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	4	3400	245	1056	
Turbidity	J.U.	-	1	4.10	4.10	4.10	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	10.0	10.0	10.0	
Fluoride	mg/1	1.3	--	--	--	---	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Scioto River at Higby

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	45	28260	600	4547	
Temperature	°C	*	48	25.1	.5	12.5	
pH	S.U.	6.0-9.0	50	8.4	7.2	8.0	
NH-3-N	mg/1	-	5	.78	.13	.37	
TKN-N	mg/1	-	4	1.4	.8	1.1	
Nitrate	mg/1	-	5	4.52	1.60	2.83	
Total Phosphorous	mg/1	-	24	.90	.10	.34	
BOD_5	mg/1	-	46	17.0	2.9	7.1	
D.O.	% Saturation		48	116.9	43.5	74.6	
D.O.	mg/1	5.0	48	14.1	4.0	8.4	6
Dissolved Solids	mg/1	1500	6	520	326	422	
Suspended Solids[5]	mg/1	-	6	122	19	56	
TOC	mg/1	-	4	17.0	5.0	11.0	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	8	9200	316	1919	8
Fecal Strep.	#/100 ml	-	8	730	29	175	
MBAS	mg/1	0.5	6	.26	.10	.16	
Conductivity	Micromhos	-	48	1800	440	712	
Turbidity	J.U.	-	6	74.00	9.60	31.60	
Total Hardness	mg/1	-	2	332	252	292	
Phenols	ug/1	10	5	14.0	2.0	--	1
Cyanide[5]	mg/1	0.2	5	.01	.01	--	
Chloride	mg/1	250	6	54.0	27.0	36.8	
Fluoride	mg/1	1.3	2	.72	.32	.52	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	14	10	5	--	
Total Chromium[5]	ug/1	300	14	30	30	--	
Copper[5]	ug/1	*	14	70	30	--	
Total Iron	ug/1	-	2	7300	2600	4950	
Lead[5]	ug/1	40	2	23	10	--	
Manganese[5]	ug/1	-	2	190	80	135	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	13	100	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	130.0	80.0	105.0	
Hex. Chromium[5]	ug/1	50	4	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Paint Creek near Bourneville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	5110	100	1249	
Temperature	°C	*	6	25.0	1.8	14.6	
pH	S.U.	6.0-9.0	6	8.1	7.4	7.8	
NH-3-N	mg/l	-	6	0.32	0.05	0.16	
TKN-N	mg/l	-	5	0.6	0.3	0.4	
Nitrate	mg/l	-	6	3.42	0.26	1.53	
Total Phosphorous	mg/l	-	6	0.20	0.05	0.10	
BOD_5	mg/l	-	6	3.4	1.6	2.5	
D.O.	% Saturation		6	100.0	83.3	93.1	
D.O.	mg/l	5.0	6	13.6	7.0	9.9	
Dissolved Solids	mg/l	1500	6	520	235	309	
Suspended Solids[5]	mg/l	-	6	200	10	57	
TOC	mg/l	-	6	18.0	1.0	8.0	
Oil-Grease	mg/l	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	8	2700	48	251	4
Fecal Strep.	#/100 ml	-	8	1500	45	156	
MBAS	mg/l	0.5	6	0.10	0.05	0.07	
Conductivity	Micromhos	-	6	550	360	463	
Turbidity	J.U.	-	5	144.0	2.20	39.78	
Total Hardness	mg/l	-	2	256	170	213	
Phenols	ug/l	10	6	4.0	2.0	--	
Cyanide[5]	mg/l	0.2	6	0.01	0.01	--	
Chloride	mg/l	250	6	18.0	12.0	16.3	
Fluoride	mg/l	1.3	2	0.21	0.16	0.18	
Arsenic[5]	ug/l	50	2	10.0	10.0	--	
Barium[5]	ug/l	800	2	200	200	--	
Cadmium[5]	ug/l	5	2	10	10	--	
Total Chromium[5]	ug/l	300	2	30	30	--	
Copper[5]	ug/l	*	2	30	30	--	
Total Iron	ug/l	-	2	8300	450	4375	
Lead[5]	ug/l	40	2	13	10	--	
Manganese[5]	ug/l	-	2	130	130	130	
Mercury[5]	ug/l	0.5	2	0.5	0.5	--	
Selenium[5]	ug/l	5	2	10	10	--	
Silver[5]	ug/l	1	2	30	30	--	
Zinc	ug/l	*	2	30	30	--	
Alumium	ug/l	-	--	--	--	--	
Sulfate[5]	mg/l	-	2	43.0	29.0	36.0	
Hex. Chromium[5]	ug/l	50	2	30	30	---	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Scioto River - Chillicothe Bus Rte. 23

