DRIFT-MINE RECLAMATION IN BIG FOUR HOLLOW NEAR LAKE HOPE, OHIO --A PRELIMINARY DATA REPORT

By Vance E. Nichols

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CONVERSION FACTORS

For the benefit of readers who prefer to use metric units, conversion factors for terms used in this report are listed below:

Multiply	By	To obtain
inch (in)	25.40	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
square mile (mi^2)	259	hectares (ha)
pounds (lb)	0.4536	kilogram (kg)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
ton	0.9072	metric ton
ton per acre foot (ton/acre-ft)	7.35	metric ton per hectare-meter
degree Fahrenheit (°F)	(°F-32)/1.8	degree Celsius (°C)

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ABSTRACT

A subsurface clay dike and hydraulic seals were constructed in 1979 by the Ohio Department of Natural Resources, Division of Reclamation, to reduce acid mine drainage from an abandoned drift mine into Big Four Hollow Creek; Big Four Hollow Creek flows into Sandy Run, the major tributary to Lake Hope. A monitoring program was established in 1979 by the U.S. Geological Survey, Water Resources Division, to evaluate sealing effects on surface-water and ground-water systems of the Big Four Hollow Creek and Sandy Run area just below the mine.

Data were collected by private consultants in 1970-71 near the mouth of Big Four Hollow Creek (U.S. Geological Survey station 03201700). Results showed an average pH of 3.1 (calculated from mean hydrogen-ion concentration in moles per liter) and a pH range of 2.7 to 4.8. The estimated sulfate load was 1,000 pounds per day, and the estimated iron load was 100 pounds per day.

Data collected in 1979, before dike construction at this site, showed a daily mean pH range of 3.4 to 5.4, with an average of 3.7, and a daily mean specific-conductance range of 160 to 600 micromhos per centimeter at 25 degrees Celsius (µmho/cm), averaging 400. Again, the estimated sulfate load was 1,000 pounds per day, but the estimated iron load had decreased to 50 pounds per day.

The first 6 months of postconstruction data from the site in 1980 showed a daily mean pH range of 4.5 to 6.8, with an average of 4.9, and a daily mean conductance range of 175 to 405 µmho/cm with average of 300. The estimated sulfate load had decreased to 570 pounds per day and the iron load to 8.5 pounds per day.

Data collected during the first 6 months after construction indicate moderate improvement in water quality. However, acidic water is still being impounded behind the dike and seals and has not yet been flushed out by infiltrating rain and ground water. Because the system has not yet stabilized, no interpretation or conclusive statement can be made at this time.

INTRODUCTION

Lake Hope, in Vinton County, Ohio, 55 miles southeast of Columbus, was formed in 1939 when Sandy Run was dammed 0.25 mile upstream from its mouth (Tobin and Youger, 1975). The lake is in Zaleski State Forest and is used for recreation. Acid drainage from abandoned drift (underground) mines and unreclaimed surface mines has affected the lake's water quality.

Sandy Run has its headwaters in the northeast corner of Vinton County, Brown Township, sections 11 and 12, and represents 53 percent of the drainage area contributing to Lake Hope (fig. 1). Both Sandy Run and Big Four Hollow Creek, a tributary of Sandy Run, carry mine drainage. Sandy Run above Big Four Hollow Creek (U.S. Geological Survey (USGS) station 03201600) has a drainage area of 1.01 square miles; Big Four Hollow Creek (03201700) has a drainage area of 0.98 square mile. Station locations and principal features of the mine area are shown in figure 1.

On June 20, 1979, the Ohio Department of Natural Resources, in cooperation with U.S. Environmental Protection Agency, began construction on a demonstration project designed to reduce acid mine discharge to Sandy Run, the principal tributary of Lake Hope. A large underground clay dike and 35 mine seals were placed in the down-dip side of the outcrop of the Middle Kittanning No. 6 coal at mine complex 88 (fig. 1). Toe drains were installed to remove water from the outside undisturbed trench wall before the clay dike was placed in the trench. The dike and seals will impound water in mine complex 88 and other smaller mines to the north (fig. 1). When the mines fill with water, free oxygen will be removed from the processes producing the acid and iron complexes, thus reducing acid mine discharge.

Acid mine drainage develops when the minerals pyrite and marcasite (iron sulfides), which are found in coal-bearing rocks in Ohio, react with free oxygen and water in partly filled underground mines. This highly acidic, highly mineralized water can flow from mine openings or can emerge from springs and seeps, eventually flowing into local streams. If the abandoned underground mines are completely flooded, however, free oxygen is removed from the chemical processes producing the acids.

A small surface mine (fig. 2, springs 15 and 16) north of the construction area was reclaimed at the same time as construction of the dike to reduce another source of acidic surface water.

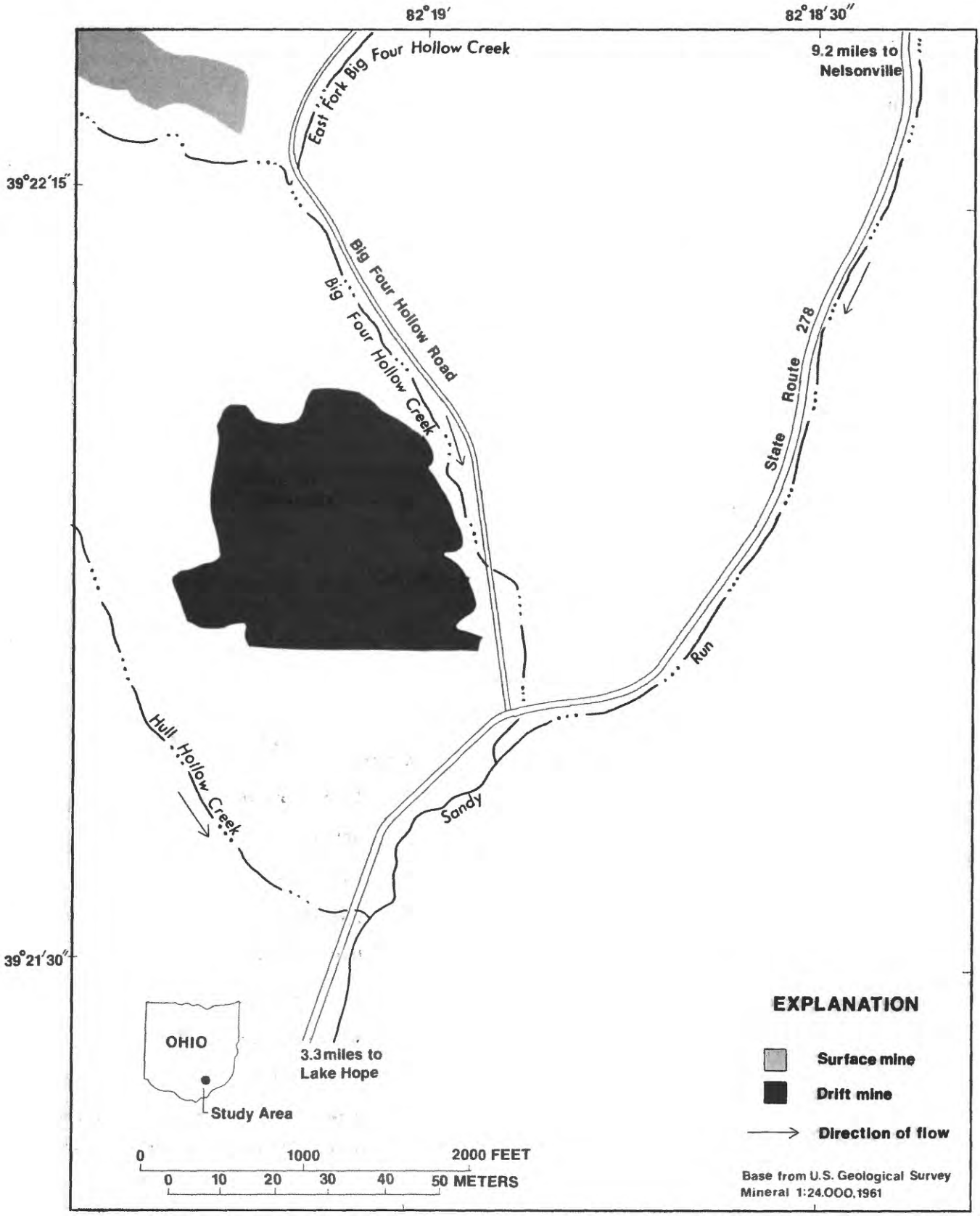

Figure 1.--Big Four Hollow Creek and Mine 88 complex.

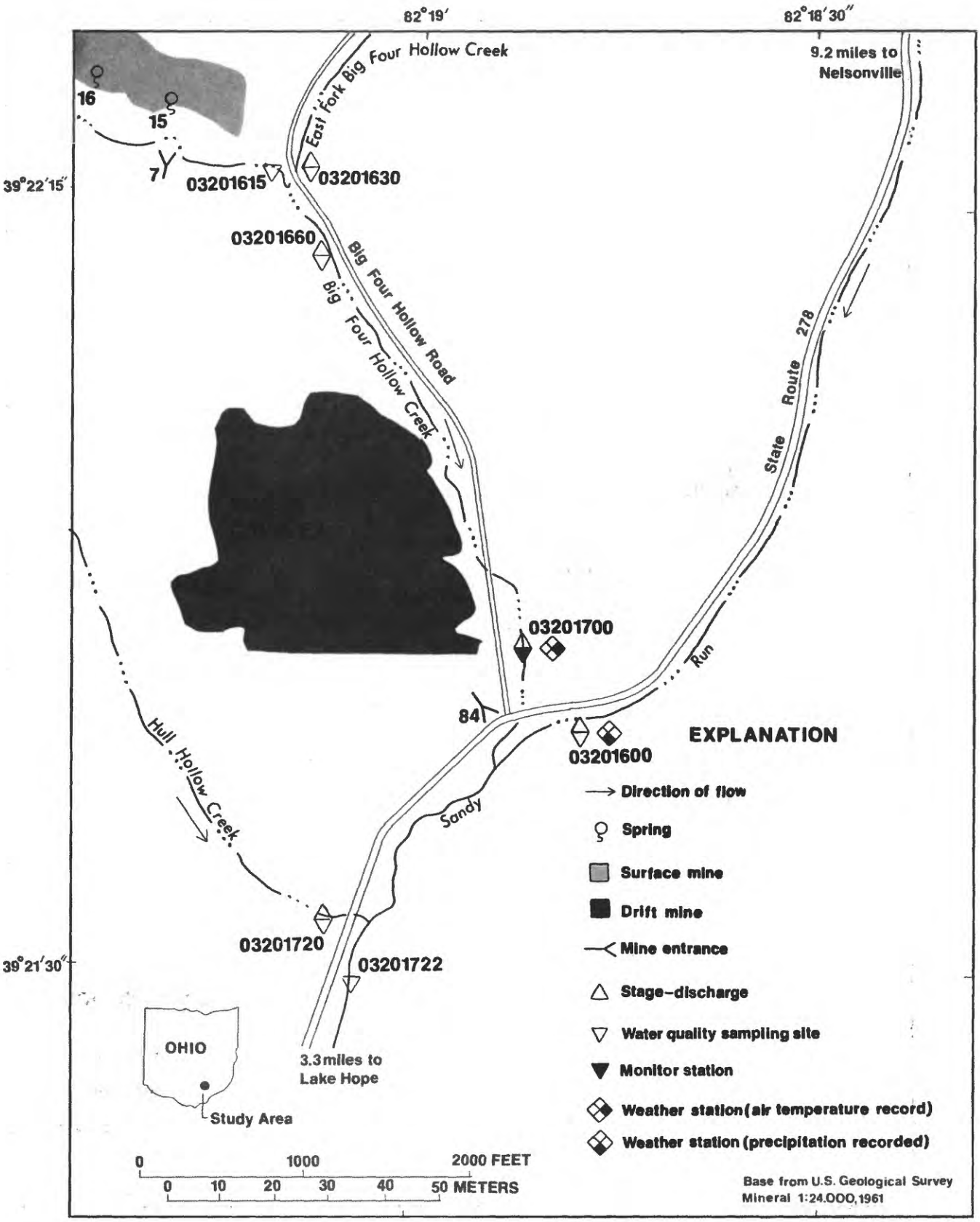

Figure 2.--Big Four Hollow water quality sampling sites.

PURPOSE AND SCOPE

This report documents the changes that occurred in the surface water and ground water as a result of the demonstration project to abate mine drainage into Big Four Hollow Creek. Hydrologic data were collected before, during, and after the 1979 dike and seal construction to evaluate the effect of mine sealing on the hydrologic system and the usefulness of mine sealing in reducing acid mine drainage from drift mines.

This report is not intended to be conclusive or final because only 1 year of postconstruction data were available as of this writing. Several years may pass before the drift-mine complex fills completely and the formation of acid decreases.

METHODS AND APPROACH

Surface Water

Six surface-water sampling stations (03201600, 03201615, 03201630, 03201700, 03201720, and 03201722) were established October 1, 1978, near Lake Hope, Ohio. (Locations are shown in fig. 1.) Sampling sites 03201615 and 03201630 were discontinued July 10, 1979, and combined at a downstream sampling station 03201660. Table 1 lists the stations in downstream order. The types of data collected at each site are shown in figure 2.

Sandy Run above Big Four Hollow Creek (03201600) and Hull Hollow Creek (03201720) were selected as control sites. They are near, but not affected by, the construction area in Big Four Hollow. Sandy Run above Big Four Hollow Creek was selected as a control stream representing acid mine drainage from the middle Kittanning No. 6 coal. Hull Hollow Creek was considered a non-acidic control stream. These sites served as water-quality-sampling and discharge-measuring sites for comparison with sites 03201660 and 03201700. The Hull Hollow Creek site was also selected to record any stream-quality or discharge change due to leakage through the west side of Mine 88 (fig. 2).

Two-surface-water sites -- 03201660 and 03201700 -- were selected on Big Four Hollow Creek (fig. 2). These sites, one upstream and one downstream from the construction site, were used to collect water-quality samples and discharge measurements. The downstream site (03201700) was the most critical to the project because it would probably be the first to show any change in water quality or discharge resulting from mine seepage or ground-water leakage from the construction area. This station

Table 1. -- Sandy Run basin gaging station names, numbers, and type of data collected.

Downstream order number	Station name	Activity
03201615	Left Fork Big Four Hollow Creek near Lake Hope	C
03201630	Right Fork Big Four Hollow Creek near Lake Hope	Q,C
03201660	Big Four Hollow Creek below confluence of left and right forks	Q
03201700	Big Four Hollow Creek near Lake Hope	Q,C,M,S
03201600	Sandy Run above Big Four Hollow Creek	Q,C
03201720	Hull Hollow Creek near Lake Hope	Q,C
03201722	Sandy Run below Hull Hollow	C

C Biweekly sampling for water quality
Q Daily discharge
M Four-parameter water-quality monitor
S Daily sediment station

was upgraded October 1, 1978, with a water-stage manometer and a water-quality monitor that measures water temperature, outside air temperature, specific conductance, and pH. Water-quality data are summarized in appendix 1. Daily sediment samples were also collected at this station; data are summarized in appendix 2.

Sandy Run below Hull Hollow (station 03201722) was selected for water-quality sampling. This site is far enough downstream from Hull Hollow Creek (200 ft) to allow mixing of all inflow before discharging into Lake Hope.

A chemical schedule was followed once every 2 weeks at stations 03201600, 03201630, 03201700, and 03201722 (fig. 2). In addition, monthly and quarterly chemical schedules were followed at the above stations, and at station 03201720 on Hull Hollow Creek. Specific conductance, pH, dissolved oxygen, alkalinity, acidity, temperature, and flow (all field-measured characteristics) were measured at the stations when water samples were collected.

Certain chemical constituents were dropped from the sampling schedule after May 9, 1980, because they were not found at significant levels. Water samples collected biweekly were analyzed for dissolved nutrients, iron (dissolved, suspended, and total), manganese, lead (total), and zinc (dissolved, suspended, and total). Samples collected monthly were analyzed for the same constituents, plus aluminum (total), nitrogen (as N), phosphorus (as P), carbon (total, dissolved, and suspended), and chemical oxygen demand. Samples collected quarterly were analyzed for the same constituents as the monthly samples plus nickel and mercury (both total). All samples in accordance with field techniques described by Rainwater and Thatcher (1960), and by Brown and others (1970; updated by Skougstad and others, 1979). All chemical constituents listed in appendixes 3-15 were analyzed in the U.S. Geological Survey Central Laboratory in Atlanta, Ga.

Discharge hydrographs for the five stage-discharge sites are shown in figures 4 through 8 at the back of this report.

Ground Water

Six wells were drilled to monitor ground-water impoundment behind the clay dike. Holes were drilled, and 4-inch PVC plastic pipe was installed as casing. Three of the wells (designated RM-wells) were drilled into mine rooms (fig. 3). Automatic data recorders were installed at each well to record changes in the mine-pool level. Water levels at well RM-1 are plotted in fig. 9 (at the back of this report). No water entered wells RM-2 and RM-3 during the data-collection period (Oct. 1978 - Sept. 1980). Well RM-3 was destroyed during construction of the dike.

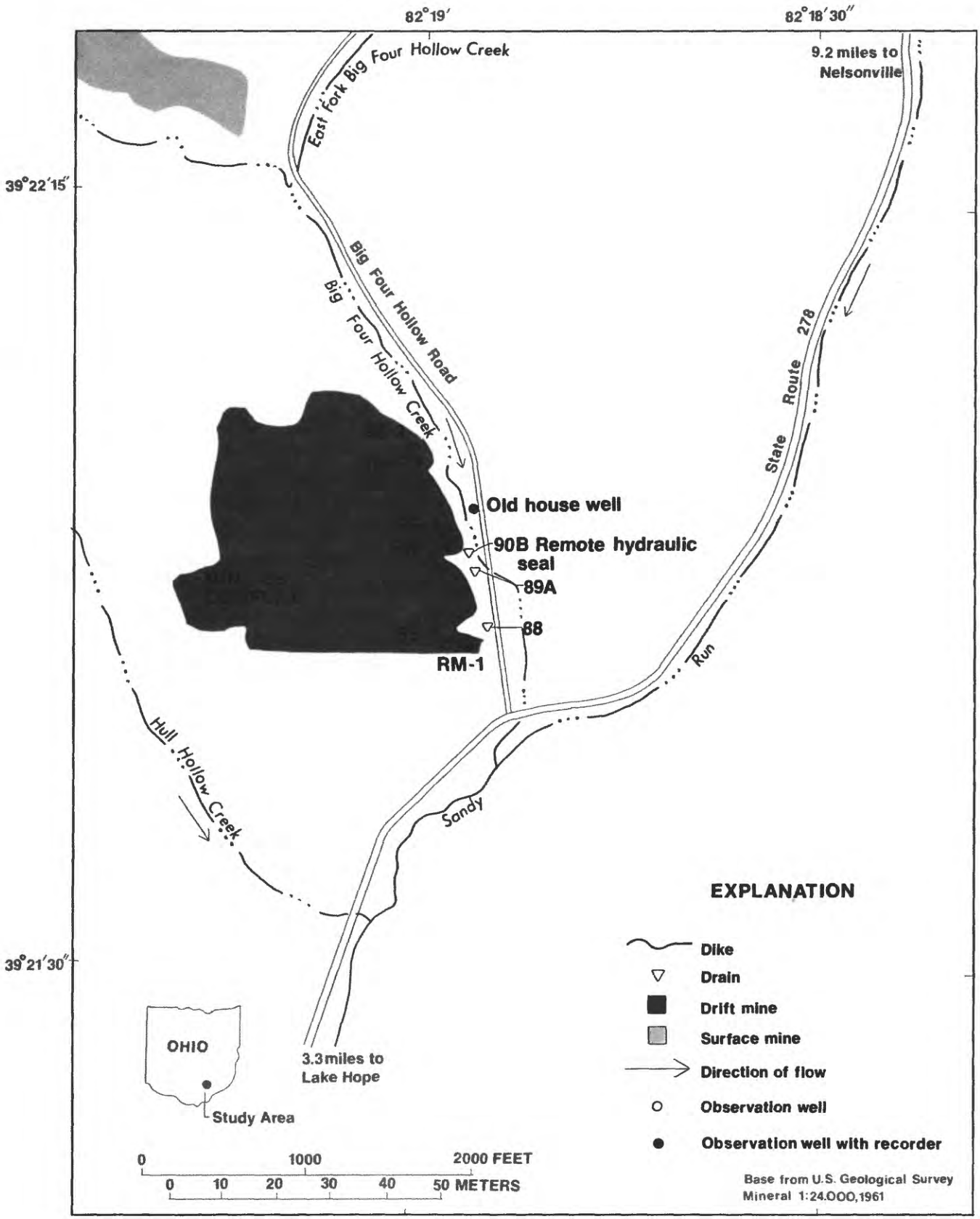

Figure 3.--Big Four Hollow water quality sampling sites.

Well RM-1 was sampled quarterly as soon as it contained enough water. The same chemical constituents were sampled as in the monthly surface-water samples (appendix 10). A PVC plastic point sampler was used to bail and sample the water. Well RM-2 is to be sampled when the water level rises sufficiently.

Three other wells (designated SS-wells) were drilled, one next to each RM-well, into the sandstone ceiling above the coal (fig. 3). The SS-wells were periodically measured to detect ground water in the sandstone unit above the top of the coal. No water above the top of the coal was detected.

The "Old House Well", a domestic well about 200 feet east of mine entrance 90B (fig. 3), taps the sandstone below the coal. This well was sampled to determine the ground-water quality below the coal and underclay; it is to be sampled in the future to detect any leakage from the mine pool into the lower sandstone unit.

Mine Entrances, Seeps, and Drains

Before construction of the clay dike, the area between mine entrances 7 and 84 contained many springs and seeps and about 30 mine entrances (fig. 2). Nearly all acid drainage into Big Four Hollow Creek came from those mine entrances. They were inspected at least quarterly. Water seeping from mine entrances 88 and 89A was sampled before the clay dike was placed and the mine complex closed in November 1979. Water-quality data from three sites are tabulated in appendixes 13 and 14.