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	5	6476	720	3422	
Temperature	°C	*	7	25.0	1.0	15.4	
pH	S.U.	6.0-9.0	9	8.1	7.6	7.8	
NH-3-N	mg/1	-	6	1.48	.23	.63	
TKN-N	mg/1	-	5	4.4	.3	1.5	
Nitrate	mg/1	-	5	4.45	1.72	3.00	
Total Phosphorous	mg/1	-	6	.74	.30	.51	
BOD_5	mg/1	-	7	6.8	1.6	3.6	
D.O.	% Saturation		7	91.5	59.6	75.8	
D.O.	mg/1	5.0	7	13.0	5.4	7.9	
Dissolved Solids	mg/1	1500	7	511	331	418	
Suspended Solids[5]	mg/1	-	7	95	12	52	
TOC	mg/1	-	5	11.0	3.0	8.2	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	8	5800	700	1875	8
Fecal Strep.	#/100 ml	-	8	510	38	151	
MBAS	mg/1	0.5	6	.24	.10	.16	
Conductivity	Micromhos	-	7	1800	480	799	
Turbidity	J.U.	-	6	40.00	4.50	19.40	
Total Hardness	mg/1	-	2	384	338	361	
Phenols	ug/1	10	6	8.0	2.0	--	
Cyanide[5]	mg/1	0.2	6	.01	.01	--	
Chloride	mg/1	250	6	48.0	29.0	36.0	
Fluoride	mg/1	1.3	2	.71	.33	.52	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	30	30	--	
Total Iron	ug/1	-	2	1330	590	960	
Lead[5]	ug/1	40	2	12	10	--	
Manganese[5]	ug/1	-	2	130	70	100	
Mercury[5]	ug/1	0.5	1	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	50	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	123.0	81.0	102.0	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Deer Creek at Rt. 104 Bridge

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	48	24.5	0.0	11.3	
pH	S.U.	6.0-9.0	50	10.0	7.1	8.0	1
NH-3-N	mg/1	-	4	.35	.05	.14	
TKN-N	mg/1	-	1	.3	.3	.3	
Nitrate	mg/1	-	--	--	--	--	
Total Phosphorous	mg/1	-	2	0.10	0.05	0.07	
BOD_5	mg/1	-	43	27.2	1.2	4.8	
D.O.	% Saturation		48	126.2	48.9	90.4	
D.O.	mg/1	5.0	48	15.4	4.6	10.3	1
Dissolved Solids	mg/1	1500	4	443	349	409	
Suspended Solids[5]	mg/1	-	4	77	10	35	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	4	750	90	246	2
Fecal Strep.	#/100 ml	-	4	560	43	234	
MBAS	mg/1	0.5	1	.05	.05	.05	
Conductivity	Micromhos	-	48	700	330	494	
Turbidity	J.U.	-	1	2.30	2.30	2.30	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	18.0	18.0	18.0	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Scioto River at Circleville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	49	39800	460	3302	
Temperature	°C	*	50	26.2	0.0	12.8	
pH	S.U.	6.0-9.0	52	9.6	7.2	7.7	1
NH-3-N	mg/1	-	5	2.76	.62	1.32	
TKN-N	mg/1	-	4	3.7	.3	1.8	
Nitrate	mg/1	-	5	4.23	1.45	2.95	
Total Phosphorous	mg/1	-	5	1.63	.20	.68	
BOD_5	mg/1	-	49	10.6	2.2	8.1	
D.O.	% Saturation		50	95.7	35.3	67.8	
D.O.	mg/1	5.0	50	13.2	3.0	7.6	13
Dissolved Solids	mg/1	1500	6	525	378	442	
Suspended Solids[5]	mg/1	-	6	100	10	41	
TOC	mg/1	-	4	11.0	3.0	6.7	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	8	8300	200	1262	8
Fecal Strep.	#/100 ml	-	8	980	23	135	
MBAS	mg/1	0.5	7	.23	.09	.17	
Conductivity	Micromhos	-	6	1800	680	937	
Turbidity	J.U.	-	6	75.00	3.70	24.72	
Total Hardness	mg/1	-	2	322	278	300	
Phenols	ug/1	10	6	5.0	2.0	--	
Cyanide[5]	mg/1	0.2	6	.01	.01	--	
Chloride	mg/1	250	6	70.0	30.0	43.8	
Fluoride	mg/1	1.3	2	.62	.35	.48	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	30	30	--	
Total Iron	ug/1	-	2	2590	660	1625	
Lead[5]	ug/1	40	2	17	10	--	
Manganese[5]	ug/1	-	2	120	70	95	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	2	30	10	--	
Silver[5]	ug/1	1	1	30	30	--	
Zinc	ug/1	*	2	50	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	128.0	86.0	107.0	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Big Darby Creek At Darbyville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	5	1105	55	451	
Temperature	°C	*	5	25.0	1.0	11.9	
pH	S.U.	6.0-9.0	5	8.7	7.6	8.1	
NH-3-N	mg/1	-	5	0.29	0.05	0.13	
TKN-N	mg/1	-	4	1.1	0.3	0.5	
Nitrate	mg/1	-	5	4.64	0.45	2.28	
Total Phosphorous	mg/1	-	5	0.12	0.09	0.10	
BOD_5	mg/1	-	5	6.9	1.0	2.6	
D.O.	% Saturation		5	135.7	88.7	101.8	
D.O.	mg/1	5.0	5	13.4	8.6	11.2	
Dissolved Solids	mg/1	1500	5	460	304	401	
Suspended Solids[5]	mg/1	-	5	59	10	32	
TOC	mg/1	-	3	8.0	2.0	5.0	
Oil-Grease	mg/1	5	2	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	7	1100	51	181	2
Fecal Strep.	#/100 ml	-	6	140	7	43	
MBAS	mg/1	0.5	5	0.11	0.05	0.09	
Conductivity	Micromhos	-	4	690	610	644	
Turbidity	J.U.	-	5	28.00	2.20	13.60	
Total Hardness	mg/1	-	1	324	324	324	
Phenols	ug/1	10	4	11.0	2.0	--	1
Cyanide[5]	mg/1	0.2	4	0.01	0.01	--	
Chloride	mg/1	250	5	40.0	20.0	31.2	
Fluoride	mg/1	1.3	2	0.61	0.31	0.46	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	2	1120	560	840	
Lead[5]	ug/1	40	2	13	10	12	
Manganese[5]	ug/1	-	2	50	30	--	
Mercury[5]	ug/1	0.5	2	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	2	82.0	55.0	68.5	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Walnut Creek at Old U.S. 23 BR

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	50	24.5	0.0	10.8	
pH	S.U.	6.0-9.0	52	8.5	6.8	7.9	
NH-3-N	mg/1	-	7	6.85	.09	1.12	
TKN-N	mg/1	-	3	9.8	.5	3.9	
Nitrate	mg/1	-	1	.42	.42	.42	
Total Phosphorous	mg/1	-	3	6.63	.10	2.31	
BOD_5	mg/1	-	46	9.4	1.0	3.9	
D.O.	% Saturation		48	124.6	45.1	87.1	
D.O.	mg/1	5.0	48	15.2	4.6	10.0	1
Dissolved Solids	mg/1	1500	7	620	365	431	
Suspended Solids[5]	mg/1	-	7	139	10	40	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	3	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	800	72	451	6
Fecal Strep.	#/100 ml	-	7	190	39	103	
MBAS	mg/1	0.5	1	.07	.07	.07	
Conductivity	Micromhos	-	49	850	260	516	
Turbidity	J.U.	-	1	3.70	3.70	3.70	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	1	26.0	26.0	26.0	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	1	840	840	840	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Big Walnut Creek at Rees

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	7	1284	58	292	
Temperature	°C	*	7	25.5	1.5	13.4	
pH	S.U.	6.0-9.0	8	8.7	6.6	7.8	
NH-3-N	mg/1	-	7	0.43	0.10	0.25	
TKN-N	mg/1	-	6	1.3	0.3	0.8	
Nitrate	mg/1	-	7	1.61	0.36	0.98	
Total Phosphorous	mg/1	-	7	0.40	0.10	0.23	
BOD_5	mg/1	-	7	5.4	2.8	3.8	
D.O.	% Saturation		7	98.4	48.9	80.5	
D.O.	mg/1	5.0	7	12.8	4.3	8.8	1
Dissolved Solids	mg/1	1500	6	466	333	383	
Suspended Solids[5]	mg/1	-	6	55	16	31	
TOC	mg/1	-	7	8.0	1.0	5.1	
Oil-Grease	mg/1	5	2	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	8	4800	300	651	8
Fecal Strep.	#/100 ml	-	9	800	11	81	
MBAS	mg/1	0.5	7	0.13	0.06	0.09	
Conductivity	Micromhos	-	7	730	490	623	
Turbidity	J.U.	-	7	24.0	3.20	12.67	
Total Hardness	mg/1	-	2	324	222	273	
Phenols	ug/1	10	7	8.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	64.0	35.0	44.1	
Fluoride	mg/1	1.3	2	0.39	0.18	0.28	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	30	30	---	
Total Iron	ug/1	-	2	2540	1390	1965	
Lead[5]	ug/1	40	2	18	10	--	
Manganese[5]	ug/1	-	2	180	110	145	
Mercury[5]	ug/1	0.5	2	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	77.0	71.0	74.0	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Alum Creek At Williams Rd.