During dike construction, toe drains were installed on the outside edge of the clay dike to drain seepage. Outflows near selected mine entrances 5 and 89A were sampled after October 1979; data are included in appendixes 13 and 14. Mine entrance 90B was sampled after April 1980, when built-in weep holes began flowing. (See appendix 15.)

Seeps 15 and 16 (fig. 2) were sampled to obtain antecedent data. Results are given in appendixes 11 and 12, respectively. These seeps will be observed and sampled again yearly for comparison if the project continues.

Precipitation

A recording rain gage was installed at Sandy Run near Lake Hope (station 03201600), on May 17, 1979. Appendix 16 lists the amounts of rain collected, in inches per day, from May 17, 1979 to Sept. 30, 1980.

RESULTS

Data collected by private consultants in 1970 and 1971 near the mouth of Big Four Hollow Creek (station 03201700) showed an average pH of 3.1 (calculated from mean hydrogen-ion concentration, in moles per liter) and a pH range of 2.7 to 4.8. The estimated sulfate load was 1,000 lb/d (pounds per day), and the estimated iron load was 100 lb/d (Stanley Consultants, 1971).

Data collected at the same site before construction of the dike in 1979 showed a daily mean pH range of 3.4 to 5.4, averaging 3.7, and a daily mean specific-conductance range of 160 to 600 µmho/cm (micromhos per centimeter at 25 degrees Celsius), averaging 400 µmho/cm. The data also indicated a sulfate load of 1,000 lb/d as before, but a decreased iron load of 50 lb/d.

All mine entrances and nearly all seeps stopped flowing after construction of the clay dike, except around mine entrance 84 (fig. 2) and upstream from Big Four Hollow Road along Mine 88 Hollow tributary (fig. 3).

Data from November 2, 1979 to May 1, 1980, indicate an improvement of water quality in Big Four Hollow Creek. The average pH (calculated from mean hydrogen-ion concentrations, in moles per liter) increased from 3.7 to 4.9. Specific-conductance averaged 400 µmho/cm before construction and 300 µmho/cm after construction. Average sulfate loads had decreased from 1,000 lb/d before and to 570 lb/d after, and average iron loads decreased from 50 lb/d before and to 8.5 lb/d after.

Sediment loads before dike construction were smaller than during construction and after construction. The slopes in the basin were initially covered with established vegetation, but during and after construction (before new growth from reseeding), the disturbed areas were susceptible to erosion, which increased the sediment load in the stream.

Although the data indicate an improvement for the most part in the water quality of Big Four Hollow Creek since completion of the reclamation work in 1979, this does not imply that the impounded mine water has improved. Water in the flooded mines is still acidic and high in iron and sulfate.

Once the mines are flooded, less oxidation of the sulfate minerals and less mineralization of the mine water can be expected. Precipitation and percolating ground water will slowly dilute and flush the impounded water. Only after a complete replacement of water in the mines, with a constantly-flooded condition, will reduction of acid mine drainage into Big Four Hollow Creek be possible.

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Tobin, R. L., and Youger, J. D., 1977, Limnology of selected lakes in Ohio - 1975: U.S. Geological Survey Water-Resources Investigation 77-105, p. 124-132.

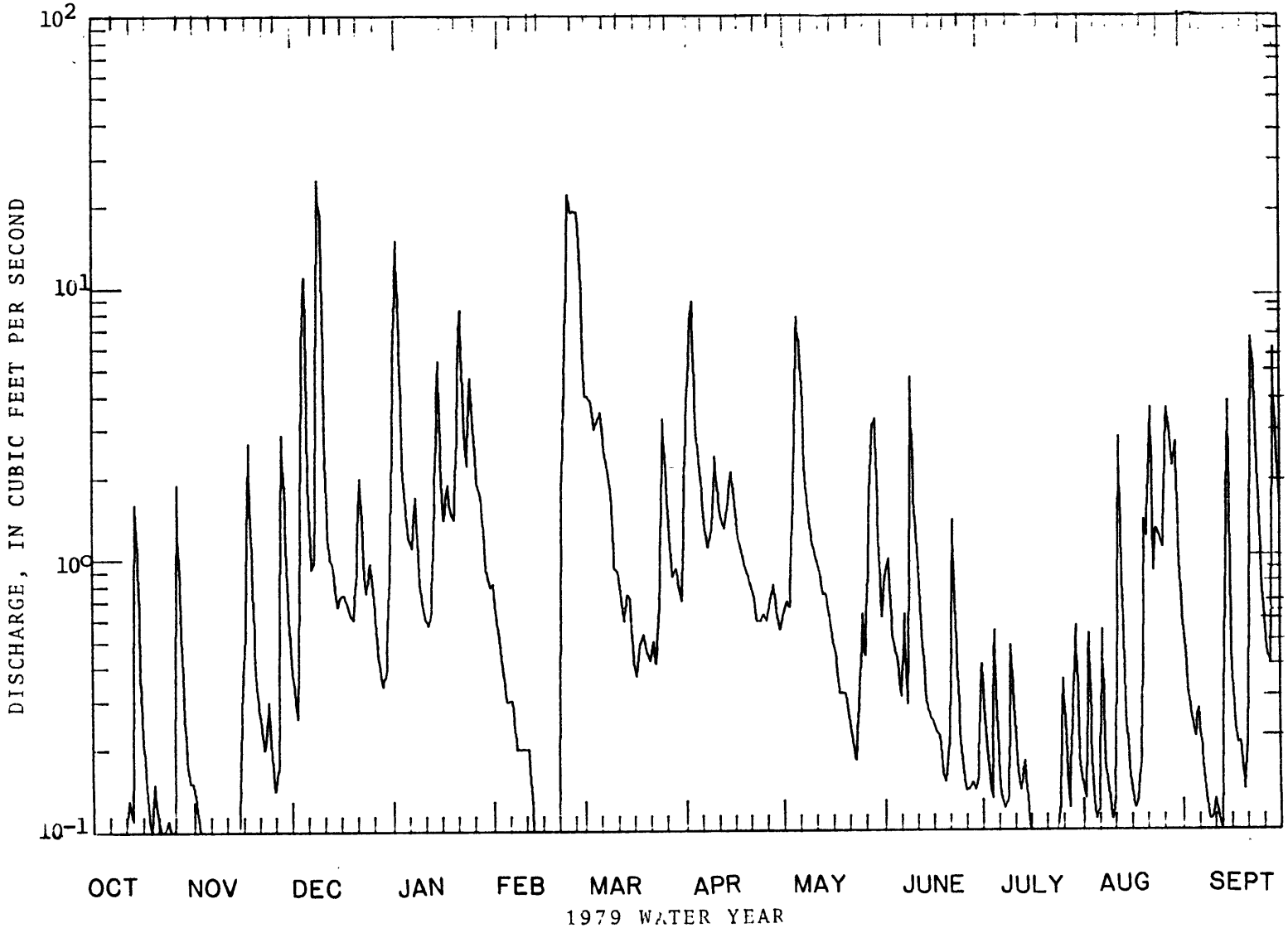

Figure 4.--Discharge, station 03201600 Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.

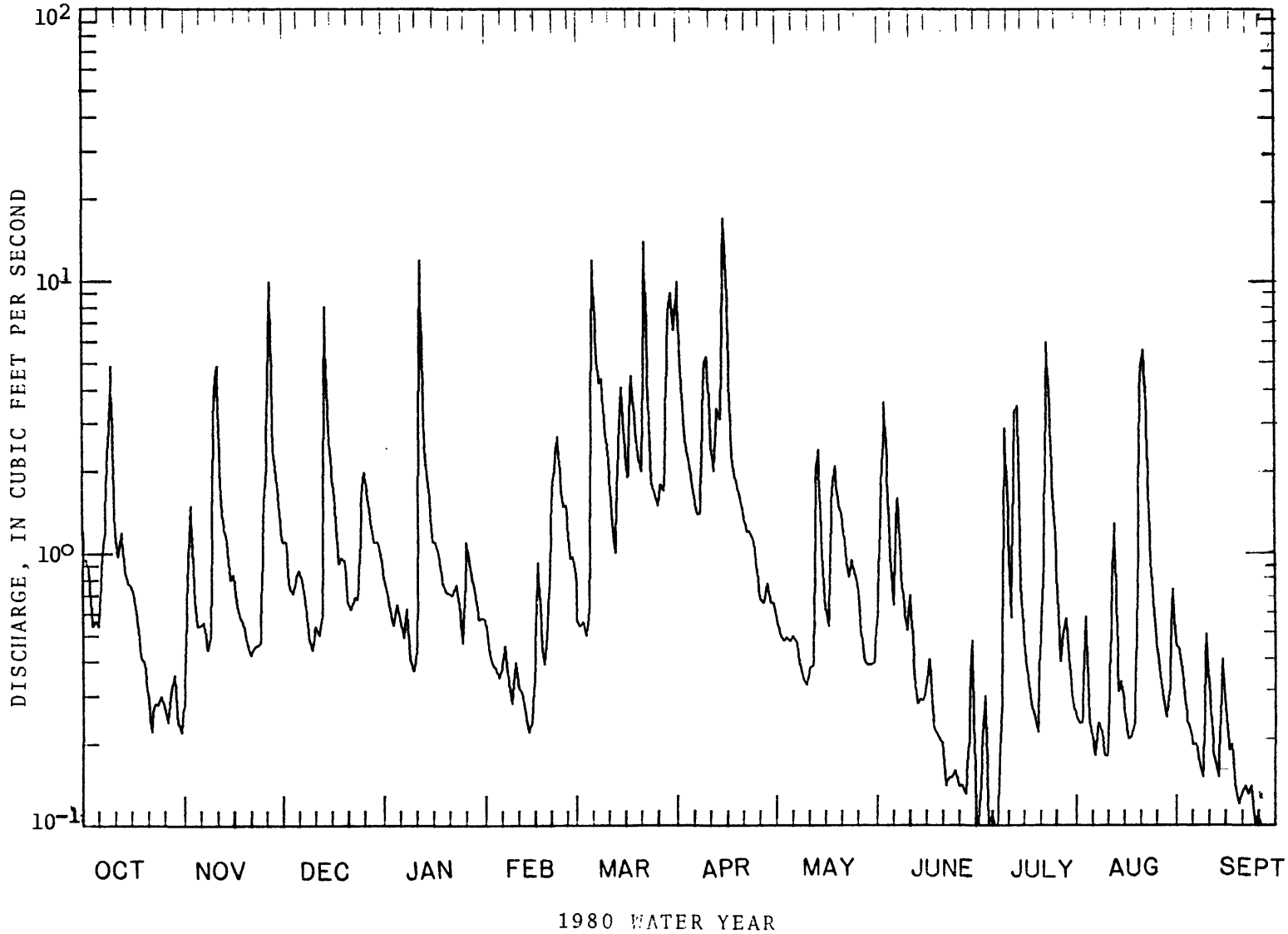

Figure 4.--Discharge, station 03201600 Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.--Continued

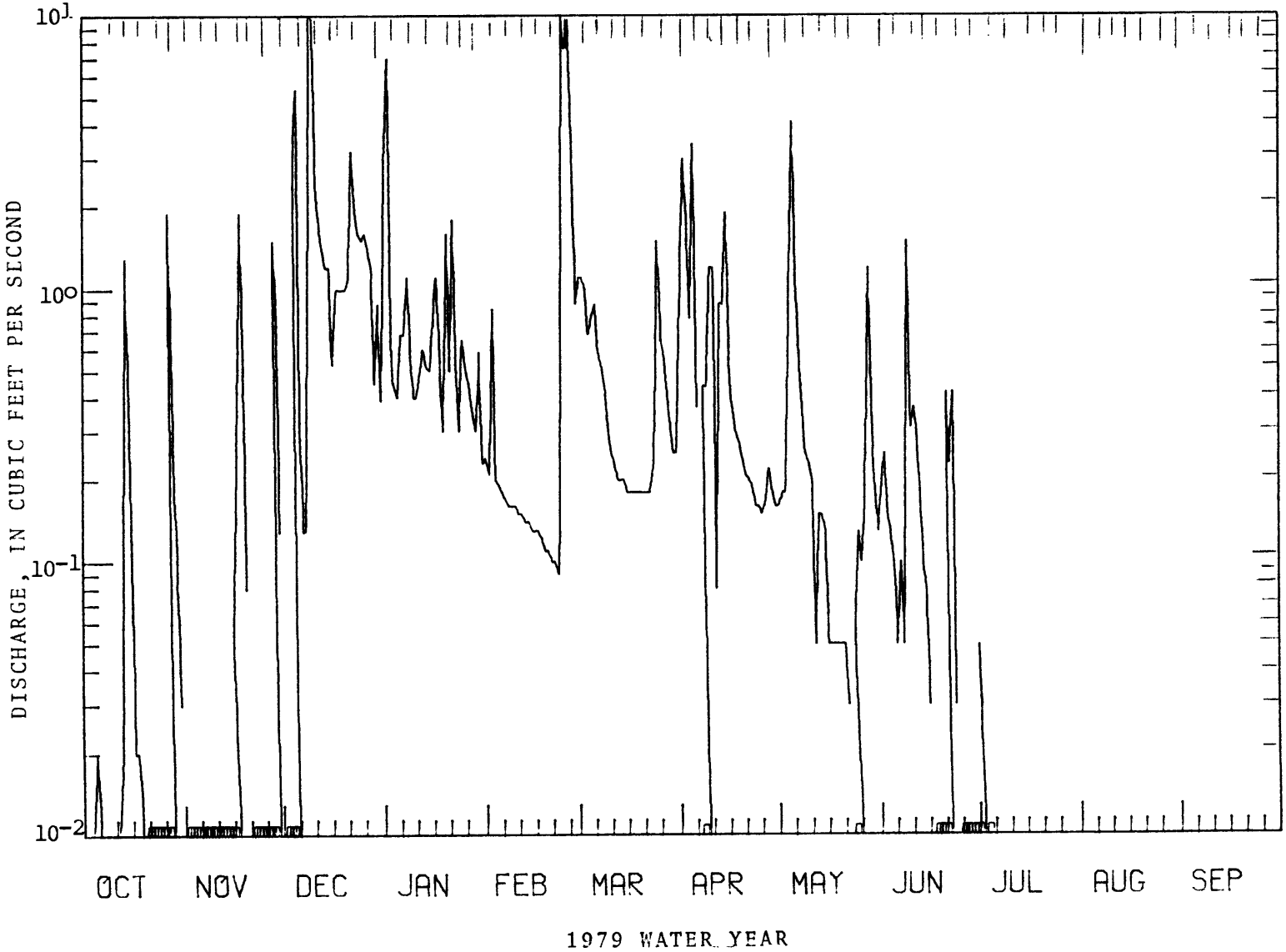

Figure 5.--Discharge, station 03201630 East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979.

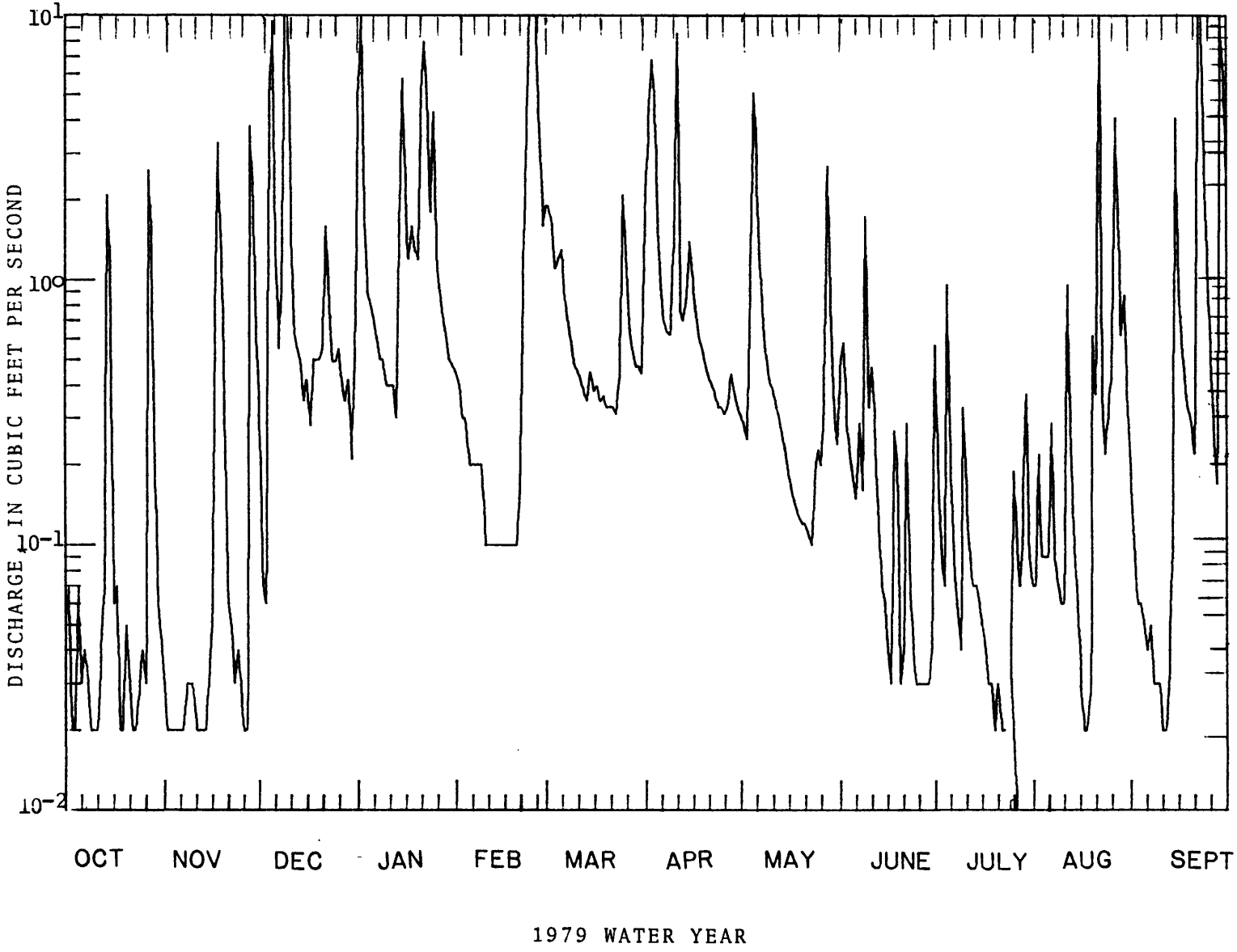

Figure 6.--Discharge, station 03201660 Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.

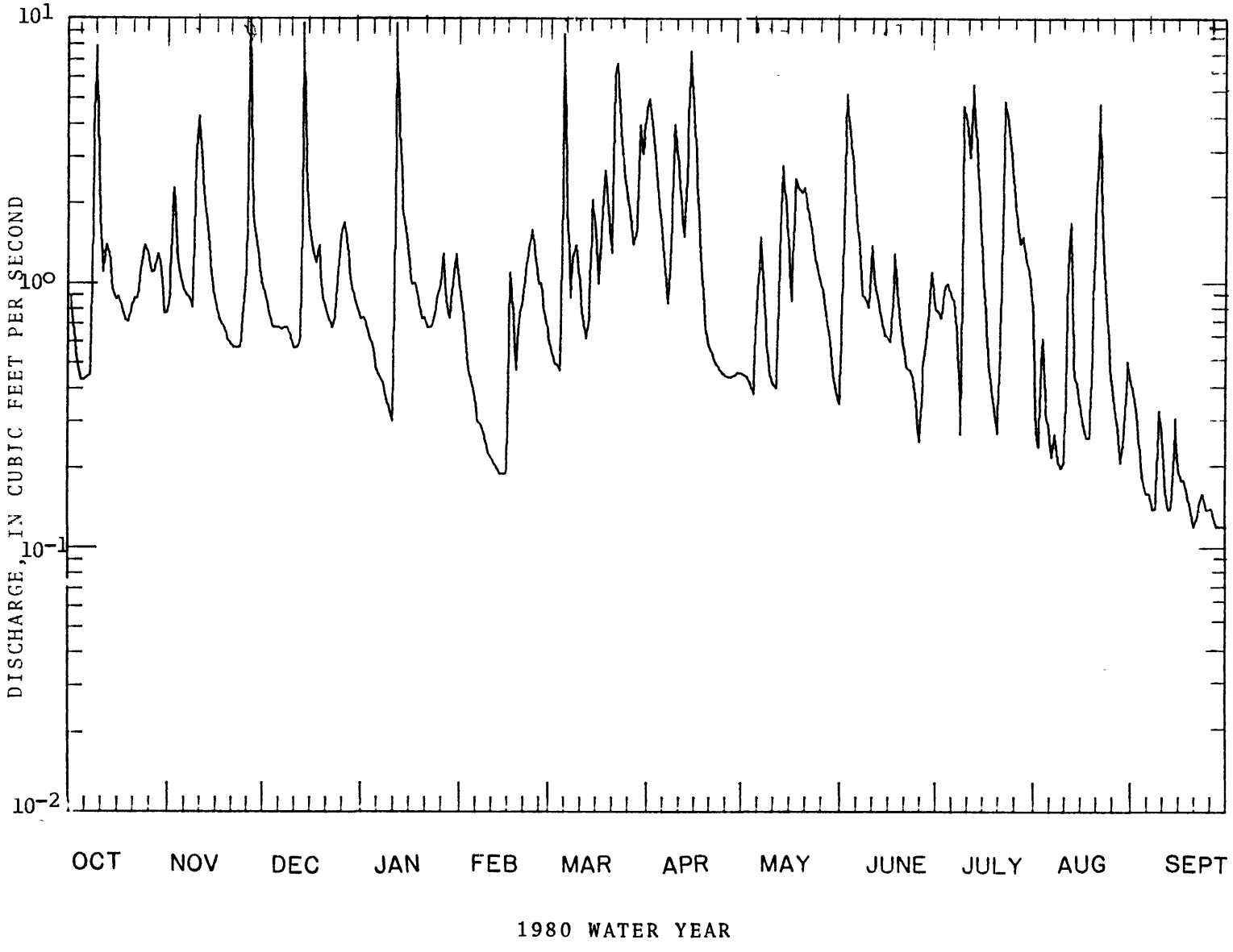

Figure 6.--Discharge, station 03201660 Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.--Continued

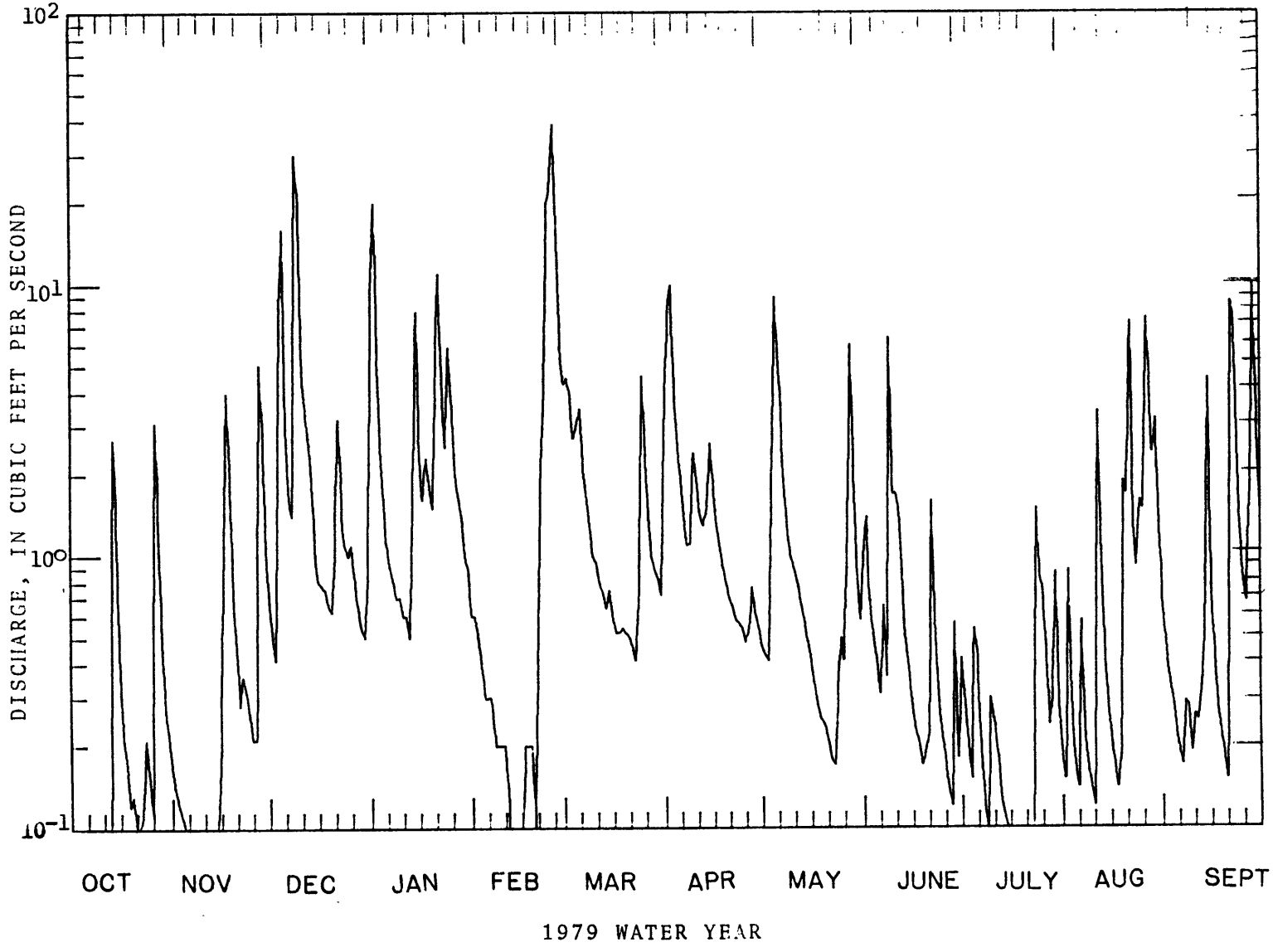

Figure 7. --Discharge, station 03201700 Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.

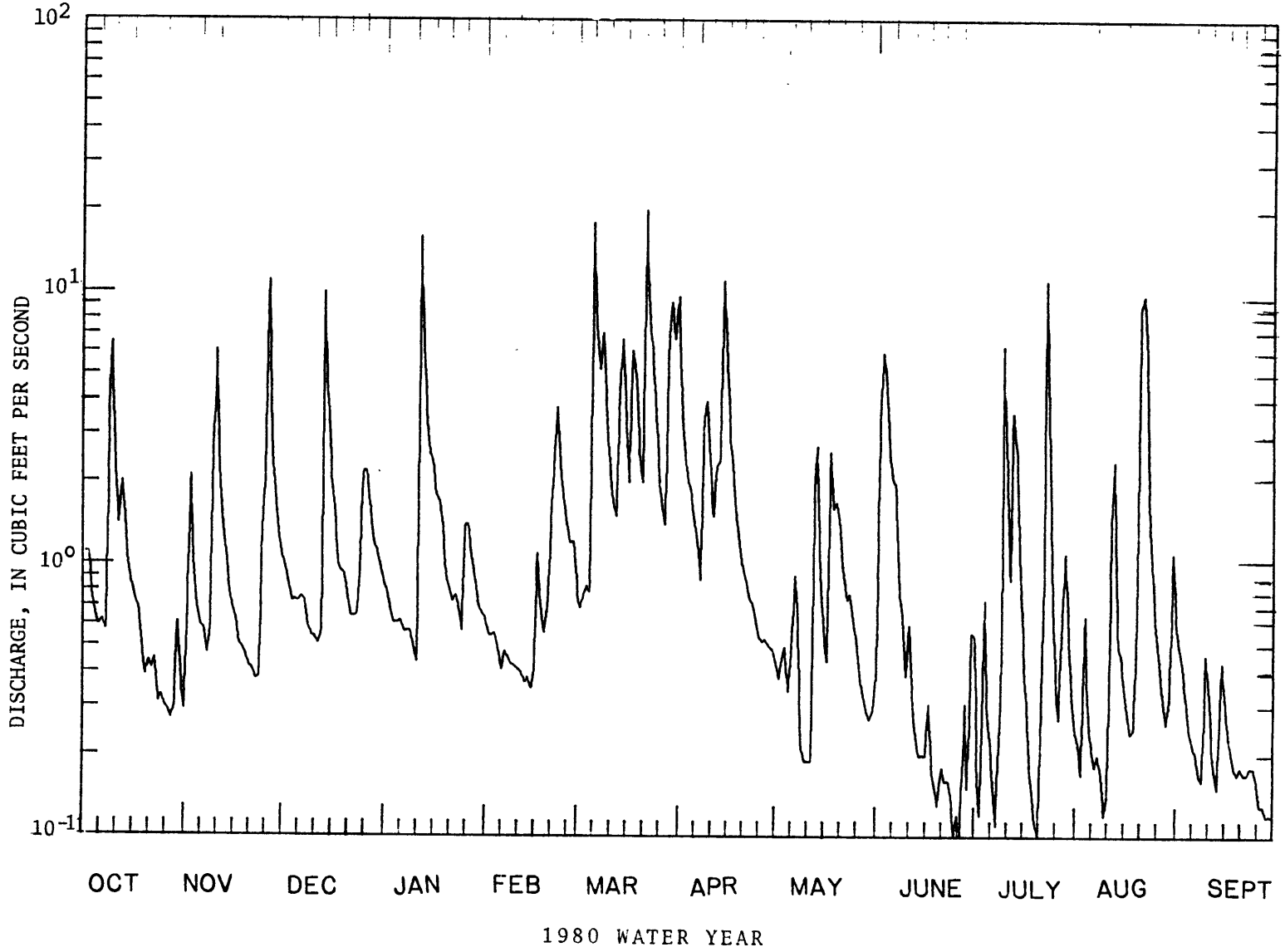

Figure 7.--Discharge, station 03201700 Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.--Continued

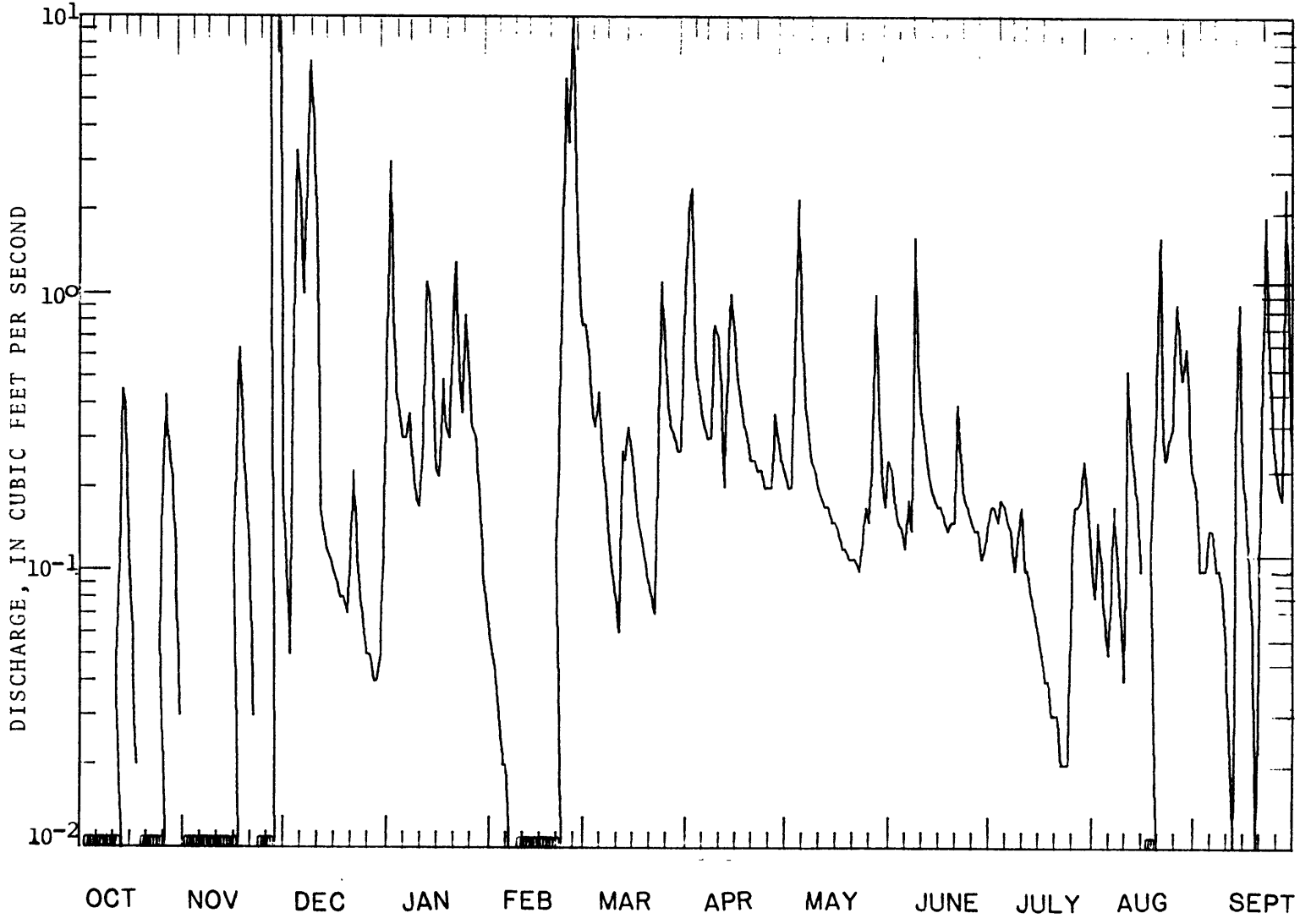

Figure 8.--Discharge, station 03201720 Hull Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

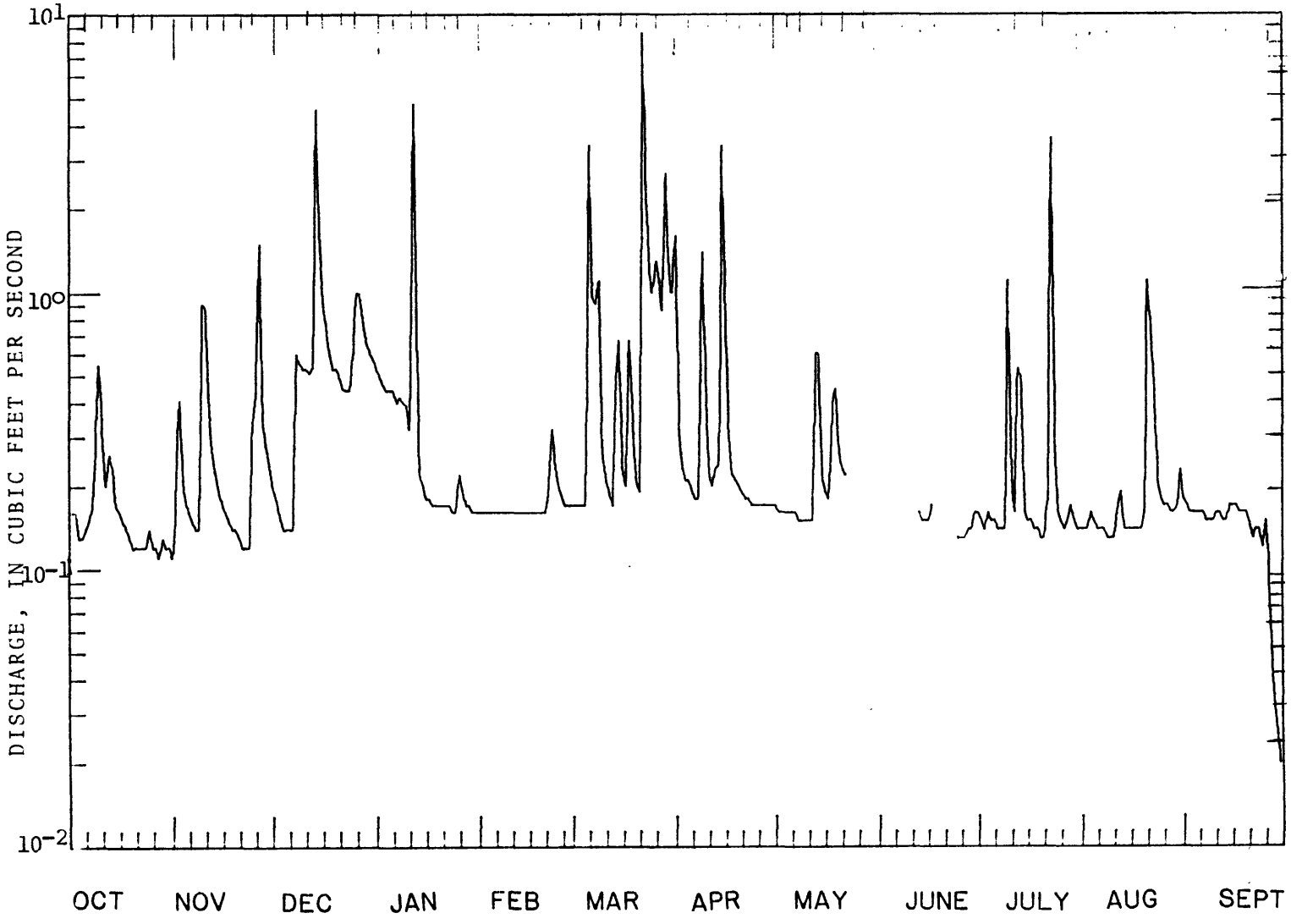

Figure 8.--Discharge, station 03201720 Hull Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980.--Continued

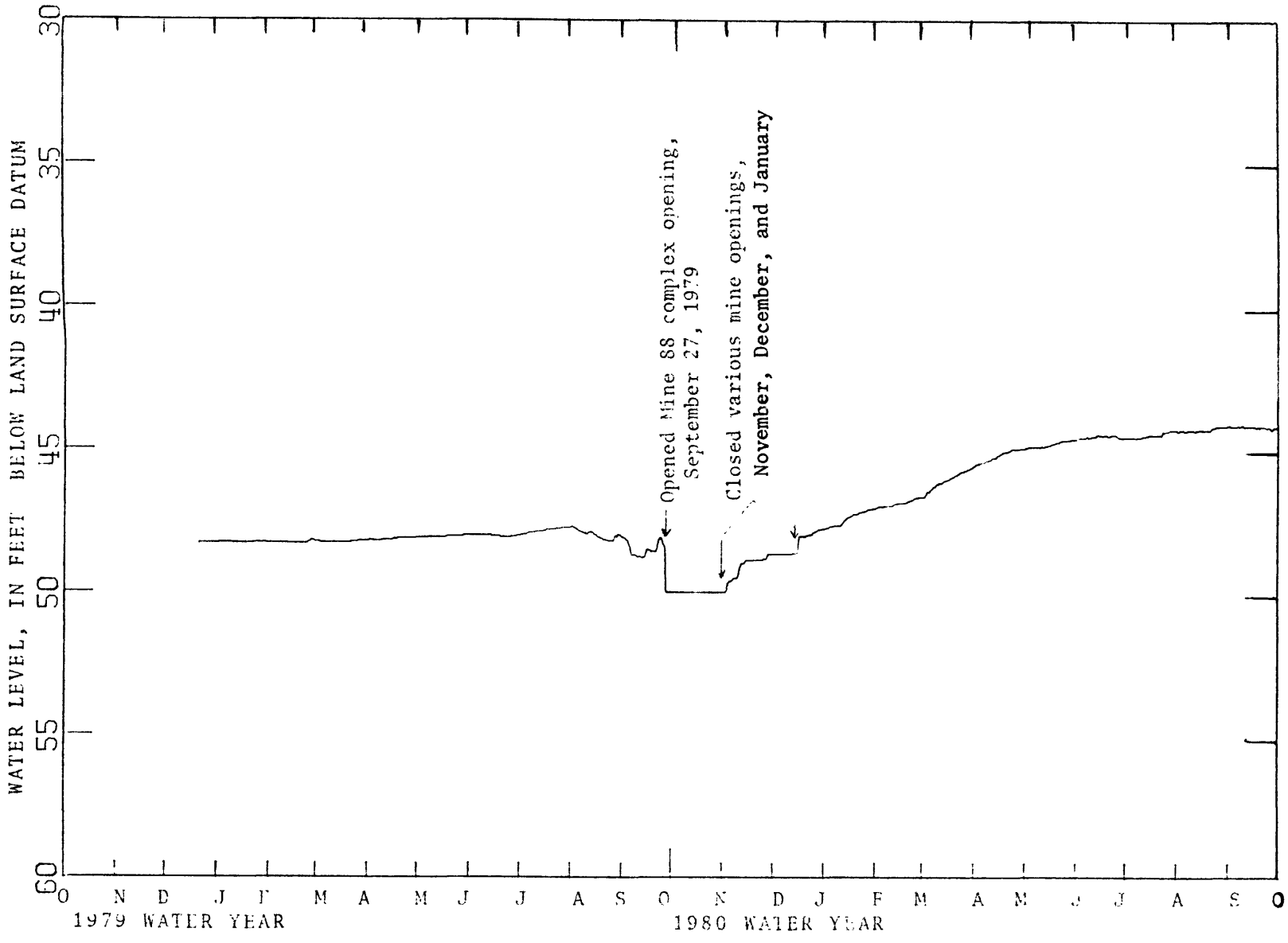

Figure 9.--Water levels for well RM-1 near Lake Hope, Ohio, water years 1979 and 1980

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	18.5	14.0	13.0	6.5	5.5	1.0	7.5	5.0	1.0	.5	5.5	2.5
2	17.0	11.5	12.5	5.0	6.0	2.0	5.0	.5	1.0	.0	7.0	3.5
3	16.5	10.5	13.0	5.5	8.5	4.5	1.0	.5	1.0	.0	9.5	3.0
4	15.5	12.5	13.0	6.0	9.0	5.5	1.0	.5	2.5	.0	10.5	6.5
5	15.0	10.5	13.0	6.0	6.0	4.0	1.0	.5	1.0	.5	---	---
6	12.5	11.0	12.0	6.5	6.0	3.0	1.5	1.0	1.0	.0	---	---
7	12.5	10.0	8.5	7.5	6.5	3.5	1.5	.5	.0	.0	8.5	2.0
8	11.0	8.0	10.5	5.0	---	---	1.0	.5	.5	.0	8.0	3.5
9	13.5	6.5	7.0	4.0	6.0	4.0	1.0	.5	.5	.0	6.5	2.5
10	14.0	7.0	10.0	4.5	4.0	1.0	1.0	.5	.5	.0	8.0	4.0
11	13.0	8.0	11.5	4.5	3.5	.5	1.0	.5	.5	.0	5.0	1.5
12	16.5	11.0	9.0	7.5	5.0	2.0	1.0	.5	.5	.0	9.5	2.0
13	13.5	11.5	12.0	9.0	5.0	2.0	1.0	.5	.5	.0	8.0	1.0
14	12.0	10.5	10.5	8.0	3.5	1.0	2.0	.5	.5	.0	6.5	4.5
15	11.5	9.5	9.5	7.5	4.5	1.0	1.0	.5	.5	.0	5.5	1.0
16	12.0	9.0	8.5	7.5	5.0	1.5	1.0	.5	.5	.0	7.0	1.0
17	12.0	8.0	11.5	8.5	5.0	1.5	1.5	1.0	.5	.0	9.5	.5
18	13.5	6.5	10.0	8.0	3.5	1.0	2.0	.5	.5	.0	12.0	3.5
19	13.5	9.5	9.5	5.5	3.0	2.5	1.0	.5	.5	.0	11.5	4.0
20	14.0	7.5	8.0	4.5	8.0	3.0	2.0	1.0	.5	.0	12.5	7.0
21	14.0	7.0	8.0	5.5	7.0	3.0	3.5	2.0	.0	.0	15.5	6.0
22	14.5	7.5	9.0	6.0	4.5	1.5	3.5	1.5	.5	.0	14.5	5.0
23	12.0	9.0	9.0	7.0	3.5	.5	4.0	1.0	---	---	11.5	8.0
24	12.5	7.0	8.0	5.0	3.5	1.0	3.5	1.0	---	---	9.0	6.0
25	11.5	5.5	6.5	4.0	3.5	1.5	2.0	1.0	---	---	7.5	4.0
26	12.5	10.5	5.5	4.0	3.0	1.0	2.0	1.0	---	---	5.5	3.5
27	11.5	7.5	8.0	4.5	2.5	.5	3.5	1.0	5.5	2.5	8.5	3.0
28	12.0	6.0	7.5	4.0	1.0	.5	2.5	1.5	5.5	1.0	12.0	1.5
29	12.0	6.5	5.0	3.0	1.5	.5	2.0	1.0	---	---	12.5	7.5
30	13.0	5.5	6.5	2.5	2.0	1.0	1.5	.5	---	---	15.0	8.5
31	13.5	5.5	---	---	6.5	2.0	1.5	.5	---	---	11.5	9.0
MONTH	18.5	5.5	13.0	2.5	9.0	.5	7.5	.5	5.5	.0	15.5	.5