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	-	--	--	--	
Temperature	°C	*	5	26.0	11.0	18.0	
pH	S.U.	6.0-9.0	6	8.6	7.4	7.8	
NH-3-N	mg/1	-	5	0.54	0.17	0.27	
TKN-N	mg/1	-	1	0.7	0.7	0.7	
Nitrate	mg/1	-	-	--	--	--	
Total Phosphorous	mg/1	-	1	0.20	0.20	0.20	
BOD_5	mg/1	-	5	7.6	2.3	4.4	
D.O.	% Saturation		5	81.1	38.6	66.7	
D.O.	mg/1	5.0	5	9.0	3.4	6.5	1
Dissolved Solids	mg/1	1500	5	532	328	430	
Suspended Solids[5]	mg/1	-	5	51	11	31	
TOC	mg/1	-	-	--	--	--	
Oil-Grease	mg/1	5	3	5.0	0.5	--	
Fecal Coliform	#/100 ml	200	6	1700	14	258	4
Fecal Strep.	#/100 ml	-	6	430	4	76	
MBAS	mg/1	0.5	-	--	--	--	
Conductivity	Micromhos	-	5	850	515	689	
Turbidity	J.U.	-	-	--	--	--	
Total Hardness	mg/1	-	-	--	--	--	
Phenols	ug/1	10	-	--	--	--	
Cyanide[5]	mg/1	0.2	-	--	--	--	
Chloride	mg/1	250	-	--	--	--	
Fluoride	mg/1	1.3	-	--	--	--	
Arsenic[5]	ug/1	50	-	--	--	--	
Barium[5]	ug/1	800	-	--	--	--	
Cadmium[5]	ug/1	5	-	--	--	--	
Total Chromium[5]	ug/1	300	-	--	--	--	
Copper[5]	ug/1	*	-	--	--	--	
Total Iron	ug/1	-	8	1180	1180	1180	
Lead[5]	ug/1	40	-	--	--	--	
Manganese[5]	ug/1	-	-	--	--	--	
Mercury[5]	ug/1	0.5	-	--	--	--	
Selenium[5]	ug/1	5	-	--	--	--	
Silver[5]	ug/1	1	-	--	--	--	
Zinc	ug/1	*	-	--	--	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	-	--	--	--	
Hex. Chromium[5]	ug/1	50	-	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Scioto River at Shadeville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	50	26.8	0.0	13.1	
pH	S.U.	6.0-9.0	51	8.2	7.6	7.9	
NH-3-N	mg/1	-	49	6.30	.01	2.55	
TKN-N	mg/1	-	4	5.1	.3	2.8	
Nitrate	mg/1	-	49	11.57	.88	3.51	
Total Phosphorous	mg/1	-	49	4.16	.05	1.27	
BOD_5	mg/1	-	50	24.0	2.0	8.2	
D.O.	% Saturation		50	97.7	36.8	69.6	
D.O.	mg/1	5.0	50	13.8	3.5	7.7	9
Dissolved Solids	mg/1	1500	6	569	425	486	
Suspended Solids[5]	mg/1	-	50	368	4	56	
TOC	mg/1	-	5	14.0	7.0	10.4	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	48	200000	200	5622	48
Fecal Strep.	#/100 ml	-	8	3800	45	293	
MBAS	mg/1	0.5	6	.34	.13	.23	
Conductivity	Micromhos	-	36	1700	289	661	
Turbidity	J.U.	-	6	44.00	6.20	18.30	
Total Hardness	mg/1	-	2	312	294	303	
Phenols	ug/1	10	6	9.0	2.0	--	
Cyanide[5]	mg/1	0.2	5	.01	.01	--	
Chloride	mg/1	250	47	200.0	26.0	51.1	
Fluoride	mg/1	1.3	2	1.17	.39	.78	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	50	30	--	
Total Iron	ug/1	-	2	1920	720	1320	
Lead[5]	ug/1	40	2	22	10	--	
Manganese[5]	ug/1	-	2	100	60	80	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	2	90	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	2	178.0	99.0	138.5	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Olentangy River Near Worthington

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	8	1287	31	333	
Temperature	°C	*	6	24.0	1.0	15.6	
pH	S.U.	6.0-9.0	7	8.3	7.8	8.0	
NH-3-N	mg/1	-	7	0.55	0.11	0.24	
TKN-N	mg/1	-	6	1.1	0.3	0.6	
Nitrate	mg/1	-	7	5.58	1.04	3.08	
Total Phosphorous	mg/1	-	7	0.30	0.18	0.23	
BOD_5	mg/1	-	7	4.0	1.0	2.1	
D.O.	% Saturation		6	94.5	70.4	83.4	
D.O.	mg/1	5.0	6	12.9	6.2	8.8	
Dissolved Solids	mg/1	1500	7	546	311	378	
Suspended Solids[5]	mg/1	-	7	83	15	34	
TOC	mg/1	-	7	28.0	1.0	8.6	
Oil-Grease	mg/1	5	1	5.0	5.0	5.0	
Fecal Coliform	#/100 ml	200	7	2600	13	596	6
Fecal Strep.	#/100 ml	-	6	440	15	113	
MBAS	mg/1	0.5	7	0.19	0.10	0.12	
Conductivity	Micromhos	-	7	790	420	609	
Turbidity	J.U.	-	7	27.00	1.20	14.81	
Total Hardness	mg/1	-	2	268	214	241	
Phenols	ug/1	10	7	2.0	0.2	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	6	52.0	25.0	39.7	
Fluoride	mg/1	1.3	3	0.34	0.19	0.28	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	4900	320	2160	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	70	30	--	
Mercury[5]	ug/1	0.5	3	1.3	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	3	92.0	65.0	79.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Mill Creek At Mills Rd.

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	7	775	4	211	
Temperature	°C	*	8	24.0	0.5	12.7	
pH	S.U.	6.0-9.0	8	8.5	7.2	7.7	
NH-3-N	mg/1	-	8	1.08	0.07	0.40	
TKN-N	mg/1	-	7	2.5	0.6	1.2	
Nitrate	mg/1	-	7	25.07	0.05	4.61	
Total Phosphorous	mg/1	-	8	0.64	0.10	0.33	
BOD_5	mg/1	-	8	8.4	1.0	3.3	
D.O.	% Saturation		7	115.5	67.4	87.9	
D.O.	mg/1	5.0	7	14.5	6.2	9.6	
Dissolved Solids	mg/1	1500	8	621	174	448	
Suspended Solids[5]	mg/1	-	8	127	10	40	
TOC	mg/1	-	7	13.0	1.0	7.3	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	6	2500	23	564	5
Fecal Strep.	#/100 ml	-	5	7900	8	297	
MBAS	mg/1	0.5	7	0.46	0.05	0.15	
Conductivity	Micromhos	-	8	870	270	630	
Turbidity	J.U.	-	7	110.00	1.40	29.74	
Total Hardness	mg/1	-	3	432	108	260	
Phenols	ug/1	10	7	22.0	2.0	--	1
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	7	46.0	15.0	33.1	
Fluoride	mg/1	1.3	3	0.56	0.14	0.36	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	4	6800	160	2203	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	3	90	30	--	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	4	30	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	3	227.0	29.0	120.0	
Hex. Chromium[5]	ug/1	50	3	30	10	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Scioto River Near Prospect

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	7	1195	38	356	
Temperature	°C	*	7	22.8	0.0	13.5	
pH	S.U.	6.0-9.0	8	8.4	7.1	7.7	
NH-3-N	mg/1	-	7	1.13	0.09	0.38	
TKN-N	mg/1	-	5	1.8	0.3	1.0	
Nitrate	mg/1	-	6	20.50	2.30	5.60	
Total Phosphorous	mg/1	-	7	0.76	0.20	0.47	
BOD_5	mg/1	-	7	8.4	2.2	3.9	
D.O.	% Saturation		6	104.0	72.8	88.2	
D.O.	mg/1	5.0	6	14.6	6.7	9.7	
Dissolved Solids	mg/1	1500	7	572	206	463	
Suspended Solids[5]	mg/1	-	7	179	16	76	
TOC	mg/1	-	7	28.0	2.0	10.3	
Oil-Grease	mg/1	5	2	5.0	5.0	5.0	
Fecal Coliform	#/100 ml	200	7	4700	330	1122	7
Fecal Strep.	#/100 ml	-	8	4700	31	350	
MBAS	mg/1	0.5	7	0.39	0.06	0.15	
Conductivity	Micromhos	-	7	840	350	687	
Turbidity	J.U.	-	7	140.00	6.10	49.41	
Total Hardness	mg/1	-	3	402	136	279	
Phenols	ug/1	10	7	12.0	2.0	--	1
Cyanide[5]	mg/1	0.2	7	0.02	0.01	--	
Chloride	mg/1	250	7	49.0	16.0	30.1	
Fluoride	mg/1	1.3	3	0.52	0.18	0.38	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	5400	1150	3123	
Lead[5]	ug/1	40	3	23	10	--	
Manganese[5]	ug/1	-	3	110	80	97	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	40	30	--	
Alumium	ug/1	-	-	--	--	--	
Sulfate[5]	mg/1	-	3	185.0	40.0	110.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Little Scioto River Below Marion

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	4	22.5	11.5	17.5	
pH	S.U.	6.0-9.0	5	7.9	7.0	7.4	
NH-3-N	mg/1	-	4	6.20	.24	2.34	
TKN-N	mg/1	-	--	--	--	--	
Nitrate	mg/1	-	--	--	--	--	
Total Phosphorous	mg/1	-	--	--	--	--	
BOD_5	mg/1	-	4	7.8	2.4	4.6	
D.O.	% Saturation		3	63.2	47.4	57.8	
D.O.	mg/1	5.0	3	5.9	4.6	5.3	1
Dissolved Solids	mg/1	1500	4	585	465	506	
Suspended Solids[5]	mg/1	-	4	69	10	32	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	5	8200	160	1889	4
Fecal Strep.	#/100 ml	-	5	500	45	140	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	3	810	660	733	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Scioto River Below Kenton