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	9.0	8.0	19.5	6.5	19.5	14.0	18.0	14.0	24.5	19.0	22.0	17.0
2	11.5	8.5	21.5	7.0	20.0	14.0	22.5	15.0	20.5	12.5	21.0	18.0
3	11.5	7.0	14.5	12.0	18.0	14.5	25.5	14.0	23.0	16.5	23.0	18.5
4	8.5	6.5	12.0	9.0	22.5	12.0	18.5	15.5	22.5	16.5	23.5	18.0
5	10.5	7.0	16.0	7.5	23.5	13.5	20.0	12.5	24.0	17.5	21.5	18.0
6	11.5	3.5	18.5	7.5	22.5	15.0	23.0	11.5	22.5	18.5	22.5	18.5
7	9.0	2.0	21.0	9.5	22.0	15.5	23.0	12.0	24.5	18.5	22.0	14.0
8	12.0	4.5	21.5	11.0	17.5	16.0	25.0	13.5	24.5	19.5	15.5	13.0
9	8.5	5.0	23.5	12.5	19.0	15.5	17.5	17.0	26.0	18.5	18.0	11.5
10	12.5	3.5	22.0	15.0	23.0	16.0	20.0	16.0	26.0	19.5	18.5	11.5
11	10.5	4.5	23.5	14.0	20.0	14.5	22.5	15.0	20.0	17.5	18.5	12.0
12	14.0	8.0	23.5	15.0	21.5	12.5	21.5	17.5	19.5	16.5	22.0	14.0
13	13.0	9.0	16.0	12.5	18.5	13.0	19.5	15.0	20.0	14.0	18.5	15.5
14	15.0	7.0	21.5	10.5	23.0	12.5	25.0	15.0	19.5	15.0	18.5	15.0
15	9.5	7.0	20.0	12.5	24.5	14.0	25.0	18.5	19.5	14.0	16.5	13.0
16	9.0	5.5	21.5	9.5	22.5	15.0	28.5	15.0	20.5	12.0	17.0	11.5
17	14.5	5.0	21.5	9.0	23.5	16.0	27.0	18.0	21.0	12.0	18.5	10.0
18	16.5	5.0	23.0	9.5	24.0	16.5	27.0	17.0	19.5	15.5	19.0	10.0
19	17.5	4.5	23.5	10.5	25.5	15.5	25.0	15.0	21.0	17.0	18.0	13.0
20	19.0	6.0	22.0	14.0	26.0	15.0	23.5	15.0	20.0	14.5	18.0	11.0
21	17.5	7.0	23.5	15.5	19.0	17.0	25.0	18.0	19.5	17.5	15.5	15.0
22	16.5	10.5	22.5	12.5	23.5	16.0	27.0	18.5	20.5	17.5	15.0	13.5
23	15.0	11.0	16.5	15.0	21.5	16.5	21.5	11.5	20.0	18.0	15.5	12.0
24	19.5	11.0	15.5	13.5	19.5	14.5	16.0	12.0	20.5	18.0	16.5	11.0
25	20.0	12.5	13.5	10.5	23.0	11.5	18.0	14.0	19.5	17.5	16.5	12.0
26	15.0	13.0	15.5	10.0	24.0	12.0	19.5	16.0	18.5	17.0	17.5	12.0
27	16.5	10.5	12.5	11.0	23.0	13.0	20.5	16.0	19.0	17.5	15.5	12.5
28	14.5	9.0	16.0	11.0	20.5	14.5	19.0	17.0	20.5	17.0	15.5	15.0
29	14.0	7.5	19.0	9.5	18.5	14.5	22.5	18.0	20.5	18.5	17.5	15.0
30	18.5	7.0	21.0	10.5	17.5	15.5	23.5	17.0	20.5	15.5	17.5	14.0
31	---	---	16.5	14.0	---	---	24.5	18.0	22.0	16.5	---	---
MONTH	20.0	2.0	23.5	6.5	26.0	11.5	28.5	11.5	26.0	12.0	23.5	10.0
YEAR	28.5	.0										

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	17.5	14.0	13.5	10.5	4.0	2.5	2.5	2.0	1.0	.5	.5	.5
2	16.0	14.5	11.5	9.0	3.5	2.0	2.0	2.0	.5	.5	1.0	.5
3	15.0	13.5	10.0	7.0	3.0	1.0	3.0	2.0	1.0	.5	1.0	.5
4	14.0	13.0	9.0	5.5	4.0	1.5	2.5	1.0	1.0	.5	1.0	.5
5	13.0	11.0	9.0	5.0	4.5	2.0	1.5	1.0	1.0	.5	3.0	.5
6	12.5	10.0	8.5	6.0	4.5	3.5	2.0	1.0	.5	.5	6.0	2.5
7	11.5	9.5	9.5	8.5	5.0	3.0	3.0	1.0	.5	.5	5.0	2.5
8	11.5	8.5	---	---	4.5	2.5	2.5	.5	1.0	.5	9.5	4.0
9	12.0	10.5	9.5	7.0	4.0	2.0	2.5	.5	1.0	.5	8.5	3.0
10	11.0	9.0	9.5	8.0	3.5	1.5	1.5	.5	1.0	.5	8.0	2.5
11	10.0	8.5	8.0	6.0	5.5	2.0	4.5	1.0	1.0	.5	6.5	1.0
12	11.5	9.5	7.0	5.0	7.0	5.0	2.5	1.0	1.0	.5	4.5	1.0
13	10.5	8.0	7.5	6.0	6.5	5.0	3.0	1.0	1.0	.5	3.5	1.5
14	10.0	7.0	6.5	5.0	5.0	3.0	4.5	3.0	1.0	.5	4.0	1.5
15	9.0	5.5	6.0	4.5	3.5	1.5	4.5	4.0	1.0	.5	9.0	1.0
16	12.0	9.0	7.5	5.0	4.5	2.0	5.5	3.0	1.0	.5	9.5	2.0
17	13.5	10.5	7.5	3.5	3.0	.5	7.5	5.0	1.0	.5	7.5	4.5
18	14.0	10.0	8.0	4.5	2.0	.5	5.5	3.5	1.0	.5	9.5	2.5
19	14.5	10.5	8.0	4.5	3.0	1.0	5.0	2.5	1.5	.5	8.0	1.5
20	16.0	11.5	9.5	6.0	3.0	1.0	5.5	2.5	1.0	.5	8.0	4.5
21	16.5	12.0	10.0	6.5	3.0	1.0	4.0	.5	1.5	.5	8.0	4.5
22	17.0	12.5	10.0	9.0	4.0	2.5	3.5	2.5	6.5	1.5	9.5	3.5
23	14.5	10.5	11.0	9.0	5.5	4.0	2.5	.5	5.0	2.5	9.5	3.0
24	10.5	9.0	10.5	9.0	8.5	5.5	.5	.5	5.0	2.5	8.0	6.0
25	9.5	7.5	12.0	9.0	7.5	5.0	2.0	.5	5.0	.5	7.0	5.0
26	11.0	6.0	11.0	8.5	5.5	4.5	2.5	.5	3.0	.5	9.5	3.5
27	10.0	5.5	9.0	6.5	4.5	3.0	2.5	1.0	1.5	.5	12.5	2.0
28	11.5	8.5	8.0	5.5	3.0	2.0	1.5	1.0	1.5	.5	7.5	5.0
29	12.5	7.0	5.0	3.5	3.5	2.5	2.0	.5	1.5	.5	8.0	6.5
30	13.0	7.0	4.0	3.0	3.0	2.0	1.0	.5	---	---	9.5	6.0
31	14.0	8.5	---	---	2.5	2.0	1.0	.5	---	---	9.5	6.5
MONTH	17.5	5.5	13.5	3.0	8.5	.5	7.5	.5	6.5	.5	12.5	.5

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	9.0	6.0	18.0	9.0	19.5	15.5	25.0	14.0	26.0	20.0	26.0	18.5
2	14.5	5.0	18.0	8.0	19.0	15.0	28.0	16.5	27.5	19.0	26.0	19.0
3	13.0	6.0	20.5	8.5	21.0	15.0	22.5	18.5	23.5	20.0	25.0	17.0
4	9.5	6.5	23.0	9.0	21.5	14.0	25.5	18.5	26.0	19.0	25.5	17.0
5	---	---	22.5	9.5	24.0	12.0	27.5	18.0	27.5	19.0	25.5	18.5
6	---	---	20.0	10.5	22.0	14.5	27.5	17.5	20.5	19.5	25.5	18.5
7	15.0	7.5	17.0	9.5	23.0	15.5	24.5	14.0	25.5	21.0	24.5	17.5
8	13.0	7.5	14.5	6.0	22.5	18.0	31.5	17.5	28.5	20.0	24.0	16.5
9	13.5	8.0	18.0	5.0	23.5	19.0	22.0	17.5	28.0	21.0	23.5	17.0
10	8.0	6.0	20.5	6.0	23.0	20.5	20.5	17.5	28.5	20.5	22.5	16.0
11	15.0	4.0	24.5	11.5	20.0	15.0	27.0	17.0	28.0	20.5	21.5	13.0
12	10.5	7.5	19.0	14.0	22.0	10.0	21.0	18.0	24.0	19.5	22.5	13.0
13	8.0	6.0	23.0	13.0	23.5	10.5	21.5	17.0	25.5	17.5	24.0	16.0
14	10.0	6.5	15.5	11.5	25.5	12.5	24.5	15.0	26.5	19.0	24.0	18.0
15	8.0	6.0	20.5	8.5	22.5	15.5	33.0	18.0	21.5	20.0	20.0	17.5
16	13.0	5.0	21.5	9.0	20.0	13.5	34.0	25.0	23.5	17.5	21.5	15.0
17	14.0	4.5	16.0	12.0	23.0	10.5	30.5	21.0	20.0	17.5	20.0	17.0
18	16.5	5.0	18.5	12.0	24.0	12.0	28.5	18.0	22.5	18.0	20.0	15.5
19	15.5	6.0	16.5	12.5	24.5	12.0	30.0	18.5	24.5	19.0	22.0	13.5
20	19.0	6.0	14.5	12.5	23.5	13.0	31.0	19.5	20.5	18.5	23.5	14.5
21	20.5	8.0	20.5	12.5	23.0	11.5	30.5	21.0	22.5	18.5	24.0	17.0
22	18.5	7.0	22.5	12.0	25.0	11.5	20.5	18.0	21.0	18.5	22.0	18.0
23	20.0	9.5	19.0	14.5	26.0	13.5	21.5	18.0	21.0	16.5	20.0	17.0
24	19.0	7.5	23.5	14.5	21.5	17.0	24.5	16.5	23.5	16.5	19.5	14.5
25	13.5	7.0	24.0	14.0	23.5	15.0	25.0	16.0	24.0	16.5	20.0	14.5
26	11.5	7.0	23.0	11.5	27.5	15.0	25.5	17.0	24.5	17.0	18.0	13.5
27	11.0	7.0	22.5	10.0	26.5	17.5	25.0	18.5	25.5	17.0	17.5	10.0
28	11.0	6.0	23.5	11.0	29.0	17.0	22.5	19.0	26.0	18.0	18.5	11.5
29	13.0	7.5	24.5	12.5	22.5	18.5	25.5	17.5	25.5	18.5	19.0	11.5
30	13.5	8.0	22.5	15.5	22.5	15.0	25.0	17.5	24.0	18.5	16.5	11.5
31	---	---	25.0	15.5	---	---	27.0	18.0	24.5	17.5	---	---
MONTH	20.5	4.0	25.0	5.0	29.0	10.0	34.0	14.0	28.5	16.5	26.0	10.0
YEAR	34.0	.5										

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	1570	984	699	663	411	375	225	111	465	393	264	234
2	1350	1220	702	669	438	393	642	180	459	417	279	249
3	1370	1230	849	687	483	153	318	267	444	429	309	279
4	---	---	894	693	243	135	459	324	558	438	318	234
5	---	---	1090	741	384	228	432	354	522	471	---	---
6	1190	1150	876	735	501	363	393	351	606	474	---	---
7	1190	1110	771	741	558	240	393	258	489	468	351	276
8	1220	1120	1440	738	201	120	---	---	486	468	342	309
9	1280	1160	1180	795	288	144	---	---	498	483	348	288
10	1280	1160	1650	903	507	246	468	438	522	483	366	264
11	1340	1180	1700	804	720	294	483	441	522	507	369	231
12	1220	1060	1160	810	396	372	483	429	522	498	399	315
13	549	255	1060	855	651	381	477	255	519	498	411	375
14	---	---	903	798	471	450	294	186	528	516	408	360
15	651	630	864	567	489	435	327	276	546	459	396	348
16	747	633	564	498	567	459	354	315	465	432	414	381
17	765	738	798	204	801	462	354	267	495	459	444	402
18	858	753	906	279	525	507	390	276	507	474	432	411
19	855	777	987	423	558	504	393	321	504	468	438	420
20	822	789	699	423	564	255	360	174	519	495	447	435
21	891	798	840	489	342	240	249	162	519	267	462	444
22	918	870	534	438	519	339	288	249	264	144	486	450
23	915	828	534	492	432	426	309	291	213	153	483	297
24	879	792	666	489	804	411	306	183	225	147	318	216
25	981	888	1040	591	549	411	276	213	207	120	297	243
26	972	267	1150	549	447	435	318	279	240	147	339	303
27	951	297	540	189	534	465	339	315	273	237	375	342
28	528	513	315	225	534	468	366	327	273	240	387	363
29	1140	525	351	315	534	495	393	360	---	---	411	387
30	699	576	387	339	558	372	399	351	---	---	426	405
31	669	654	---	---	396	150	459	363	---	---	420	189
MONTH	1570	255	1700	189	804	120	642	111	606	120	486	189

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	252	162	438	414	405	285	459	387	972	903	453	417
2	243	174	462	432	450	405	492	444	2900	453	471	453
3	285	243	456	270	465	444	525	492	1350	1250	507	471
4	294	282	276	156	504	465	522	237	1350	1290	552	501
5	327	303	273	192	537	498	789	372	1320	1070	570	531
6	330	300	330	273	597	339	645	558	1090	519	606	558
7	321	297	366	330	558	516	582	558	1010	846	1760	564
8	336	309	390	360	450	171	600	573	1060	981	1670	1370
9	324	243	414	381	462	312	597	360	1200	1060	1370	1220
10	303	270	420	375	543	225	780	420	1530	1130	1970	1130
11	318	291	411	384	474	273	660	300	1390	213	1950	1640
12	360	321	432	384	540	471	606	600	579	279	1730	717
13	360	246	414	402	582	534	600	300	747	588	1320	396
14	279	243	438	411	606	558	618	300	837	750	594	156
15	303	279	456	435	600	516	630	600	1100	840	591	441
16	321	303	477	450	585	555	660	600	1310	1130	687	597
17	339	318	489	468	606	564	690	630	1410	1270	732	600
18	354	327	501	483	621	585	717	690	1400	1120	846	600
19	366	339	525	498	612	531	762	720	1230	192	870	807
20	378	351	537	519	624	345	732	720	2650	171	864	828
21	387	363	549	531	399	258	732	714	291	132	903	129
22	390	381	567	549	480	396	753	720	387	294	264	147
23	396	387	567	450	558	483	1540	750	411	321	354	234
24	411	396	480	429	606	558	1600	1490	420	243	429	357
25	420	405	486	387	639	597	1590	894	342	264	570	372
26	423	405	426	336	744	564	1210	1140	354	150	531	351
27	387	348	435	186	558	531	1240	1140	267	183	2750	387
28	396	372	387	243	759	543	1240	522	330	270	651	159
29	411	396	516	387	627	576	720	420	309	267	294	234
30	426	405	552	495	543	336	882	732	1860	312	339	288
31	---	---	546	255	---	---	942	870	414	375	---	---
MONTH	426	162	567	156	759	171	1600	237	2900	132	2750	129
YEAR	2900	111										

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	468	333	1510	609	285	273	306	300	351	333	354	324
2	1370	318	582	429	288	279	315	306	372	351	336	321
3	774	306	612	525	300	288	333	315	381	357	354	327
4	1230	312	651	543	297	291	327	315	381	360	339	288
5	504	438	657	357	303	294	321	312	384	363	276	135
6	1190	369	516	342	300	297	333	321	363	354	234	171
7	498	429	474	384	318	303	336	327	363	354	231	201
8	621	156	---	---	318	312	351	327	372	363	225	189
9	258	162	327	219	324	315	348	330	369	366	237	219
10	303	258	231	192	327	318	366	345	381	369	258	240
11	327	297	246	225	330	324	345	141	390	381	270	252
12	339	258	258	246	348	318	225	171	399	384	294	264
13	558	270	267	258	360	165	249	225	411	399	294	180
14	375	327	276	267	237	204	285	249	408	399	225	177
15	1580	303	285	273	249	237	297	258	399	363	246	225
16	357	297	297	276	264	252	315	279	363	324	258	246
17	516	303	330	285	282	267	333	288	369	348	315	189
18	624	330	303	288	297	282	327	300	399	348	243	219
19	477	426	306	294	288	279	312	306	369	327	258	243
20	477	438	312	300	306	288	312	309	342	288	276	258
21	498	465	318	306	309	303	324	312	330	264	282	114
22	717	369	318	309	306	303	318	312	273	252	216	177
23	438	387	336	315	333	303	342	318	276	258	240	219
24	918	387	336	285	348	300	357	324	279	273	270	240
25	420	381	294	258	297	264	324	267	288	273	252	240
26	411	390	228	147	264	258	297	273	324	279	267	237
27	432	402	237	219	270	264	300	294	321	291	279	249
28	417	396	252	237	279	270	306	297	339	285	318	153
29	2200	378	267	252	288	279	336	303	360	306	219	171
30	1250	408	273	267	291	285	348	321	---	---	264	156
31	801	423	---	---	300	291	330	321	---	---	213	159
MONTH	2200	156	1510	147	360	165	366	141	411	252	354	114

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	237	216	375	348	393	228	582	513	498	450	480	330
2	252	216	381	363	531	183	624	582	576	498	459	402
3	264	252	381	369	285	210	831	333	657	381	519	462
4	270	258	390	375	330	288	513	435	534	459	564	522
5	279	270	429	384	366	333	621	489	591	537	612	567
6	288	279	447	390	573	339	603	537	579	543	657	612
7	300	288	432	399	423	339	642	603	588	513	708	645
8	318	159	510	405	336	327	666	348	672	582	750	705
9	234	189	429	411	---	---	492	159	699	648	825	276
10	246	234	438	420	---	---	330	273	714	609	579	309
11	258	249	438	426	---	---	387	330	714	270	666	591
12	303	234	591	312	684	444	501	135	357	243	726	669
13	276	234	327	276	513	477	291	165	420	360	780	723
14	252	120	339	318	552	516	357	294	435	321	942	402
15	213	177	366	339	744	402	372	354	438	411	660	495
16	234	213	381	360	588	417	378	369	501	438	711	660
17	645	234	573	270	546	486	552	378	522	483	729	681
18	258	252	318	282	597	549	594	552	534	486	813	732
19	264	258	480	300	645	576	636	591	564	339	837	774
20	276	264	312	300	675	582	684	630	465	132	873	813
21	282	276	324	309	723	669	774	279	336	126	912	864
22	288	282	501	327	777	702	276	147	258	150	912	858
23	297	288	435	330	804	711	330	216	309	264	900	831
24	306	297	369	336	756	681	384	330	348	312	939	828
25	315	306	375	342	816	756	429	384	396	351	960	936
26	321	315	411	375	819	771	468	429	438	399	990	936
27	324	318	444	411	864	354	621	300	483	438	1010	978
28	333	324	462	438	615	480	387	297	525	474	1050	1010
29	339	327	483	462	741	345	399	342	711	432	1080	1020
30	366	339	513	411	513	303	444	402	468	240	1090	1040
31	---	---	558	429	---	---	483	447	423	330	---	---
MONTH	645	120	591	270	864	183	831	135	714	126	1090	276
YEAR	2200	114										