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	4	25.0	15.0	19.4	
pH	S.U.	6.0-9.0	4	8.1	7.2	7.6	
NH-3-N	mg/1	-	4	.47	.20	.32	
TKN-N	mg/1	-	1	1.1	1.1	1.1	
Nitrate	mg/1	-	--	--	--	--	
Total Phosphorous	mg/1	-	1	.30	.30	.30	
BOD_5	mg/1	-	4	3.6	1.6	2.4	
D.O.	% Saturation		4	73.4	64.7	71.0	
D.O.	mg/1	5.0	4	6.9	6.1	6.6	
Dissolved Solids	mg/1	1500	4	735	627	680	
Suspended Solids[5]	mg/1	-	3	156	24	76	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	5	5400	340	2242	5
Fecal Strep.	#/100 ml	-	5	1500	300	597	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	3	980	790	857	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	--	--	--	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	--	--	--	--	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	--	--	--	--	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	--	--	--	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	--	--	--	--	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Hocking River at Athens

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	1067	135	596	
Temperature	°C	*	8	24.0	1.0	13.6	
pH	S.U.	6.0-9.0	11	8.0	6.7	7.1	
NH-3-N	mg/1	-	7	.28	.17	.21	
TKN-N	mg/1	-	5	.3	.3	.3	
Nitrate	mg/1	-	7	1.87	.43	.92	
Total Phosphorous	mg/1	-	7	.11	.10	.10	
BOD_5	mg/1	-	6	1.7	1.0	1.2	
D.O.	% Saturation		7	109.8	88.2	95.0	
D.O.	mg/1	5.0	7	13.0	7.5	10.2	
Dissolved Solids	mg/1	1500	7	579	263	398	
Suspended Solids[5]	mg/1	-	8	144	10	56	
TOC	mg/1	-	7	15.0	1.0	4.9	
Oil-Grease	mg/1	5	1	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	7	1500	19	236	4
Fecal Strep.	#/100 ml	-	8	1900	4	90	
MBAS	mg/1	0.5	7	.07	.05	.06	
Conductivity	Micromhos	-	8	850	440	589	
Turbidity	J.U.	-	7	56.00	4.40	20.44	
Total Hardness	mg/1	-	2	354	222	288	
Phenols	ug/1	10	7	2.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	.01	.01	--	
Chloride	mg/1	250	7	70.0	24.0	45.4	
Fluoride	mg/1	1.3	2	.25	.15	.20	
Arsenic[5]	ug/1	50	2	10.0	10.0	--	
Barium[5]	ug/1	800	2	200	200	--	
Cadmium[5]	ug/1	5	2	10	10	--	
Total Chromium[5]	ug/1	300	2	30	30	--	
Copper[5]	ug/1	*	2	30	30	--	
Total Iron	ug/1	-	4	3900	90	2300	
Lead[5]	ug/1	40	2	10	10	--	
Manganese[5]	ug/1	-	4	1390	70	893	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	2	10	10	--	
Silver[5]	ug/1	1	2	30	30	--	
Zinc	ug/1	*	3	40	30	--	
Alumium	ug/1	-	2	1500	300	900	
Sulfate[5]	mg/1	-	3	250.0	124.0	199.7	
Hex. Chromium[5]	ug/1	50	2	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Sunday Creek Near Chauncey

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	5	21.0	10.0	14.2	
pH	S.U.	6.0-9.0	7	6.8	3.4	5.1	4
NH-3-N	mg/1	-	2	.51	.25	.38	
TKN-N	mg/1	-	--	--	--	--	
Nitrate	mg/1	-	--	--	--	--	
Total Phosphorous	mg/1	-	--	--	--	--	
BOD_5	mg/1	-	1	2.6	2.6	2.6	
D.O.	% Saturation		1	100.0	100.0	100.0	
D.O.	mg/1	5.0	1	9.0	9.0	9.0	
Dissolved Solids	mg/1	1500	6	928	228	582	
Suspended Solids[5]	mg/1	-	7	95	10	38	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	950	1	9	1
Fecal Strep.	#/100 ml	-	3	22	1	4	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	6	1250	340	701	
Turbidity	J.U.	-	1	108.00	108.00	108.00	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	6	43000	4700	15483	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	6	4800	840	2037	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	1	30	30	--	
Alumium	ug/1	-	2	700	300	500	
Sulfate[5]	mg/1	-	5	680.0	103.0	348.8	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Monday Creek Near Nelsonville