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

PH (STANDARD UNITS), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	3.8	3.4	3.6	3.4	4.5	3.9	5.6	4.4	4.0	3.8	4.3	4.1
2	3.7	3.2	3.6	3.4	4.3	3.8	6.0	3.9	3.9	3.6	4.2	3.7
3	3.6	3.5	3.6	3.3	4.1	3.9	4.2	4.1	3.8	3.4	4.1	3.8
4	3.8	3.6	3.5	3.3	---	---	4.1	3.9	3.7	3.5	4.9	3.7
5	3.8	3.6	3.5	3.3	---	---	3.9	3.8	3.8	3.7	---	---
6	3.8	3.6	3.5	3.3	---	---	3.9	3.7	3.8	3.3	---	---
7	3.8	3.7	3.4	3.4	---	---	4.4	3.8	3.7	3.6	4.0	3.8
8	3.8	3.7	3.5	3.3	5.5	4.3	4.1	3.8	3.8	3.5	4.0	3.8
9	3.8	3.6	3.6	3.4	4.2	3.9	3.9	3.8	3.8	3.4	4.0	3.8
10	3.8	3.6	3.5	3.3	4.0	3.9	3.9	3.4	3.8	3.4	3.9	3.7
11	3.7	2.9	3.5	3.3	---	---	3.9	3.4	3.7	3.4	3.9	3.8
12	3.8	3.5	3.4	3.3	---	---	3.7	3.4	3.7	3.5	4.0	3.8
13	6.3	3.8	3.3	3.2	4.1	4.0	5.3	3.6	3.8	3.4	4.1	3.8
14	4.5	3.8	3.4	3.3	4.0	3.8	5.7	4.3	3.7	3.3	4.2	3.9
15	3.8	3.6	3.8	3.4	4.0	3.9	4.4	4.1	3.9	3.5	4.1	3.8
16	3.6	3.4	3.9	3.8	4.0	3.7	4.1	3.8	4.0	3.7	3.9	3.6
17	3.5	3.3	6.0	3.7	---	---	4.9	3.6	4.0	3.6	4.0	3.7
18	3.5	3.2	5.2	4.3	---	---	4.5	4.0	3.9	3.7	4.0	3.9
19	3.4	3.3	4.3	4.1	3.6	3.6	4.1	3.6	3.9	3.6	4.0	3.7
20	3.4	3.2	4.2	4.1	4.9	3.2	5.7	3.7	3.9	3.2	3.9	3.7
21	3.4	3.2	4.1	3.4	5.2	4.0	5.7	4.3	5.4	3.6	3.9	3.7
22	3.3	3.1	4.6	3.9	4.1	3.8	4.3	3.9	5.8	4.8	3.9	3.5
23	3.3	3.2	4.0	3.9	4.0	3.3	4.1	3.5	5.8	4.2	4.9	3.6
24	3.4	3.2	3.9	3.9	3.9	3.6	5.9	3.9	5.4	4.1	6.0	4.5
25	3.4	3.2	3.9	3.8	3.9	3.6	4.6	4.1	5.5	4.5	5.2	4.2
26	5.6	3.2	3.9	3.8	3.9	3.5	4.1	3.9	4.5	4.1	4.2	4.0
27	5.0	4.0	6.4	3.8	3.9	3.7	3.9	3.7	4.3	3.9	4.0	3.8
28	4.0	3.7	5.9	5.1	3.8	3.5	3.8	3.6	4.3	4.0	4.0	3.8
29	3.9	3.6	5.1	4.6	3.8	3.1	3.9	3.7	---	---	3.8	3.7
30	3.8	3.5	4.6	4.2	3.7	3.5	4.0	3.8	---	---	3.8	3.7
31	3.7	3.4	---	---	5.1	3.8	4.0	3.8	---	---	5.9	3.6
MONTH	6.3	2.9	6.4	3.2	5.5	3.1	6.0	3.4	5.8	3.2	6.0	3.5

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

PH (STANDARD UNITS), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.9	4.7	3.9	3.8	5.6	3.7	4.1	3.8	3.2	3.0	4.2	3.9
2	5.6	4.4	3.8	3.7	3.8	3.6	3.9	3.7	3.8	2.8	3.9	3.7
3	4.4	4.0	6.1	3.7	3.6	3.5	3.8	3.6	3.2	3.0	3.8	3.6
4	4.1	4.1	6.3	5.7	3.7	3.4	6.0	3.6	3.2	3.0	3.7	3.5
5	4.1	4.0	5.9	4.7	3.6	3.4	4.3	3.3	3.2	3.0	3.6	3.5
6	4.1	4.0	4.7	4.0	4.1	3.4	3.8	3.6	3.7	3.2	3.6	3.5
7	4.2	4.0	4.2	3.8	3.5	3.4	3.7	3.6	3.2	3.0	3.6	3.3
8	4.1	4.0	4.0	3.7	6.0	3.5	3.7	3.5	3.1	3.0	3.5	3.3
9	5.8	4.1	3.9	3.6	4.4	3.5	4.1	3.6	3.1	2.9	3.4	3.3
10	5.0	4.3	3.8	3.6	5.6	3.3	3.8	3.3	3.0	2.9	3.4	3.2
11	4.5	4.2	3.8	3.6	5.1	3.6	3.6	3.3	6.0	3.0	3.4	3.1
12	4.2	4.0	3.7	3.6	3.7	3.5	3.6	3.3	6.1	3.6	3.6	3.2
13	5.8	3.9	3.8	3.7	3.6	3.4	3.6	3.0	3.6	3.3	4.3	3.4
14	6.0	4.6	3.8	3.6	3.6	3.3	3.6	3.0	3.4	3.2	5.9	4.0
15	4.7	4.3	3.8	3.6	3.5	3.3	3.5	3.3	3.3	3.2	4.6	4.1
16	4.3	4.1	3.8	3.6	3.5	3.3	3.5	3.3	3.2	3.0	4.1	3.8
17	4.1	4.1	3.7	3.6	3.5	3.3	3.5	3.3	3.1	2.9	3.9	3.0
18	4.1	4.0	3.7	3.5	3.4	3.3	3.5	3.3	3.1	2.9	3.6	3.0
19	4.1	3.9	3.7	3.5	3.5	3.3	3.4	3.0	6.0	3.0	3.6	3.4
20	4.1	3.9	3.6	3.5	4.1	3.3	3.4	3.3	6.0	2.8	3.6	3.4
21	4.0	3.8	3.6	3.5	5.9	4.0	3.4	3.3	6.1	5.6	6.3	3.4
22	3.9	3.8	3.6	3.4	4.1	3.7	3.4	3.3	5.5	4.2	6.4	6.0
23	3.9	3.8	3.7	3.5	3.8	3.6	3.4	3.2	5.0	4.2	6.1	5.0
24	3.9	3.8	3.8	3.6	3.6	3.5	3.4	3.2	6.3	4.5	5.0	4.4
25	3.8	3.7	4.0	3.7	3.6	3.3	3.6	3.0	6.3	5.0	4.5	3.8
26	3.8	3.8	4.6	3.8	3.6	3.3	3.2	3.0	6.4	4.9	4.3	3.4
27	4.1	3.9	6.0	3.8	3.7	3.6	3.2	3.0	6.2	5.8	4.1	2.9
28	4.0	3.9	5.6	3.9	3.7	3.3	3.6	3.0	5.8	4.7	6.1	3.6
29	3.9	3.8	3.9	3.5	3.7	3.6	4.4	3.3	5.7	5.0	5.9	5.5
30	3.9	3.8	3.7	3.6	4.3	3.7	3.4	3.0	5.0	3.0	5.5	4.9
31	---	---	5.8	3.5	---	---	3.2	3.0	4.5	4.1	---	---
MONTH	6.0	3.7	6.3	3.4	6.0	3.3	6.0	3.0	6.4	2.8	6.4	2.9
YEAR	6.4	2.8										

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

PH (STANDARD UNITS), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	5.1	4.2	4.1	3.6	---	---	5.5	5.3	5.4	4.9	5.3	4.8
2	5.0	3.7	5.7	4.5	---	---	5.3	5.1	5.3	4.7	5.3	4.9
3	6.1	4.2	5.2	4.6	---	---	5.1	5.0	5.2	4.8	5.5	4.8
4	5.1	3.7	---	---	---	---	5.1	5.0	5.2	4.8	5.4	4.8
5	5.5	4.6	---	---	---	---	5.2	5.1	5.2	4.8	6.1	5.4
6	6.3	4.9	---	---	5.6	5.4	5.1	4.8	5.0	4.9	6.1	5.9
7	5.3	4.5	---	---	5.9	5.6	5.2	5.0	5.1	5.0	6.1	5.8
8	6.5	4.2	---	---	5.6	5.4	5.3	4.8	5.1	4.7	5.9	5.5
9	6.5	6.3	---	---	5.6	5.2	5.1	4.8	4.8	4.7	5.9	5.5
10	6.3	6.1	---	---	5.5	5.0	5.0	4.5	5.0	4.7	5.8	5.4
11	6.1	5.8	---	---	5.4	4.6	6.1	4.7	4.9	4.7	5.9	5.6
12	6.5	5.8	---	---	5.1	4.7	6.2	6.0	4.9	4.5	5.6	4.6
13	6.3	5.9	---	---	6.3	5.0	6.1	5.8	4.9	4.3	6.0	5.4
14	5.9	5.5	---	---	6.3	6.2	6.2	5.7	4.8	4.3	6.2	5.4
15	6.0	4.7	---	---	6.4	5.9	6.1	5.6	4.8	4.3	6.0	5.0
16	6.0	5.7	---	---	6.2	5.9	6.4	5.7	6.1	4.9	6.0	5.0
17	5.9	5.4	---	---	6.2	5.9	6.3	5.6	5.7	5.4	6.0	4.9
18	5.3	4.2	---	---	6.0	5.5	5.8	5.5	5.4	4.8	5.8	4.9
19	4.6	4.3	---	---	5.7	5.4	5.5	5.3	5.6	4.9	5.8	4.6
20	4.4	4.2	---	---	5.8	5.3	5.4	5.3	6.1	5.3	5.8	4.7
21	4.3	4.0	---	---	5.6	4.9	5.4	5.2	6.1	5.4	5.8	5.1
22	4.5	3.8	---	---	5.3	4.8	5.4	5.2	5.9	5.7	5.9	5.1
23	4.4	4.2	---	---	5.1	4.7	5.4	4.8	5.9	5.7	5.8	5.1
24	4.4	4.1	---	---	6.1	4.6	5.2	5.1	6.0	5.8	5.9	5.0
25	4.4	4.3	---	---	6.2	6.1	6.3	5.1	6.0	5.7	5.7	5.2
26	4.4	4.3	---	---	6.2	6.1	6.2	5.8	6.0	5.6	5.7	4.8
27	5.1	4.2	---	---	6.0	5.9	5.9	5.7	5.9	5.5	5.7	4.7
28	4.4	4.3	---	---	6.0	5.8	5.9	5.7	5.9	5.4	5.6	4.6
29	4.4	3.2	---	---	5.8	5.7	5.7	5.0	5.7	5.2	5.9	5.4
30	4.4	3.6	---	---	5.8	5.6	5.5	4.8	---	---	5.7	5.0
31	4.4	3.7	---	---	5.7	5.5	5.5	5.0	---	---	6.4	5.3
MONTH	6.5	3.2	5.7	3.6	6.4	4.6	6.4	4.5	6.1	4.3	6.4	4.6

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

PH (STANDARD UNITS), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.2	6.1	4.8	4.6	6.2	5.4			---	---	5.7	4.2
2	6.2	5.9	4.8	4.4	6.3	4.4			---	---	4.7	4.3
3	6.2	5.9	4.7	4.4	---	---			---	---	4.3	4.1
4	6.2	6.0	4.7	4.4	---	---			---	---	4.1	3.8
5	6.0	5.8	4.6	4.3	---	---			---	---	3.9	3.7
6	5.9	5.5	4.5	4.3	---	---			---	---	3.8	3.6
7	5.6	4.7	4.5	4.3	---	---			3.9	3.8	3.7	3.5
8	6.4	4.7	4.6	4.3	---	---			3.8	3.6	3.6	3.5
9	6.5	6.4	4.8	4.1	---	---			3.8	3.7	5.7	3.4
10	6.4	6.3	4.5	4.1	---	---			3.8	3.5	5.7	3.9
11	6.3	6.1	4.3	4.1	---	---			6.2	3.6	3.9	3.7
12	6.6	5.8	6.2	4.2	---	---			6.4	5.8	3.8	3.5
13	6.5	5.9	6.5	6.0	---	---			5.8	4.7	3.6	3.4
14	6.6	5.8	6.2	5.6	---	---			6.1	4.5	4.2	3.4
15	6.5	6.2	5.9	4.6	---	---			4.5	4.4	4.1	3.7
16	6.4	6.0	4.9	4.2	---	---			4.5	4.2	3.7	3.6
17	6.2	3.0	6.3	3.9	---	---			4.2	4.1	3.6	3.5
18	6.2	5.3	6.1	5.8	---	---			4.6	3.9	3.6	3.4
19	6.2	5.5	6.2	4.9	---	---			6.1	3.8	3.6	3.4
20	5.9	5.6	6.1	5.9	---	---			6.3	4.2	3.6	3.3
21	5.9	5.4	6.0	5.9	---	---			6.3	4.6	3.5	3.3
22	5.7	5.3	5.9	3.4	---	---			6.2	6.1	3.4	3.3
23	5.7	5.2	5.9	4.2	---	---			6.2	5.9	3.5	3.4
24	5.4	5.0	5.7	4.7	---	---			5.9	5.2	3.6	3.4
25	5.3	5.0	5.4	4.7	---	---			5.2	4.5	3.5	3.3
26	5.1	5.0	4.8	4.3	---	---			4.5	4.3	3.5	3.4
27	5.2	5.0	4.4	4.2	---	---			4.4	4.0	3.6	3.4
28	5.1	4.9	4.3	4.0	---	---			4.2	3.9	3.5	3.3
29	5.1	4.9	4.1	3.8	---	---			4.3	3.7	3.5	3.3
30	4.9	4.7	4.1	3.7	---	---			6.0	4.1	3.5	3.3
31	---	---	5.2	3.7	---	---			5.9	4.5	---	---
MONTH	6.6	3.0	6.5	3.4	6.3	4.4			6.4	3.5	5.7	3.3
YEAR	6.6	3.0										

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

TEMPERATURE, AIR (DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	20.5	8.5	18.5	-0.5	11.5	-8.5	15.5	-0.5	-6.0	-14.0	11.0	-2.0
2	24.0	5.0	21.5	-3.0	13.0	-4.0	-1.5	-16.5	2.0	-13.0	12.5	-0.5
3	24.0	4.0	22.5	-0.5	14.5	2.5	-7.5	-17.5	4.5	-7.0	21.0	-1.5
4	17.0	10.5	23.5	.5	15.0	1.5	-2.0	-10.0	.5	-14.5	19.0	9.0
5	21.5	4.0	25.0	1.0	10.5	-2.0	-2.5	-10.0	-4.0	-21.5	12.0	-1.5
6	13.0	5.0	24.0	1.5	13.5	-3.5	1.5	-8.5	1.0	-22.0	10.5	-3.5
7	12.5	4.5	9.0	5.5	12.0	-0.5	-1.5	-7.0	1.0	-7.0	14.0	-6.5
8	11.5	.5	13.0	-3.0	17.0	2.0	-5.5	-20.5	-1.5	-18.5	13.5	-2.0
9	18.0	-1.5	7.0	-4.0	1.5	-7.5	-5.0	-21.5	-7.0	-23.0	9.0	-5.5
10	22.5	.5	17.0	-1.5	-3.0	-12.5	-2.0	-12.0	-5.5	-23.5	6.0	-5.0
11	21.0	4.0	21.5	-0.5	4.0	-12.5	-5.0	-13.5	-4.5	-19.0	-2.5	-9.5
12	26.5	11.5	12.0	6.5	7.5	-4.0	1.5	-9.5	-2.0	-16.0	8.5	-6.5
13	16.0	9.5	20.5	7.0	8.5	-5.0	5.5	-5.5	-4.0	-23.0	18.5	-8.0
14	11.0	6.5	17.5	5.0	2.5	-8.0	5.5	-14.5	.0	-17.0	13.0	.0
15	11.0	4.0	7.0	5.0	10.0	-3.0	-6.5	-20.5	3.0	-2.0	-2.0	-11.5
16	12.5	5.0	10.0	5.0	11.0	-4.0	4.0	-8.0	.0	-16.5	9.0	-13.5
17	12.5	.0	18.5	9.5	3.5	-5.0	7.0	-6.5	-8.0	-21.0	18.5	-8.5
18	20.5	-1.5	10.5	6.0	6.0	-6.5	-1.5	-11.5	-4.0	-13.5	20.5	2.0
19	17.5	4.5	12.0	-2.0	1.5	-0.5	-0.5	-12.0	1.5	-18.0	20.5	.0
20	20.5	.0	9.0	-3.5	17.5	1.0	4.0	.5	13.5	-20.0	21.0	5.0
21	24.0	.5	8.5	2.0	6.5	-2.0	2.5	-0.5	8.5	-6.5	23.0	.5
22	27.0	2.0	14.0	1.0	7.5	-5.5	3.5	-5.5	10.0	-3.0	26.0	-1.0
23	20.0	5.5	12.5	6.0	8.0	-8.0	9.5	-7.0	10.5	2.0	19.0	6.0
24	16.0	-1.0	9.5	1.0	8.5	-5.5	3.5	-9.0	5.0	1.0	9.5	1.0
25	20.5	-3.0	5.0	-2.5	2.5	-4.0	-4.5	-9.0	3.5	1.0	4.0	-3.5
26	17.5	8.0	4.0	.0	2.5	-4.5	-2.5	-8.5	1.5	-4.0	.0	-3.5
27	17.0	-0.5	12.0	2.0	-1.0	-10.0	3.5	-3.0	7.0	-3.5	5.0	-7.0
28	21.0	-2.0	7.5	-5.0	1.0	-13.0	.0	-3.0	12.0	-6.5	19.5	-8.5
29	16.0	.0	4.0	-6.5	9.0	-8.5	-3.0	-5.5	---	---	24.5	9.5
30	23.0	-2.5	7.5	-6.0	7.5	-0.5	-1.0	-6.5	---	---	25.5	8.5
31	23.0	-0.5	---	---	15.5	5.5	-2.5	-8.5	---	---	18.5	10.0
MONTH	27.0	-3.0	25.0	-6.5	17.5	-13.0	15.5	-21.5	13.5	-23.5	26.0	-13.5

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

TEMPERATURE, AIR (DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	10.5	6.0	19.0	-3.0	29.0	18.5	23.5	12.0	---	22.5	---	18.0
2	20.0	7.0	28.0	-1.0	27.5	14.0	26.5	14.5	28.5	19.0	29.5	19.5
3	11.5	.5	21.5	12.5	24.5	11.5	30.0	9.5	---	16.5	---	21.0
4	10.5	1.0	12.0	4.0	30.5	7.0	23.5	11.0	---	16.5	---	18.5
5	12.0	3.5	18.5	-1.0	31.0	11.0	23.5	7.0	---	18.5	29.5	19.0
6	11.0	-5.5	26.0	-0.5	31.5	15.0	26.5	6.0	---	19.5	30.0	19.5
7	7.5	-9.0	32.0	4.5	31.5	15.0	29.5	7.0	---	19.5	27.5	14.0
8	21.0	-1.5	---	8.5	31.5	19.5	---	10.5	---	20.5	19.0	9.5
9	11.5	-0.5	---	11.5	31.5	18.5	22.0	19.0	---	19.0	23.0	6.5
10	14.0	-4.5	32.0	16.5	---	16.0	30.0	19.0	---	22.0	28.0	8.0
11	19.0	-3.0	---	13.5	24.5	11.5	---	16.0	22.5	17.0	30.5	12.0
12	24.5	9.0	---	14.5	26.0	6.5	32.0	15.5	24.5	12.5	32.0	14.5
13	23.0	8.5	16.5	7.0	25.0	8.5	26.0	21.0	27.0	9.5	28.0	16.5
14	20.0	1.0	25.0	3.5	---	8.5	---	21.0	26.5	13.0	21.5	14.5
15	8.5	.0	23.5	6.5	---	12.0	---	20.0	21.5	8.5	20.5	8.5
16	10.0	-2.0	20.5	1.0	---	12.5	---	19.0	24.0	6.0	23.5	5.5
17	13.5	-2.0	26.0	-0.5	31.5	15.0	31.0	16.0	27.5	7.0	26.5	7.5
18	16.5	-4.0	29.5	1.5	28.0	16.0	28.0	12.5	29.0	17.0	27.5	10.0
19	19.5	-4.5	31.5	3.5	28.5	12.5	31.5	9.0	30.5	20.5	22.0	8.5
20	25.5	-2.0	---	13.0	---	12.0	32.0	10.0	29.0	21.0	26.5	6.0
21	29.0	.5	27.0	12.0	28.5	18.0	---	18.0	31.0	20.5	18.5	16.0
22	23.0	10.5	27.5	5.5	31.0	15.5	---	17.5	32.0	19.0	16.0	10.5
23	21.5	11.0	21.0	14.0	28.0	16.0	---	20.0	29.0	21.0	22.0	7.0
24	30.0	10.5	19.0	10.0	21.0	8.5	31.5	21.0	28.0	20.5	26.0	6.5
25	30.0	13.0	10.0	5.0	23.5	4.0	27.5	21.5	27.5	18.0	26.0	9.0
26	20.0	11.0	18.0	5.0	28.5	5.5	31.0	22.0	29.0	18.5	28.0	9.0
27	15.5	2.5	18.5	8.0	30.5	8.0	31.0	21.5	30.0	21.0	26.5	10.5
28	12.5	1.5	25.0	7.5	32.0	12.0	27.5	22.5	---	19.0	21.5	17.0
29	16.0	-1.0	23.5	3.0	25.0	15.5	31.5	21.0	30.0	20.0	26.0	14.5
30	19.0	-1.0	30.5	5.5	20.5	13.5	---	17.0	31.0	19.5	26.5	13.5
31	---	---	24.5	15.5	---	---	---	21.0	---	16.0	---	---
MONTH	30.0	-9.0	32.0	-3.0	32.0	4.0	32.0	6.0	32.0	6.0	32.0	5.5
YEAR	32.0	-23.5										