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	6	22.5	9.9	15.5	
pH	S.U.	6.0-9.0	8	5.1	3.4	4.0	8
NH-3-N	mg/1	-	2	.22	.18	.20	
TKN-N	mg/1	-	--	--	--	--	
Nitrate	mg/1	-	--	--	--	--	
Total Phosphorous	mg/1	-	--	--	--	--	
BOD_5	mg/1	-	1	1.0	1.0	1.0	
D.O.	% Saturation		1	95.5	95.5	95.5	
D.O.	mg/1	5.0	1	8.6	8.6	8.6	
Dissolved Solids	mg/1	1500	5	924	570	768	
Suspended Solids[5]	mg/1	-	7	128	10	32	
TOC	mg/1	-	--	--	--	--	
Oil-Grease	mg/1	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	3	3	1	1	
Fecal Strep.	#/100 ml	-	3	76	1	4	
MBAS	mg/1	0.5	--	--	--	--	
Conductivity	Micromhos	-	6	1200	640	1018	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/1	-	--	--	--	--	
Phenols	ug/1	10	--	--	--	--	
Cyanide[5]	mg/1	0.2	--	--	--	--	
Chloride	mg/1	250	--	--	--	--	
Fluoride	mg/1	1.3	--	--	--	--	
Arsenic[5]	ug/1	50	1	10.0	10.0	--	
Barium[5]	ug/1	800	--	--	--	--	
Cadmium[5]	ug/1	5	--	--	--	--	
Total Chromium[5]	ug/1	300	--	--	--	--	
Copper[5]	ug/1	*	--	--	--	--	
Total Iron	ug/1	-	7	14400	3400	6807	
Lead[5]	ug/1	40	--	--	--	--	
Manganese[5]	ug/1	-	6	4960	2830	3843	
Mercury[5]	ug/1	0.5	--	--	--	--	
Selenium[5]	ug/1	5	--	--	--	--	
Silver[5]	ug/1	1	--	--	--	--	
Zinc	ug/1	*	1	160	160	160	
Alumium	ug/1	-	3	12000	6000	8500	
Sulfate[5]	mg/1	-	5	680.0	98.0	373.6	
Hex. Chromium[5]	ug/1	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Hocking River Near Enterprise

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	6	1766	84	597	
Temperature	°C	*	8	22.3	1.0	13.3	
pH	S.U.	6.0-9.0	9	8.0	7.0	7.5	
NH-3-N	mg/1	-	8	0.43	0.14	0.24	
TKN-N	mg/1	-	6	0.5	0.3	0.4	
Nitrate	mg/1	-	8	1.65	0.45	1.11	
Total Phosphorous	mg/1	-	8	0.30	0.10	0.16	
BOD_5	mg/1	-	8	5.2	1.0	1.9	
D.O.	% Saturation		8	104.4	78.9	90.2	
D.O.	mg/1	5.0	8	13.1	7.1	9.7	
Dissolved Solids	mg/1	1500	8	439	219	330	
Suspended Solids[5]	mg/1	-	8	1994	10	280	
TOC	mg/1	-	8	26.0	1.0	7.7	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	6	8800	70	744	5
Fecal Strep.	#/100 ml	-	7	1500	16	220	
MBAS	mg/1	0.5	7	0.70	0.05	0.16	1
Conductivity	Micromhos	-	8	660	350	524	
Turbidity	J.U.	-	8	840.00	2.60	114.70	
Total Hardness	mg/1	-	3	294	204	254	
Phenols	ug/1	10	7	7.0	2.0	--	
Cyanide[5]	mg/1	0.2	7	0.01	0.01	--	
Chloride	mg/1	250	8	67.0	22.0	43.1	
Fluoride	mg/1	1.3	3	0.30	0.15	0.23	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	200	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	4	1970	350	943	
Lead[5]	ug/1	40	3	10	10	--	
Manganese[5]	ug/1	-	4	1650	890	1263	
Mercury[5]	ug/1	0.5	3	0.5	0.5	--	
Selenium[5]	ug/1	5	2	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	1	200	200	200	
Sulfate[5]	mg/1	-	3	122.0	79.0	98.3	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Rush Creek at Sugar Grove

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	--	--	--	--	
Temperature	°C	*	4	22.5	9.0	17.0	
pH	S.U.	6.0-9.0	4	7.0	6.8	6.9	
NH-3-N	mg/l	-	2	.47	.29	.38	
TKN-N	mg/l	-	1	.5	.5	.5	
Nitrate	mg/l	-	--	--	--	--	
Total Phosphorous	mg/l	-	--	--	--	--	
BOD_5	mg/l	-	3	1.5	1.0	1.2	
D.O.	% Saturation		4	84.0	61.1	76.1	
D.O.	mg/l	5.0	4	9.4	5.5	7.5	
Dissolved Solids	mg/l	1500	4	561	162	335	
Suspended Solids[5]	mg/l	-	4	1978	10	537	
TOC	mg/l	-	--	--	--	--	
Oil-Grease	mg/l	5	--	--	--	--	
Fecal Coliform	#/100 ml	200	4	1900	83	387	2
Fecal Strep.	#/100 ml	-	4	760	47	175	
MBAS	mg/l	0.5	--	--	--	--	
Conductivity	Micromhos	-	3	800	190	493	
Turbidity	J.U.	-	--	--	--	--	
Total Hardness	mg/l	-	--	--	--	--	
Phenols	ug/l	10	--	--	--	--	
Cyanide[5]	mg/l	0.2	--	--	--	--	
Chloride	mg/l	250	1	25.0	25.0	25.0	
Fluoride	mg/l	1.3	--	--	--	--	
Arsenic[5]	ug/l	50	--	--	--	--	
Barium[5]	ug/l	800	--	--	--	--	
Cadmium[5]	ug/l	5	--	--	--	--	
Total Chromium[5]	ug/l	300	--	--	--	--	
Copper[5]	ug/l	*	--	--	--	--	
Total Iron	ug/l	-	3	3300	340	1403	
Lead[5]	ug/l	40	--	--	--	--	
Manganese[5]	ug/l	-	4	5400	2230	3670	
Mercury[5]	ug/l	0.5	--	--	--	--	
Selenium[5]	ug/l	5	--	--	--	--	
Silver[5]	ug/l	1	--	--	--	--	
Zinc	ug/l	*	--	--	--	--	
Alumium	ug/l	-	1	200	200	200	
Sulfate[5]	mg/l	-	3	251.0	86.0	183.0	
Hex. Chromium[5]	ug/l	50	--	--	--	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards

Hocking River at Lancaster - Gage

PARAMETER	UNIT	WQS[1]	N[2]	MAX.	MIN.	AVG.	V[4]
Flow	cfs	-	7	87	13	45	
Temperature	°C	*	8	23.0	2.0	15.4	
pH	S.U.	6.0-9.0	9	8.4	7.3	7.8	
NH-3-N	mg/1	-	8	.63	.07	.35	
TKN-N	mg/1	-	8	1.0	.3	.6	
Nitrate	mg/1	-	8	4.67	.58	1.95	
Total Phosphorous	mg/1	-	7	.49	.10	.17	
BOD_5	mg/1	-	8	8.6	1.6	3.3	
D.O.	% Saturation		8	196.1	79.3	114.3	
D.O.	mg/1	5.0	8	20.0	6.9	11.7	
Dissolved Solids	mg/1	1500	8	1801	201	643	1
Suspended Solids[5]	mg/1	-	8	736	10	138	
TOC	mg/1	-	8	23.0	1.0	8.0	
Oil-Grease	mg/1	5	2	5.0	5.0	--	
Fecal Coliform	#/100 ml	200	6	31000	330	3544	6
Fecal Strep.	#/100 ml	-	7	5200	49	715	
MBAS	mg/1	0.5	8	.33	.05	.13	
Conductivity	Micromhos	-	9	3200	440	1092	
Turbidity	J.U.	-	8	480.00	3.10	78.72	
Total Hardness	mg/1	-	3	812	288	467	
Phenols	ug/1	10	8	26.0	2.0	--	1
Cyanide[5]	mg/1	0.2	8	.03	.01	--	
Chloride	mg/1	250	8	710	12.0	182.4	2
Fluoride	mg/1	1.3	3	.30	.17	.23	
Arsenic[5]	ug/1	50	3	10.0	10.0	--	
Barium[5]	ug/1	800	3	400	200	--	
Cadmium[5]	ug/1	5	3	10	5	--	
Total Chromium[5]	ug/1	300	3	30	30	--	
Copper[5]	ug/1	*	3	30	30	--	
Total Iron	ug/1	-	3	1300	530	997	
Lead[5]	ug/1	40	3	11	10	--	
Manganese[5]	ug/1	-	2	170	80	125	
Mercury[5]	ug/1	0.5	2	.5	.5	--	
Selenium[5]	ug/1	5	3	10	5	--	
Silver[5]	ug/1	1	3	30	30	--	
Zinc	ug/1	*	3	30	30	--	
Alumium	ug/1	-	--	--	--	--	
Sulfate[5]	mg/1	-	3	79.0	57.0	65.7	
Hex. Chromium[5]	ug/1	50	3	30	30	--	

1. Water Quality Standards
2. Number of samples taken
3. Fecal coliform and strep are geometric means. All others are arithmetic
4. Number of samples in violation
5. Refer to the list of laboratory detection limits in front of tables

* Variable - refer to Water Quality Standards