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

TEMPERATURE, AIR (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	27.0	13.5	25.5	9.5	4.0	-6.0	-1.0	-3.5	-5.0	-18.0	-10.5	-14.5
2	20.5	13.5	14.0	3.0	-1.5	-9.0	1.0	-2.0	-5.5	-18.0	-6.0	---
3	21.0	11.5	13.0	-2.0	4.5	-11.5	3.5	-1.0	-4.0	-17.5	2.5	---
4	15.0	10.5	12.5	-4.0	9.5	-2.5	-1.0	-4.0	-2.5	-17.0	9.0	-12.0
5	14.5	5.5	18.0	-3.0	16.5	-3.5	-2.0	-4.5	1.0	-15.0	8.0	-1.5
6	18.5	3.0	11.5	-1.0	14.0	3.0	2.0	-3.5	3.0	-4.0	7.0	-3.0
7	14.0	3.0	6.5	4.0	12.0	-3.0	4.5	-9.0	-2.0	-7.0	8.0	-2.5
8	18.5	1.5	---	---	5.5	-6.5	1.0	-9.5	3.0	-10.5	22.5	1.0
9	13.5	7.0	14.0	7.5	7.5	-6.0	1.5	-12.0	.0	-4.0	10.5	-3.0
10	11.0	2.5	11.0	3.5	12.0	-5.0	8.5	-12.5	.0	-13.0	15.5	-4.0
11	12.5	3.0	5.0	-1.5	21.0	-2.0	12.0	-1.5	1.0	-12.5	2.0	-6.5
12	15.5	8.0	8.5	-3.0	17.5	5.0	-1.0	-9.0	2.5	-18.5	2.5	-9.5
13	10.0	.0	8.5	-1.5	4.5	-1.0	8.0	-7.5	4.5	-17.5	5.5	-1.5
14	13.0	-0.5	7.0	-2.0	4.0	-5.5	7.0	2.0	6.5	-9.5	1.5	-4.5
15	14.5	-2.0	7.5	-2.0	9.0	-8.0	5.5	.0	5.5	.5	15.5	-7.5
16	19.5	10.0	9.5	-3.0	8.5	-5.5	12.5	-0.5	2.5	-13.0	22.0	-3.0
17	25.0	10.0	18.0	-5.0	-4.5	-11.5	15.0	3.0	-3.0	-16.0	14.5	.0
18	26.0	8.0	20.5	-1.5	2.5	-12.5	4.5	-2.5	4.0	-18.5	7.5	-5.5
19	27.5	7.5	20.0	-2.0	7.5	-5.0	5.5	-3.5	13.0	-8.5	15.5	-6.5
20	30.5	10.0	22.5	3.0	9.5	-7.0	5.0	-4.0	5.0	-0.5	14.5	3.5
21	31.0	10.5	23.5	3.0	12.5	-6.0	4.5	-9.5	9.5	2.5	12.5	.0
22	31.0	11.0	18.0	10.5	11.0	1.5	4.0	.0	18.5	.5	8.0	-3.5
23	15.5	4.5	22.5	9.5	13.5	5.0	.5	-10.0	8.0	1.0	15.0	-5.5
24	7.5	4.5	10.5	7.0	15.5	8.0	2.0	-11.5	4.5	-1.0	13.5	5.0
25	9.0	-0.5	22.0	7.5	7.0	1.5	8.5	-1.5	6.0	-7.0	6.0	1.5
26	9.0	-3.5	16.0	5.0	3.5	1.0	1.5	-8.0	-2.5	-11.5	6.5	-3.0
27	19.0	-3.5	17.0	.0	3.0	-4.5	2.5	-4.0	1.0	-6.0	17.5	-5.5
28	17.0	2.0	16.0	-2.0	.0	-7.0	-3.0	-5.0	.0	-16.0	12.0	3.0
29	21.5	-0.5	-0.5	-4.0	2.0	-3.5	-4.5	-12.5	-5.5	-16.5	13.0	5.0
30	24.5	1.5	-0.5	-6.5	-0.5	-5.0	-4.0	-11.5	---	---	13.0	4.5
31	26.5	5.5	---	---	-1.5	-5.0	-5.5	-13.5	---	---	11.0	2.5
MONTH	31.0	-3.5	25.5	-6.5	21.0	-12.5	15.0	-13.5	18.5	-18.5	22.5	-14.5

Appendix 1.--Water-quality monitor data, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

TEMPERATURE, AIR (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	11.5	.0	22.5	5.5	27.5	16.0	29.5	10.0	32.0	22.0	---	20.0
2	21.5	-1.0	22.0	2.0	28.5	18.5	---	17.0	---	19.5	---	20.5
3	22.5	.5	25.5	3.5	30.0	16.5	29.5	22.0	30.0	21.0	30.5	16.0
4	12.5	2.5	30.0	3.5	24.0	11.5	---	22.5	---	20.0	---	16.5
5	14.0	-1.0	32.0	4.0	28.0	6.0	32.0	19.5	---	20.5	---	19.0
6	21.5	-2.5	25.0	5.0	32.0	13.0	25.5	14.5	26.0	21.0	32.0	19.0
7	22.5	.0	19.0	1.0	---	18.0	30.5	10.0	32.0	23.5	29.0	16.0
8	20.5	5.0	13.5	-3.0	24.0	7.5	---	18.5	---	21.5	32.0	14.0
9	17.5	5.0	18.0	-3.5	23.5	8.0	---	21.0	---	22.5	32.0	16.0
10	9.0	.0	26.5	-0.5	20.0	7.0	31.0	21.5	---	22.0	23.0	12.0
11	20.5	-2.5	30.5	12.5	20.0	2.5	---	19.0	---	22.5	27.0	7.5
12	13.5	2.0	28.0	14.5	25.5	2.5	29.5	20.0	29.0	21.0	30.0	8.0
13	7.0	.0	31.5	16.0	30.5	5.5	30.5	17.0	32.0	16.5	---	16.0
14	16.5	3.5	21.5	8.0	---	8.5	---	12.5	---	20.0	31.5	20.5
15	5.5	1.5	22.0	2.5	31.5	16.5	---	16.5	27.0	22.5	24.0	18.0
16	8.5	-1.5	27.5	4.0	21.0	9.5	---	23.0	25.5	16.5	28.0	12.0
17	17.5	-5.5	22.0	14.0	25.0	3.5	---	19.5	24.5	17.5	26.0	17.0
18	21.0	-1.0	27.5	15.0	27.0	7.0	---	16.0	31.5	19.5	23.5	12.5
19	25.0	1.0	24.5	13.5	29.5	7.0	---	17.5	31.5	22.5	28.5	9.5
20	25.5	1.5	20.5	14.0	24.0	8.0	---	19.5	28.0	21.0	---	13.5
21	23.5	1.5	27.5	11.5	28.0	5.5	---	22.0	---	22.5	---	17.5
22	29.5	-0.5	30.0	10.5	31.5	6.5	24.5	20.5	29.5	21.0	31.0	19.5
23	23.0	3.5	27.0	16.0	---	10.5	28.5	18.5	29.5	16.0	23.5	13.5
24	22.5	1.0	30.0	16.0	30.0	16.5	29.5	14.5	31.5	16.5	24.0	11.0
25	12.0	.0	29.5	10.0	30.5	13.5	32.0	13.0	---	15.5	27.0	13.0
26	12.0	1.0	24.5	5.0	---	13.0	---	16.5	---	16.0	18.5	6.5
27	11.5	1.5	25.5	3.0	---	17.5	---	20.0	---	16.5	21.5	2.5
28	13.0	-1.0	31.0	5.5	---	17.0	29.5	20.0	---	18.0	25.0	6.5
29	16.0	4.0	34.5	8.5	28.5	18.5	30.5	17.0	---	18.5	27.0	7.0
30	17.5	4.0	32.0	16.0	25.0	11.5	31.5	17.5	31.5	19.5	24.5	8.0
31	---	---	31.0	16.0	---	---	---	17.5	---	18.0	---	---
MONTH	29.5	-5.5	34.5	-3.5	32.0	2.5	32.0	10.0	32.0	15.5	32.0	2.5
YEAR	34.5	-18.5										

Appendix 2.--Daily sediment discharge, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	.02	.01	6.4	.01	.14	1.8	.00	.06	.00	.01	.08
2	.00	.01	.01	.24	.01	.12	.91	.00	.01	.00	.88	.03
3	.00	.01	6.6	.08	.01	.09	.20	.15	.01	.00	.00	.01
4	.00	.00	4.5	.04	.01	.36	.10	5.6	.01	.21	.00	.02
5	.00	.00	.15	.03	.01	.15	.04	.19	.00	.02	.00	.01
6	.00	.00	.07	.02	.01	.07	.04	.10	.19	.00	.18	.00
7	.00	.00	.15	.16	.00	.10	.02	.06	.01	.00	.01	.06
8	.00	.00	27	.03	.00	.18	.03	.03	3.7	.00	.00	.01
9	.00	.00	16	.03	.00	.08	.43	.02	.07	.01	.00	.00
10	.00	.00	.29	.02	.00	.03	.03	.01	.44	.00	.00	.01
11	.00	.00	.17	.02	.00	.03	.02	.01	.08	.00	1.9	.01
12	.00	.00	.12	.01	.00	.02	.02	.01	.04	.00	.14	.13
13	.80	.00	.10	.19	.00	.01	.26	.01	.03	.00	.05	.20
14	.27	.00	.05	2.3	.00	.02	.08	.00	.02	.00	.02	7.7
15	.01	.01	.03	.17	.00	.01	.03	.00	.01	.00	.01	.09
16	.01	.02	.04	.04	.03	.01	.02	.00	.00	.00	.01	.04
17	.01	2.6	.03	.10	.00	.01	.02	.00	.00	.00	.00	.02
18	.00	.26	.02	.13	.00	.01	.02	.00	.00	.00	.01	.01
19	.00	.00	.03	.05	.00	.01	.02	.00	.00	.00	2.0	.00
20	.00	.00	.22	.85	.01	.01	.01	.00	.04	.00	2.5	.00
21	.01	.00	.84	1.5	.04	.01	.01	.00	.51	.00	41	20
22	.00	.00	.06	.10	.54	.01	.01	.00	.01	.00	.20	3.8
23	.01	.00	.04	.06	2.2	.12	.01	.00	.01	1.3	.13	.24
24	.01	.01	.08	.29	2.1	1.1	.00	.00	.00	.38	.45	.10
25	.01	.00	.04	.11	45	.07	.00	.00	.00	.34	.06	.09
26	2.0	.00	.01	.06	4.4	.03	.01	.04	.00	.07	20	.10
27	.29	.74	.02	.03	.17	.03	.01	3.2	.00	.03	.28	1.1
28	.02	.07	.02	.02	.15	.02	.00	.08	.04	.06	2.1	7.6
29	.01	.04	.02	.01	---	.02	.00	.04	.00	.11	1.1	.19
30	.01	.04	.12	.00	---	.01	.00	.02	.03	.02	.50	.07
31	.03	---	3.0	.01	---	3.6	---	.21	---	.01	.18	---
MEAN	.11	.13	1.9	.42	2.0	.21	.14	.32	.18	.08	2.4	1.4

WTR YR 1979 MEAN .76 MAX 45 MIN .00

Appendix 2.--Daily sediment discharge, station 03201700, Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.09	.33	.03	.01	.01	.02	.23	.00	5.4	.00	.00	.05
2	.08	1.8	.02	.01	.02	.02	.14	.02	12	.00	.00	.02
3	.05	.13	.02	.00	.01	.07	.11	.03	.70	.26	.33	.00
4	.08	.11	.02	.01	.01	.03	.09	.00	.18	.00	.01	.00
5	.06	.05	.01	.01	.01	77	.15	.02	.10	.00	.01	.00
6	.11	.03	.02	.00	.01	5.3	.04	.12	1.7	.00	.00	.00
7	.05	.01	.01	.01	.01	1.1	.03	.09	.06	.00	.00	.00
8	5.8	.01	.01	.01	.00	2.2	6.0	.01	.14	.08	.00	.00
9	3.8	3.9	.00	.00	.00	.22	.66	.00	.03	5.5	.00	.69
10	.25	4.6	.00	.00	.00	.09	.11	.00	.22	.41	.00	.21
11	.13	.25	.00	36	.00	.06	.06	.00	.05	.04	2.3	.00
12	.46	.12	.02	.73	.00	.08	.36	5.6	.04	10	.23	.00
13	.17	.03	7.4	.16	.00	1.5	.17	4.4	.03	5.3	.01	.00
14	.08	.03	.18	.24	.00	1.1	9.9	4.4	.01	.33	.04	.29
15	.11	.02	.03	.36	.00	.12	.55	.05	.04	.16	.00	.01
16	.04	.02	.05	.27	.04	.07	.23	.03	.05	.09	.00	.00
17	.06	.04	.03	.17	.02	2.6	.48	5.7	.00	.01	.00	.00
18	.06	.04	.03	.12	.00	.28	.09	.55	.01	.00	.00	.00
19	.05	.03	.02	.07	.03	.10	.05	.36	.00	.00	.43	.00
20	.07	.02	.02	.06	.56	.09	.04	.08	.00	.00	15	.00
21	.03	.01	.01	.07	1.3	31	.04	.06	.00	1.8	12	.00
22	.06	.00	.01	.04	2.7	1.6	.02	.05	.00	7.3	1.8	.00
23	.04	.00	.02	.03	.46	.38	.02	.09	.03	.21	.08	.00
24	.03	.16	.14	.04	.15	.17	.02	.04	.01	.03	.03	.00
25	.00	.23	.21	1.7	.31	.09	.01	.03	.00	.01	.02	.00
26	.00	8.7	.05	.48	.21	.07	.00	.01	.00	.00	.01	.00
27	.00	.24	.03	.04	.10	.08	.02	.01	.17	.08	.00	.00
28	.00	.12	.03	.04	.03	12	.02	.00	.01	.11	.00	.00
29	.20	.14	.03	.02	.02	1.6	.02	.00	.16	.01	.12	.00
30	.03	.04	.03	.03	---	1.9	.01	.00	.22	.00	1.2	.00
31	.04	---	.02	.02	---	2.4	---	.15	---	.00	.02	---
MEAN	.39	.71	.27	1.3	.21	4.6	.66	.71	.71	1.0	1.1	.04

WTR YR 1980 MEAN .99 MAX 77 MIN .00

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)
WATER YEAR 1979												
OCT												
12...	1030	.90	1800	2.7	13.0	32	600	600	7.5	372	130	67
12...	1615	.05	--	--	--	--	--	--	--	--	--	--
24...	1530	.70	1500	2.8	11.5	17	450	450	5.8	288	100	49
NOV												
06...	1000	.80	1400	2.7	10.0	13	480	480	5.5	273	110	50
22...	1000	.20	1000	2.9	7.0	6	300	300	3.3	164	69	32
30...	0930	.46	550	3.3	4.5	13	210	210	1.5	74	48	21
DEC												
08...	1400	34	--	--	--	--	--	--	--	--	--	--
09...	1145	10	--	--	--	--	--	--	--	--	--	--
21...	1330	1.6	270	4.4	4.5	27	94	94	.5	25	22	9.4
21...	1620	1.5	--	--	--	--	--	--	--	--	--	--
JAN												
04...	1500	1.4	410	3.7	1.0	17	120	120	1.0	50	26	13
16...	1500	1.3	375	3.7	2.0	1	110	110	1.0	50	26	12
FEB												
01...	1400	.59	450	3.5	.5	8	140	140	1.0	50	31	14
14...	0900	.26	640	3.2	.0	7	210	210	2.0	99	46	22
27...	1500	3.0	330	3.9	6.5	11	77	77	.6	30	18	7.8
MAR												
13...	1100	.76	675	3.3	6.0	12	190	190	2.5	124	42	20
26...	1430	1.0	355	4.0	5.0	8	110	110	.4	20	26	11
APR												
09...	1130	2.9	--	--	--	--	--	--	--	--	--	--
11...	1100	1.3	350	4.0	7.0	13	110	110	.6	30	25	11
30...	1200	.61	750	3.4	12.5	10	210	210	2.2	109	46	23
MAY												
15...	1300	.40	730	3.4	17.0	24	190	190	1.6	79	43	21
30...	1100	.61	695	3.5	12.0	0	190	190	1.6	79	42	21
JUN												
11...	1430	.59	500	4.0	18.0	3	150	150	.8	40	37	15
28...	1100	.14	1300	3.0	17.5	12	360	360	4.0	199	77	41
JUL												
10...	1130	.25	900	3.4	16.5	4	270	270	2.5	124	60	30
26...	1300	.20	1000	3.4	20.5	2	270	270	2.2	109	60	29
AUG												
08...	0845	.13	1100	2.9	18.5	50	320	320	3.3	164	73	34
23...	1200	1.0	314	5.0	18.0	39	120	110	--	--	28	11
SEP												
05...	1400	.24	950	3.1	19.0	12	300	300	3.3	164	67	32
17...	1230	.19	790	3.5	14.0	7	220	220	2.0	99	51	22

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)
WATER YEAR 1979											
OCT											
12...	32	10	.6	--	3.0	0	0	0	.0	910	24
12...	--	--	--	--	--	--	--	--	--	--	--
24...	29	12	.6	--	3.0	0	0	0	.0	660	24
NOV											
06...	26	10	.5	--	3.0	0	0	0	.0	640	23
22...	20	12	.5	--	2.6	0	0	0	.0	470	17
30...	14	13	.4	--	2.3	0	0	0	.0	280	14
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
21...	6.8	13	.3	--	1.7	0	0	0	.0	110	6.3
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
04...	6.1	10	.2	--	1.4	0	0	0	.0	170	6.4
16...	6.8	11	.3	--	1.3	0	0	0	.0	150	7.4
FEB											
01...	11	15	.4	--	1.6	0	0	0	.0	180	12
14...	15	14	.5	--	2.0	0	0	0	.0	280	14
27...	13	26	.6	--	1.4	0	0	0	.0	96	23
MAR											
13...	13	13	.4	--	2.0	0	0	0	.0	280	11
26...	9.6	16	.4	--	1.5	0	0	0	.0	130	11
APR											
09...	--	--	--	--	--	--	--	--	--	--	--
11...	8.6	15	.4	--	1.6	0	0	0	.0	130	10
30...	15	13	.5	--	2.3	0	0	0	.0	300	11
MAY											
15...	15	14	.5	--	2.2	0	0	0	.0	270	13
30...	13	13	.4	15	2.0	0	0	0	.0	260	13
JUN											
11...	11	13	.4	--	1.9	0	0	0	.0	200	14
28...	26	13	.6	29	2.7	0	0	0	.0	560	21
JUL											
10...	24	16	.6	--	2.9	0	0	0	.0	390	21
26...	25	17	.7	28	2.7	0	0	0	.0	400	23
AUG											
08...	26	15	.6	29	2.7	0	0	0	.0	480	24
23...	8.8	14	.4	11	2.0	3	0	2	48	120	7.2
SEP											
05...	20	13	.5	23	2.6	0	0	0	.0	430	15
17...	11	10	.3	13	2.4	0	0	0	.0	320	13

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS PO4)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)
WATER YEAR 1979											
OCT											
12...	1320	1.80	.08	39	39	170	.000	--	--	110	3
12...	--	--	--	--	--	--	--	--	--	--	--
24...	992	1.35	.13	.50	.63	2.8	.050	--	--	14000	1
NOV											
06...	981	1.33	.12	--	--	--	.000	--	--	15000	0
22...	671	.91	.09	.32	.41	1.8	.000	--	--	8200	0
30...	374	.51	.12	.24	.36	1.6	.000	--	--	1000	0
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
21...	174	.24	.11	.09	.20	.89	.000	--	--	1500	0
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
04...	251	.34	.16	.07	.23	1.0	.000	--	--	4700	0
16...	233	.32	.11	.46	.57	2.5	.000	--	--	2000	0
FEB											
01...	275	.37	.09	.18	.27	1.2	.000	--	--	4000	0
14...	445	.61	.13	.49	.62	2.7	.000	--	--	5400	0
27...	185	.25	.18	.22	.40	1.8	.010	--	--	310	0
MAR											
13...	424	.58	.08	.33	.41	1.8	.000	--	--	6600	0
26...	219	.30	.09	.35	.44	1.9	.040	--	--	3500	0
APR											
09...	--	--	--	--	--	--	--	--	--	--	--
11...	213	.29	.04	.15	.19	.84	.000	--	--	4100	0
30...	453	.62	.03	.28	.31	1.4	.000	.00	.00	7200	0
MAY											
15...	470	.64	.06	.31	.37	1.6	.000	.00	.00	6200	0
30...	416	.57	.05	.00	.05	.22	.000	.00	.00	7600	0
JUN											
11...	341	.46	.06	.30	.36	1.6	.010	.03	.03	5000	0
28...	905	1.23	.11	.44	.55	2.4	.000	.00	.00	13000	0
JUL											
10...	648	.88	.09	.37	.46	2.0	.000	--	.00	8300	0
26...	620	.84	.12	.23	.35	1.6	.030	--	.09	9000	0
AUG											
08...	802	1.09	.11	.34	.45	2.0	.010	--	.03	9300	0
23...	217	.30	.07	.23	.30	1.3	.010	--	.03	2000	0
SEP											
05...	702	.95	.02	.34	.36	1.6	.000	--	.00	12000	0
17...	490	.67	.11	.81	.92	4.1	.000	--	.00	890	0

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
WATER YEAR 1979											
OCT											
12...	0	100	5	4	12	90000	--	44000	39	4900	--
12...	--	--	--	--	--	--	--	--	--	--	--
24...	0	10	2	5	16	24000	--	24000	84	4200	--
NOV											
06...	0	10	1	3	10	30000	--	30000	46	3900	--
22...	0	10	5	4	6	28000	--	26000	15	2600	--
30...	0	5	77	4	3	14000	--	8200	41	1400	--
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
21...	1	0	3	2	4	58000	--	1900	39	520	--
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
04...	0	0	0	3	6	9300	--	6600	7	850	--
16...	1	0	1	6	4	7400	--	6100	29	800	--
FEB											
01...	1	0	7	0	5	8300	--	4900	140	990	--
14...	0	10	1	4	6	12000	--	11000	11	1800	--
27...	0	0	0	1	5	1400	--	1400	0	450	--
MAR											
13...	1	10	1	0	6	19000	--	17000	12	1400	--
26...	1	0	0	0	4	5900	--	980	7	670	--
APR											
09...	--	--	--	--	--	--	--	--	--	--	--
11...	0	0	1	6	4	5700	--	830	34	630	--
30...	0	10	5	9	7	17000	4000	13000	32	1500	0
MAY											
15...	0	10	2	5	6	11000	4800	6200	25	1500	100
30...	0	0	4	12	6	12000	4700	7300	92	1400	0
JUN											
11...	1	0	7	8	6	7400	6100	1300	21	1100	0
28...	1	20	0	9	10	22000	0	22000	3	3400	300
JUL											
10...	1	10	1	17	9	15000	3000	12000	4	2100	0
26...	1	10	0	19	1	12000	6200	5800	4	2200	100
AUG											
08...	2	10	3	20	9	26000	10000	16000	5	3000	100
23...	2	0	1	13	4	5800	4600	1200	5	660	20
SEP											
05...	0	0	0	6	9	18000	--	16000	0	2800	500
17...	0	10	0	19	8	10000	--	7400	3	3800	400

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979											
OCT											
12...	4900	<.5	180	0	0	--	520	520	3.0	.3	1
12...	--	--	--	--	--	--	--	--	--	--	--
24...	4200	<.5	160	0	0	--	350	360	1.9	.1	0
NOV											
06...	3600	<.5	150	0	0	--	470	470	1.2	.3	1
22...	2300	<.5	100	0	0	--	220	2200	2.8	.6	0
30...	1400	<.5	61	0	0	--	120	120	8.3	.3	0
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
21...	520	<.5	35	0	0	--	60	80	2.1	1.0	2
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
04...	100	<.5	48	0	0	--	1000	1000	1.8	.2	0
16...	800	<.5	26	0	0	--	110	110	1.7	.2	0
FEB											
01...	990	<.5	56	0	0	--	80	90	1.5	.1	0
14...	1800	<.5	79	0	0	--	170	170	1.6	.2	0
27...	450	<.5	4	0	0	--	50	50	4.4	--	2
MAR											
13...	1400	<.5	69	0	0	--	130	160	4.7	.2	0
26...	670	<.5	41	0	0	--	80	80	4.6	.2	0
APR											
09...	--	--	--	--	--	--	--	--	--	--	--
11...	630	<.5	57	0	0	--	80	90	1.1	.2	0
30...	1500	<.5	98	0	0	20	170	190	2.9	.1	0
MAY											
15...	1400	<.5	84	0	0	0	160	160	3.7	.2	1
30...	1400	<.5	60	0	0	0	220	220	2.0	.2	0
JUN											
11...	1100	<.5	66	0	0	30	90	120	2.0	.2	0
28...	3100	<.5	130	0	0	10	330	340	2.7	.1	2
JUL											
10...	2100	<.5	110	0	0	60	210	270	1.1	.2	0
26...	2100	<.5	0	0	0	70	200	270	3.1	.0	0
AUG											
08...	2900	<.5	110	0	0	0	250	250	1.9	.1	0
23...	640	<.5	22	0	1	0	60	60	4.1	.5	0
SEP											
05...	2300	<.5	110	0	0	60	260	320	2.0	.1	2
17...	3400	<.5	75	0	0	20	150	170	5.2	.1	2

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
WATER YEAR 1980											
OCT											
02...	1230	1.0	525	3.6	15.0	4	160	160	1.4	70	36
23...	1600	.31	870	3.2	11.0	23	250	250	2.6	129	56
NOV											
09...	1500	7.6	220	6.5	8.5	22	82	63	--	--	20
20...	1000	.40	625	3.6	6.5	29	170	170	1.8	89	40
DEC											
06...	0930	.68	560	3.7	5.5	0	180	180	1.6	79	40
20...	1500	.65	408	4.2	3.0	15	140	140	1.0	50	32
JAN											
10...	1500	.55	710	3.5	1.5	6	220	220	2.6	129	48
24...	1400	.50	510	3.9	.5	19	160	160	2.0	99	38
FEB											
12...	1100	.29	710	3.6	.5	22	230	230	2.7	134	52
28...	1400	1.0	520	3.8	2.5	10	160	160	1.9	94	37
MAR											
12...	1100	.95	290	5.0	1.5	83	120	120	--	--	27
25...	1600	1.1	330	5.1	6.5	10	110	110	--	--	26
APR											
08...	1100	1.5	520	3.7	11.0	26	150	150	1.4	70	33
24...	0900	.81	400	4.4	9.0	5	140	140	.9	45	32
MAY											
09...	0930	.28	680	3.6	6.5	--	200	200	2.5	124	43
23...	1130	1.2	485	3.9	14.5	14	160	160	1.4	70	34
JUN											
12...	0930	.26	650	3.7	11.0	--	190	190	2.6	129	43
24...	1030	.15	1200	3.2	15.0	12	330	330	5.7	283	73
JUL											
10...	0845	1.8	300	6.7	17.5	19	110	96	.6	30	29
21...	0915	.20	1100	3.2	19.0	--	300	300	3.8	189	65
AUG											
06...	1620	.15	1000	3.1	23.0	--	--	--	3.0	149	--
19...	1000	.56	450	5.9	19.0	16	160	160	.5	25	40
SEP											
08...	1300	.11	1050	3.4	18.0	--	350	350	3.6	179	76
22...	1045	.13	1100	3.3	17.0	33	290	290	4.0	199	62

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
WATER YEAR 1980											
OCT											
02...	17	11	13	.4	13	2.3	0	0	0	.0	200
23...	27	17	21	.5	20	2.9	0	0	0	.0	330
NOV											
09...	7.8	7.6	24	.4	10	2.7	23	0	19	12	91
20...	18	10	18	.3	12	1.8	0	0	0	.0	250
DEC											
06...	20	13	22	.4	15	1.9	0	0	0	.0	230
20...	14	8.7	19	.3	10	1.4	0	0	0	.0	170
JAN											
10...	24	13	19	.4	15	2.2	0	0	0	.0	310
24...	16	10	18	.3	12	2.2	0	0	0	.0	210
FEB											
12...	24	14	12	.4	--	1.8	0	0	0	.0	320
28...	17	13	15	.4	15	1.6	0	0	0	.0	220
MAR											
12...	12	7.2	12	.3	8.2	1.0	2	0	2	32	120
25...	12	6.7	11	.3	8.2	1.5	5	0	4	64	110
APR											
08...	16	11	14	.4	--	1.7	0	0	0	.0	210
24...	14	8.8	12	.3	--	2.0	0	0	0	.0	180
MAY											
09...	23	14	13	.4	--	1.9	0	0	0	.0	300
23...	17	12	14	.4	--	1.8	0	0	0	.0	200
JUN											
12...	21	15	14	.5	--	1.9	0	0	0	.0	260
24...	37	21	12	.5	--	2.6	0	0	0	.0	490
JUL											
10...	10	9.7	15	.4	--	2.0	21	0	17	6.7	110
21...	34	22	14	.6	--	2.9	0	0	0	.0	500
AUG											
06...	--	--	--	--	--	--	0	0	0	.0	--
19...	15	13	15	.4	--	2.2	6	0	5	12	170
SEP											
08...	40	18	10	.4	--	2.9	0	0	0	.0	460
22...	33	21	13	.5	--	3.2	0	0	0	.0	520

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
WATER YEAR 1980											
OCT											
02...	8.1	327	.44	.06	.24	.30	1.3	.010	.03	4900	0
23...	10	513	.70	.05	.21	.26	1.2	.000	.00	6000	0
NOV											
09...	4.4	171	.23	.23	.70	.93	4.1	.060	.18	2000	0
20...	9.6	399	.54	.05	.21	.26	1.2	.000	.00	5200	0
DEC											
06...	7.8	368	.50	.12	.13	.25	1.1	.000	.00	4900	0
20...	7.0	262	.36	.07	.04	.11	.49	.000	.00	4400	0
JAN											
10...	9.1	465	.63	.07	.45	.52	2.3	.000	.00	6800	0
24...	6.5	349	.47	.08	.21	.29	1.3	.000	.00	4500	0
FEB											
12...	10	502	.68	.08	.67	.75	3.3	.000	.00	7700	0
28...	11	365	.50	.14	.71	.85	3.8	.010	.03	5300	0
MAR											
12...	8.0	208	.28	.13	.17	.30	1.3	.010	.03	500	0
25...	6.6	203	.28	.13	.34	.47	2.1	.010	.03	1300	0
APR											
08...	6.8	325	.44	.07	.20	.27	1.2	.000	.00	3700	0
24...	7.0	289	.39	.06	.29	.35	1.6	.010	.03	3500	0
MAY											
09...	9.3	470	.64	--	--	--	--	--	--	--	--
23...	7.3	317	.43	.06	.31	.37	1.6	.020	.06	4300	--
JUN											
12...	12	417	.57	--	--	--	--	--	--	--	--
24...	12	844	1.15	.10	.43	.53	2.3	.010	.03	15000	--
JUL											
10...	6.8	220	.30	.14	.18	.32	1.4	.010	.03	1900	--
21...	14	803	1.09	--	--	--	--	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	10000	--
19...	10	312	.42	.22	.26	.48	2.1	.010	.03	2300	--
SEP											
08...	11	744	1.01	.08	--	--	--	.000	.00	--	--
22...	12	792	1.08	.09	.18	.27	1.2	.010	.03	--	--

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
WATER YEAR 1980											
OCT											
02...	2	10	0	10	4	13000	--	2700	1	1100	100
23...	1	10	0	16	7	15000	--	13000	0	1900	0
NOV											
09...	1	0	0	10	3	13000	--	550	2	480	100
20...	1	0	0	20	5	12000	--	6200	2	1400	100
DEC											
06...	0	20	0	30	4	12000	--	7100	0	1200	0
20...	0	20	0	2	5	6400	5000	1400	1	890	0
JAN											
10...	1	20	0	10	6	18000	0	18000	1	1600	0
24...	2	10	0	30	3	22000	5000	17000	0	1200	0
FEB											
12...	1	10	0	39	6	14000	0	14000	0	1900	0
28...	1	0	1	13	4	11000	4500	6500	12	990	20
MAR											
12...	1	0	0	13	3	5000	4500	510	1	600	10
25...	0	0	0	5	2	4400	3900	540	1	530	0
APR											
08...	1	10	0	2	4	12000	4700	7300	0	960	20
24...	0	10	0	6	4	6600	5200	1400	3	880	0
MAY											
09...	--	--	--	--	--	11000	3400	7600	0	1500	100
23...	--	--	--	--	--	14000	12000	1800	0	950	90
JUN											
12...	--	--	--	--	--	8600	4800	3800	1	1600	100
24...	--	--	--	--	--	19000	17000	1800	4	2800	0
JUL											
10...	--	--	--	--	--	10000	9100	880	2	560	0
21...	--	--	--	--	--	16000	3000	13000	9	2700	0
AUG											
06...	--	--	--	--	--	11000	--	--	9	2300	--
19...	--	--	--	--	--	5000	4300	670	19	930	50
SEP											
08...	0	--	1	20	8	16000	2000	14000	9	2900	2600
22...	--	--	--	--	--	--	--	12000	--	--	--

Appendix 3.--Water-quality data, station 03201600, Sandy Run above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979											
OCT											
02...	1000	<.5	48	0	0	0	130	130	2.2	.8	1
23...	1900	<.1	75	0	0	0	190	190	6.2	.0	0
NOV											
09...	380	<.1	17	0	0	0	40	40	4.4	--	0
20...	1300	.1	55	0	0	0	150	150	6.1	.1	0
DEC											
06...	1200	1.4	58	0	0	0	170	170	2.1	.3	0
20...	890	<.1	34	0	0	0	120	120	2.2	.2	0
JAN											
10...	1600	.2	65	0	0	0	190	190	2.5	.1	2
24...	1200	<.1	47	0	0	0	150	150	1.7	.2	0
FEB											
12...	1900	<.1	71	0	0	0	210	210	3.3	.1	0
28...	970	.6	42	0	0	0	120	120	2.0	.2	0
MAR											
12...	590	.1	28	0	0	0	60	60	0.3	.2	6
25...	530	.1	0	0	0	0	130	130	1.6	.6	3
APR											
08...	940	.1	40	0	0	0	110	110	1.2	.1	0
24...	880	<.1	31	0	0	0	100	100	1.6	.1	0
MAY											
09...	1400	--	--	--	--	--	150	--	--	--	--
23...	860	--	--	--	--	10	90	100	2.5	.6	--
JUN											
12...	1500	--	--	--	--	--	150	--	--	--	--
24...	2800	--	--	--	--	0	290	290	4.3	.0	--
JUL											
10...	560	.1	21	--	--	0	70	70	1.4	1.0	--
21...	2700	--	--	--	--	--	330	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	--	--
19...	880	--	--	--	--	0	80	80	2.3	.6	--
SEP											
08...	330	<.1	--	0	0	--	260	250	--	--	--
22...	3000	--	--	--	--	--	320	--	2.4	--	--

Appendix 4.--Water-quality data, station 03201615, Big Four Hollow Creek above East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979.

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
OCT											
12...	1345	380	8.6	15.0	--	110	110	.7	35	23	13
25...	1130	360	8.4	7.5	32	120	120	--	--	26	14
NOV											
06...	1100	350	8.1	9.5	15	120	120	--	--	27	13
20...	1200	280	8.9	5.0	9	110	98	--	--	26	12
30...	1430	280	8.8	6.0	16	110	110	--	--	25	12
DEC											
22...	1100	220	8.8	2.0	32	84	74	--	--	20	8.3
JAN											
04...	1030	195	8.7	.0	21	78	67	--	--	17	8.7
17...	1500	200	8.0	.0	4	85	77	--	--	20	8.6
FEB											
01...	1500	190	8.9	.0	9	82	74	--	--	19	8.5
16...	1100	260	8.9	.0	5	130	120	--	--	31	13
27...	1100	150	8.5	3.0	8	51	47	--	--	12	5.0
MAR											
12...	1200	200	8.9	8.0	12	85	84	--	--	20	8.4
26...	0930	190	8.1	4.0	12	88	80	--	--	21	8.7
APR											
10...	1200	210	8.1	11.0	13	76	61	--	--	18	7.5
27...	0900	250	8.4	11.0	10	97	82	--	--	23	9.6
MAY											
15...	1000	230	8.5	17.0	27	90	75	--	--	21	9.1
31...	0930	255	8.2	15.0	3	93	83	--	--	22	9.3
JUN											
11...	1130	232	8.8	18.0	13	88	85	--	--	22	8.1
25...	1500	275	8.2	17.0	21	91	83	--	--	20	9.9

Appendix 4.--Water-quality data, station 03201615, Big Four Hollow Creek above East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)
OCT											
12...	5.2	9	.2	--	2.5	0	0	0	.0	140	3.0
25...	5.1	8	.2	--	2.5	0	0	0	.0	150	3.7
NOV											
06...	5.5	9	.2	--	2.0	4	0	3	51	148	4.3
20...	6.4	11	.3	--	2.2	20	0	16	40	110	6.6
30...	5.7	10	.2	--	2.0	2	0	2	5.1	100	6.3
DEC											
22...	4.5	10	.2	--	1.7	12	0	10	30	84	4.7
JAN											
04...	3.4	8	.2	--	1.4	14	0	11	45	75	3.3
17...	4.3	10	.2	--	1.3	10	0	8	16	73	5.0
FEB											
01...	4.5	10	.2	--	1.6	10	0	8	20	86	4.8
16...	5.2	8	.2	--	1.7	14	0	11	28	176	4.9
27...	2.6	10	.2	--	1.3	4	0	3	20	53	2.7
MAR											
12...	4.2	10	.2	--	1.5	1	0	1	2.0	90	4.2
26...	5.1	11	.2	--	1.4	10	0	8	13	84	4.9
APR											
10...	4.5	11	.2	--	1.6	18	0	15	23	73	4.3
27...	4.7	9	.2	--	1.8	18	0	15	11	97	3.7
MAY											
15...	4.5	10	.2	--	1.7	18	0	15	9.1	92	2.5
31...	4.5	9	.2	6.1	1.6	12	0	10	12	95	3.1
JUN											
11...	4.3	9	.2	--	1.6	28	0	23	7.1	78	3.5
28...	4.8	10	.2	6.4	1.6	10	0	8	10	100	2.4

Appendix 4.--Water-quality data, station 03201615, Big Four Hollow Creek above East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHATE, TOTAL (MG/L AS PO4)	PHOS-PHORUS TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
OCT											
12...	225	.31	.06	31	140	.01	--	--	210	3	1
25...	246	.33	.05	.43	1.9	.00	--	--	100000	1	0
NOV											
06...	241	.33	.05	.41	1.8	.00	--	--	410	0	0
20...	191	.26	.08	.26	1.2	.00	--	--	350	0	1
30...	192	.26	.05	.17	.75	.00	--	--	320	0	0
DEC											
22...	147	.20	.06	.11	.49	.00	--	--	310	0	1
JAN											
04...	135	.18	.07	.14	.62	.00	--	--	520	0	0
17...	134	.18	.11	.11	.49	.00	--	--	350	0	1
FEB											
01...	144	.20	.06	.20	.89	.00	--	--	340	0	1
16...	275	.37	.35	.64	2.8	.00	--	--	400	0	0
27...	96	.13	.25	.47	2.1	.02	--	--	350	0	0
MAR											
12...	154	.21	.07	.13	.58	.00	--	--	680	0	1
26...	151	.21	.06	.35	1.6	.00	--	--	500	0	1
APR											
10...	152	.21	.04	.33	1.5	.00	--	--	700	0	0
27...	163	.22	.04	.37	1.6	.00	.00	.00	220	0	0
MAY											
15...	179	.24	.03	.31	1.4	.00	.00	.00	300	0	0
31...	166	.23	.05	.16	.71	.01	.03	.03	400	0	0
JUN											
11...	160	.22	.02	.15	.66	.01	.03	.03	600	0	1
28...	199	.27	.05	.32	1.4	.00	.00	.00	400	0	1

Appendix 4.--Water-quality data, station 03201615, Big Four Hollow Creek above East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT											
12...	0	8	0	4	7300	--	50	75	6800	--	6800
25...	0	2	1	4	14000	--	14000	45	7500	--	7500
NOV											
06...	0	0	1	3	11000	--	1100	150	6600	--	6100
20...	0	8	0	2	6900	--	6000	58	3400	--	310
30...	0	2	1	2	5000	--	4000	17	2500	--	2300
DEC											
22...	0	4	1	2	3000	--	2600	40	1500	--	1500
JAN											
04...	0	2	0	2	3100	--	2900	29	1400	--	1400
17...	0	1	5	1	2100	--	1500	20	960	--	960
FEB											
01...	0	6	0	1	3400	--	3100	150	1800	--	1700
16...	0	3	1	1	6100	--	6100	100	5600	--	5200
27...	0	18	0	2	1500	--	1200	180	800	--	800
MAR											
12...	0	1	0	2	3400	--	3000	8	1900	--	1900
26...	0	2	0	2	2700	--	2200	34	1500	--	1400
APR											
10...	0	19	5	0	1900	--	1400	150	1100	--	1100
27...	0	12	6	3	3000	600	2400	140	2000	100	1900
MAY											
15...	0	5	2	1	2700	400	2300	20	2300	0	2300
31...	0	3	6	1	4000	700	3300	30	2600	100	2500
JUN											
11...	0	1	5	1	2300	800	1500	3	1400	0	1400
28...	0	0	7	3	5300	0	5300	0	4200	0	4200

Appendix 4.--Water-quality data, station 03201615, Big Four Hollow Creek above East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C)	PHENOLS (UG/L)
OCT										
12...	<.5	29	0	0	--	10	40	4.6	.4	1
25...	<.5	19	0	0	--	20	30	3.0	.7	4
NOV										
06...	<.5	34	0	0	--	20	20	1.2	.3	0
20...	<.5	0	0	0	--	30	30	2.0	.5	2
30...	<.5	21	0	0	--	20	20	1.0	.2	0
DEC										
22...	<.5	18	0	0	--	20	30	3.7	.4	2
JAN										
04...	<.5	19	0	0	--	30	40	1.3	.3	4
17...	<.5	7	0	0	--	40	40	2.0	.2	1
FEB										
01...	<.5	16	0	0	--	20	20	4.0	.2	0
16...	<.5	15	0	0	--	90	90	1.6	.2	0
27...	<.5	15	0	0	--	0	40	4.3	--	8
MAR										
12...	<.5	19	0	0	--	0	30	4.5	.2	0
26...	<.5	15	0	0	--	20	20	3.9	.0	2
APR										
10...	<.5	40	0	0	--	40	40	1.1	--	0
27...	<.5	25	0	0	30	10	40	3.7	.1	0
MAY										
15...	<.5	20	0	0	0	30	30	3.6	.1	0
31...	<.5	15	0	0	0	30	30	2.9	.6	0
JUN										
11...	<.5	22	0	0	8	2	10	8.9	.3	0
28...	<.5	27	0	0	30	20	50	3.9	.3	0

Appendix 5.--Water-quality data, Station 03201630, East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
OCT											
13...	1445	1.4	220	6.5	13.0	23	86	59	22	7.6	4.4
25...	1000	.12	350	5.3	6.5	9	150	150	33	17	5.3
NOV											
06...	1200	.10	350	5.6	12.0	9	140	140	33	14	5.4
20...	1030	.25	230	6.3	7.5	9	100	77	24	10	5.5
30...	1330	.51	220	6.0	6.5	11	97	77	24	9.0	5.0
DEC											
08...	1600	19	--	--	--	--	--	--	--	--	--
09...	1000	8.2	--	--	--	--	--	--	--	--	--
22...	1000	1.9	165	6.2	2.0	43	72	54	17	7.2	4.2
JAN											
04...	0930	1.3	140	6.5	.5	26	63	47	15	6.3	3.2
17...	1400	1.7	170	6.7	1.5	0	78	61	18	8.0	4.0
FEB											
01...	1500	.25	190	6.3	.5	10	76	61	18	7.5	4.0
16...	1000	.25	210	6.6	.0	9	92	74	22	9.0	4.8
25...	2030	9.8	--	--	--	--	--	--	--	--	--
27...	1000	1.6	110	6.2	1.5	8	47	39	11	4.7	2.5
MAR											
12...	1300	.20	190	6.7	5.0	11	75	74	18	7.4	3.8
26...	1030	.60	180	6.7	4.0	8	75	57	18	7.4	4.1
APR											
02...	1300	3.0	--	--	--	--	--	--	--	--	--
10...	1500	1.2	220	6.2	11.0	10	71	55	17	7.0	4.1
27...	1000	.22	225	6.8	11.0	4	91	68	22	8.8	4.6
MAY											
15...	0900	.10	130	7.1	16.5	24	92	71	22	9.0	5.0
31...	0900	.10	235	7.2	13.0	4	91	68	22	8.8	4.6
JUN											
11...	1030	.31	190	7.1	14.5	22	80	53	20	7.4	4.1
29...	1200	.01	315	6.1	16.0	9	120	110	29	12	5.1

Appendix 5.--Water-quality data, Station 03201630, East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)
OCT											
13...	10	.2	--	2.4	33	0	27	17	62	2.7	130
25...	7	.2	--	2.6	0	0	0	.0	150	2.8	233
NOV											
06...	8	.2	--	2.0	6	0	5	24	140	4.4	227
20...	10	.2	--	2.0	30	0	25	24	85	5.9	158
30...	10	.2	--	1.9	24	0	20	38	71	5.2	134
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
22...	11	.2	--	1.7	22	0	18	22	57	3.8	111
JAN											
04...	10	.2	--	1.4	20	0	16	10	58	3.0	106
17...	10	.2	--	1.3	20	0	16	6.4	56	3.7	109
FEB											
01...	10	.2	--	1.5	18	0	15	14	64	4.0	118
16...	10	.2	--	1.5	22	0	18	8.8	83	4.2	145
25...	--	--	--	--	--	--	--	--	--	--	--
27...	10	.2	--	1.3	10	0	8	10	40	2.6	81
MAR											
12...	10	.2	--	1.5	2	0	2	.6	68	3.7	120
26...	10	.2	--	1.3	22	0	18	7.0	61	3.6	123
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	11	.2	--	1.7	20	0	16	20	59	3.6	119
27...	10	.2	--	1.9	28	0	23	7.1	75	3.6	138
MAY											
15...	10	.2	--	1.9	26	0	21	3.3	79	3.5	164
31...	10	.2	6.5	1.9	28	0	23	2.8	77	3.3	149
JUN											
11...	10	.2	--	1.7	34	0	28	4.3	54	4.3	143
29...	8	.2	--	2.0	9	0	7	11	120	3.0	216

Appendix 5.--Water-quality data, Station 03201630, East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHOPHOSPHATE TOTAL (MG/L AS PO4)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
OCT											
13...	.18	.72	.45	1.2	5.2	.020	--	--	100	3	0
25...	.32	.04	.22	.26	1.2	.050	--	--	330	1	0
NOV											
06...	.31	.06	1.5	1.6	6.9	.050	--	--	970	0	0
20...	.21	.15	.07	.22	.97	.000	--	--	350	0	0
30...	.18	.15	.05	.20	.89	.000	--	--	290	0	0
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
22...	.15	.13	.00	.13	.58	.000	--	--	190	0	1
JAN											
04...	.14	.15	.02	.17	.75	.000	--	--	250	0	0
17...	.15	.17	.07	.24	1.1	.000	--	--	150	0	1
FEB											
01...	.16	.11	.49	.60	2.7	.000	--	--	270	0	1
16...	.20	.42	.22	.64	2.8	.000	--	--	0	0	0
25...	--	--	--	--	--	--	--	--	--	--	--
27...	.11	.24	.11	.35	1.6	.000	--	--	10	0	0
MAR											
12...	.16	.13	.07	.20	.89	.000	--	--	260	0	1
26...	.17	.12	.16	.28	1.2	.010	--	--	320	0	1
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	.16	.07	.13	.20	.89	.000	--	--	220	0	0
27...	.19	.04	.14	.18	.80	.000	.00	.00	230	0	0
MAY											
15...	.22	.63	.27	.90	4.0	.020	.06	.06	330	0	0
31...	.20	.12	.00	.12	.53	.010	.03	.03	370	0	0
JUN											
11...	.19	.11	.06	.17	.75	.020	.06	.06	180	0	0
29...	.29	.08	.03	.11	.49	.010	.03	.03	2300	0	1

Appendix 5.--Water-quality data, Station 03201630, East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT											
13...	0	3	0	4	1300	--	300	30	130	--	120
25...	0	1	0	7	7500	--	1600	25	900	--	810
NOV											
06...	0	0	4	3	6300	--	1400	21	650	--	600
20...	0	2	1	2	1100	--	390	16	160	--	140
30...	0	3	1	1	770	--	180	10	110	--	110
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
22...	0	14	1	3	510	--	260	140	70	--	70
JAN											
04...	0	3	1	1	800	--	170	26	80	--	80
17...	0	1	5	1	180	--	180	15	70	--	70
FEB											
01...	0	10	0	1	560	--	140	170	100	--	100
16...	0	3	0	0	670	--	220	23	90	--	80
25...	--	--	--	--	--	--	--	--	--	--	--
27...	0	7	1	6	330	--	70	63	110	--	70
MAR											
12...	0	1	0	2	670	--	190	6	130	--	130
26...	0	0	0	2	770	--	190	3	90	--	90
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	0	1	6	1	550	--	50	9	70	--	70
27...	0	20	5	3	400	320	80	180	100	0	100
MAY											
15...	0	1	4	3	850	650	200	23	190	10	180
31...	0	9	4	0	1200	840	360	36	180	10	170
JUN											
11...	0	5	8	1	410	380	30	18	60	0	60
29...	0	0	7	5	5700	5100	630	2	550	0	550

Appendix 5.--Water-quality data, Station 03201630, East Fork Big Four Hollow Creek near Lake Hope, Ohio, water year 1979--Continued

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	PHENOLS (UG/L)
OCT										
13...	<.5	21	0	0	--	10	10	4.8	.7	1
25...	<.5	41	0	0	--	50	60	3.2	.5	3
NOV										
06...	<.5	48	0	0	--	40	90	2.9	.5	0
20...	<.5	21	0	0	--	10	20	4.2	.5	1
30...	<.5	13	0	0	--	10	20	1.2	.5	0
DEC										
08...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
22...	<.5	18	0	0	--	20	50	3.8	.4	1
JAN										
04...	<.5	15	0	0	--	20	20	2.7	.1	0
17...	<.5	5	0	0	--	20	20	5.9	.1	3
FEB										
01...	<.5	9	0	0	--	10	20	1.3	.1	0
16...	<.5	15	0	0	--	10	30	2.9	.1	0
25...	--	--	--	--	--	--	--	--	--	--
27...	<.5	7	0	0	--	0	30	4.6	--	1
MAR										
12...	<.5	17	0	0	--	20	20	4.1	.1	0
26...	<.5	11	0	0	--	10	10	1.9	.0	1
APR										
02...	--	--	--	--	--	--	--	--	--	--
10...	<.5	28	0	0	--	20	40	4.8	--	0
27...	<.5	21	0	0	30	10	40	3.1	.1	0
MAY										
15...	<.5	27	0	0	0	50	50	14	.2	0
31...	<.5	16	0	0	0	90	90	6.8	.4	0
JUN										
11...	<.5	17	0	0	20	0	20	2.6	.2	0
29...	<.5	28	0	0	10	30	40	5.7	.5	2

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
WATER YEAR 1979											
NOV											
06...	1230	.96	--	--	--	--	--	--	--	--	--
20...	1230	1.6	--	--	--	--	--	--	--	--	--
30...	1500	2.0	--	--	--	--	--	--	--	--	--
DEC											
08...	1315	21	--	--	--	--	--	--	--	--	--
08...	1316	21	--	--	--	--	--	--	--	--	--
09...	1030	11	--	--	--	--	--	--	--	--	--
18...	1615	26	--	--	--	--	--	--	--	--	--
22...	1100	2.7	--	--	--	--	--	--	--	--	--
FEB											
25...	2100	16	--	--	--	--	--	--	--	--	--
MAR											
12...	1530	.42	--	--	--	--	--	--	--	--	--
APR											
02...	1400	6.2	--	--	--	--	--	--	--	--	--
MAY											
31...	1130	.19	--	--	--	--	--	--	--	--	--
JUN											
08...	1200	4.5	--	--	--	--	--	--	--	--	--
JUL											
10...	0900	.37	265	6.9	19.0	3	110	98	26	11	6.0
26...	1515	.29	300	6.5	21.0	2	110	90	26	10	5.4
AUG											
08...	1200	.25	300	6.5	22.5	41	110	100	26	11	6.0
23...	1400	.62	245	6.8	19.0	37	91	65	22	8.7	5.6
SEP											
05...	1500	.17	258	6.6	20.5	2	100	83	24	9.7	5.6
17...	1300	.81	280	6.5	15.5	6	99	81	24	9.6	5.1

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980-Continued

DATE	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)
WATER YEAR 1979											
NOV											
06...	--	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--
FEB											
25...	--	--	--	--	--	--	--	--	--	--	--
MAR											
12...	--	--	--	--	--	--	--	--	--	--	--
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
MAY											
31...	--	--	--	--	--	--	--	--	--	--	--
JUN											
08...	--	--	--	--	--	--	--	--	--	--	--
JUL											
10...	10	.2	--	2.1	15	0	12	3.0	110	4.3	213
26...	10	.2	7.5	2.1	20	0	16	10	110	3.9	205
AUG											
08...	10	.2	8.1	2.1	12	0	10	6.1	110	4.0	233
23...	12	.3	7.6	2.0	32	0	26	8.1	75	4.7	148
SEP											
05...	11	.2	7.5	1.9	20	0	16	8.0	97	3.5	203
17...	10	.2	7.0	1.9	22	0	18	11	96	4.2	183

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)
WATER YEAR 1979											
NOV											
06...	--	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
08...	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--
FEB											
25...	--	--	--	--	--	--	--	--	--	--	--
MAR											
12...	--	--	--	--	--	--	--	--	--	--	--
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
MAY											
31...	--	--	--	--	--	--	--	--	--	--	--
JUN											
08...	--	--	--	--	--	--	--	--	--	--	--
JUL											
10...	.29	.09	.13	.22	.97	.000	.00	300	0	1	0
26...	.28	.12	.18	.30	1.3	.030	.09	700	0	1	0
AUG											
08...	.32	.08	.11	.19	.84	.000	.00	220	0	2	0
23...	.20	.09	.14	.23	1.0	.010	.03	260	0	2	0
SEP											
05...	.28	.06	.00	.06	.27	.000	.00	310	0	0	0
17...	.25	.08	.57	.65	2.9	.010	.03	800	0	1	0

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
WATER YEAR 1979										
NOV										
06...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
DEC										
08...	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
FEB										
25...	--	--	--	--	--	--	--	--	--	--
MAR										
12...	--	--	--	--	--	--	--	--	--	--
APR										
02...	--	--	--	--	--	--	--	--	--	--
MAY										
31...	--	--	--	--	--	--	--	--	--	--
JUN										
08...	--	--	--	--	--	--	--	--	--	--
JUL										
10...	0	16	2	1600	400	1200	3	1600	0	1600
26...	0	14	0	1300	350	950	3	1600	100	1500
AUG										
08...	1	16	4	1500	400	1100	5	2000	200	1800
23...	1	19	3	1200	720	480	5	850	50	800
SEP										
05...	0	2	2	2200	--	950	5	1800	100	1700
17...	0	3	3	3000	--	1300	2	1800	100	1700

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979										
NOV										
06...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--
DEC										
08...	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
FEB										
25...	--	--	--	--	--	--	--	--	--	--
MAR										
12...	--	--	--	--	--	--	--	--	--	--
APR										
02...	--	--	--	--	--	--	--	--	--	--
MAY										
31...	--	--	--	--	--	--	--	--	--	--
JUN										
08...	--	--	--	--	--	--	--	--	--	--
JUL										
10...	<.5	37	0	0	10	20	30	3.9	.1	0
26...	<.5	2	0	0	30	30	60	2.6	.0	0
AUG										
08...	<.5	10	0	0	10	30	40	3.1	.3	0
23...	<.5	7	0	1	0	20	20	6.4	.4	0
SEP										
05...	<.5	10	0	0	0	30	30	2.9	.2	1
17...	<.5	10	0	0	30	0	30	7.0	.6	0

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
WATER YEAR 1980											
OCT											
02...	1130	1.1	220	7.1	15.0	3	82	55	--	--	20
23...	1400	1.1	260	6.2	11.5	20	100	84	--	--	25
NOV											
09...	1200	3.0	260	6.2	8.0	33	110	95	--	--	29
20...	1200	.50	250	6.7	8.0	8	99	79	--	--	24
DEC											
06...	1300	.50	250	6.7	6.0	15	98	74	--	--	23
20...	1200	.50	200	6.9	1.5	7	96	74	--	--	23
JAN											
10...	1000	.40	240	7.6	.5	6	110	90	--	--	27
24...	1200	.40	240	7.0	.5	63	100	77	--	--	25
FEB											
12...	1430	.40	270	7.1	.5	15	120	98	--	--	27
28...	1130	.80	230	7.0	.5	8	99	69	--	--	24
MAR											
12...	1000	1.5	190	6.6	.5	87	110	89	--	--	21
25...	1500	1.3	220	7.5	6.5	2	85	62	--	--	20
APR											
08...	1300	1.3	220	7.4	11.0	12	84	64	--	--	20
25...	1000	.60	215	6.8	9.0	8	94	73	--	--	23
MAY											
09...	1300	.30	275	6.4	13.5	--	110	96	--	--	26
23...	1430	.70	275	6.2	16.0	15	110	78	.2	10	25
JUN											
12...	1530	.30	280	7.4	18.5	--	110	83	--	--	25
24...	1430	.10	315	5.9	21.0	40	120	100	--	--	30
JUL											
10...	1230	.80	225	7.0	18.5	3	92	58	--	--	23
21...	1130	.70	310	7.2	25.0	--	120	100	--	--	28
AUG											
06...	1450	.60	290	6.7	24.0	--	--	--	.2	10	--
19...	1400	.70	290	6.7	21.5	19	120	80	.3	15	29
SEP											
08...	1430	.50	280	6.4	21.0	--	120	110	.2	10	30
22...	1300	.50	310	7.4	18.0	20	120	100	--	--	28

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
WATER YEAR 1980											
OCT											
02...	7.9	4.9	11	.2	7.2	2.3	33	0	27	4.2	65
23...	9.9	5.2	15	.2	8.1	2.9	23	0	19	23	93
NOV											
09...	9.8	4.3	11	.2	8.4	4.1	22	0	18	22	97
20...	9.6	4.8	14	.2	6.4	1.6	25	0	21	8.0	96
DEC											
06...	9.9	5.7	17	.3	7.3	1.6	30	0	25	9.6	89
20...	9.3	4.7	10	.2	6.1	1.4	27	0	22	5.4	83
JAN											
10...	11	4.9	13	.2	6.5	1.6	28	0	23	1.1	110
24...	10	5.0	9	.2	6.6	1.6	33	0	27	5.3	95
FEB											
12...	12	5.7	9	.2	7.1	1.4	23	0	19	2.9	110
28...	9.6	5.0	10	.2	6.3	1.3	37	0	30	5.9	88
MAR											
12...	13	4.1	8	.2	5.2	1.1	25	0	21	10	74
25...	8.4	3.7	9	.2	5.3	1.6	28	0	23	1.4	64
APR											
08...	8.3	4.3	10	.2	--	1.6	25	0	21	1.6	76
25...	8.9	4.3	9	.2	--	1.9	26	0	21	.3	84
MAY											
09...	11	5.7	10	.2	--	1.8	17	0	14	11	110
23...	11	5.5	10	.2	--	2.2	36	0	30	36	92
JUN											
12...	11	5.7	10	.2	--	2.2	30	0	25	1.9	100
24...	12	5.5	9	.2	--	2.3	24	0	20	.6	130
JUL											
10...	8.4	4.6	10	.2	--	2.0	42	0	34	6.7	60
21...	12	5.7	9	.2	--	2.5	18	0	15	1.8	120
AUG											
06...	--	--	--	--	--	--	18	0	15	5.7	--
19...	11	6.4	10	.3	--	2.6	46	0	38	15	89
SEP											
08...	12	5.4	8	.2	--	2.3	22	0	18	14	130
22...	12	5.7	9	.2	--	2.7	18	0	15	1.1	140

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
WATER YEAR 1980											
OCT											
02...	3.2	139	.19	.10	.06	.16	.71	.010	.03	300	0
23...	3.0	168	.23	.02	.11	.13	.58	.010	.03	300	0
NOV											
09...	3.6	177	.24	.15	1.0	1.2	5.1	.130	.40	3200	0
20...	3.0	166	.23	--	--	--	--	--	--	220	0
DEC											
06...	3.3	163	.22	.12	.17	.29	1.3	.000	.00	200	0
20...	3.0	110	.15	.11	.13	.24	1.1	.000	.00	250	0
JAN											
10...	3.4	162	.25	.13	.50	.63	2.8	.000	.00	500	0
24...	3.0	177	.24	.10	.25	.35	1.6	.000	.00	800	0
FEB											
12...	3.3	200	.27	.08	.07	.15	.66	.000	.00	4000	0
28...	3.5	163	.22	.22	.23	.45	2.0	.010	.03	500	0
MAR											
12...	3.0	146	.20	.16	.09	.25	1.1	.010	.03	150	0
25...	2.5	152	.21	.20	.09	.29	1.3	.000	.00	240	0
APR											
08...	2.6	131	.18	.13	.49	.62	2.7	.040	.12	1100	0
25...	2.4	170	.23	.08	.31	.39	1.7	.000	.00	600	0
MAY											
09...	2.7	196	.27	--	--	--	--	--	--	--	--
23...	4.2	167	.23	.13	.35	.48	2.1	.010	.03	40	--
JUN											
12...	4.0	192	.26	--	--	--	--	--	--	--	--
24...	3.8	230	.31	.19	.16	.35	1.6	.010	.03	150	--
JUL											
10...	3.2	155	.21	.20	.07	.27	1.2	.000	.00	20	--
21...	3.4	235	.32	--	--	--	--	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	--	--
19...	4.7	197	.27	.02	.12	.14	.62	.010	.03	400	--
SEP											
08...	3.5	214	.29	--	--	--	--	--	--	--	--
22...	3.4	251	.34	.19	.31	.50	2.2	.010	.03	--	--

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS Fe)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
WATER YEAR 1980											
OCT											
02...	2	10	0	9	0	2000	--	400	1	750	40
23...	1	0	0	11	2	1500	--	750	0	1600	0
NOV											
09...	1	0	0	10	8	12000	--	2000	3	1600	0
20...	0	0	0	20	1	2000	--	1500	0	1200	0
DEC											
06...	0	20	0	5	1	2000	--	1600	0	1100	0
20...	0	10	0	3	2	1900	200	1700	0	940	0
JAN											
10...	1	20	0	5	1	3600	600	3000	1	1600	0
24...	2	10	0	7	1	4500	1400	3100	0	1400	0
FEB											
12...	1	0	0	25	1	3900	700	3200	0	1700	0
28...	1	0	0	23	1	1900	800	1100	7	640	0
MAR											
12...	1	0	0	8	1	1800	600	1200	0	630	10
25...	0	0	0	5	1	1300	450	850	0	570	0
APR											
08...	2	0	0	4	4	5100	4400	680	3	900	0
25...	0	10	0	5	2	2500	1400	1100	0	1100	0
MAY											
09...	--	--	--	--	--	1500	400	1100	0	1400	0
23...	--	--	--	--	--	1400	1000	370	0	850	40
JUN											
12...	--	--	--	--	--	1100	640	460	2	1200	0
24...	--	--	--	--	--	2100	1200	890	2	1900	0
JUL											
10...	--	--	--	--	--	1000	570	430	3	650	0
21...	--	--	--	--	--	1500	500	1000	0	1700	100
AUG											
06...	--	--	--	--	--	1200	--	--	0	1600	--
19...	--	--	--	--	--	1700	1400	330	12	1000	20
SEP											
08...	--	--	--	--	--	1400	200	1200	0	1600	100
22...	--	--	--	--	--	--	--	1200	--	--	--

Appendix 6.--Water-quality data, Station 03201660, Big Four Hollow Creek below East Fork Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1980											
OCT											
02...	710	<.5	4	0	0	0	20	20	2.3	.6	0
23...	1600	<.1	8	0	1	10	20	30	6.9	.2	0
NOV											
09...	1600	<.1	34	0	0	20	70	90	5.9	1.7	0
20...	1200	.1	8	0	0	10	0	10	2.8	.1	1
DEC											
06...	1100	.4	7	0	0	0	20	20	2.3	.5	0
20...	940	.1	6	0	0	0	20	20	1.9	.2	0
JAN											
10...	1600	<.1	7	0	0	0	20	20	1.3	.1	0
24...	1400	<.1	7	0	0	0	20	20	3.7	.3	0
FEB											
12...	1700	.1	12	0	0	0	20	20	5.9	.3	0
28...	640	.2	2	0	0	0	30	30	1.0	--	0
MAR											
12...	620	<.1	5	0	0	20	30	50	1.3	.2	4
25...	570	.1	2	0	0	0	20	20	4.0	.4	2
APR											
08...	900	.1	11	0	0	0	30	30	3.4	.5	1
25...	1100	<.1	3	0	0	20	5	20	9.0	.4	0
MAY											
09...	1400	--	--	--	--	--	20	--	--	--	--
23...	810	--	--	--	--	8	2	10	4.5	.3	--
JUN											
12...	1200	--	--	--	--	--	20	--	--	--	--
24...	1900	--	--	--	--	10	20	30	7.1	.4	--
JUL											
10...	650	<.1	3	--	--	0	30	30	1.8	.4	--
21...	1600	--	--	--	--	--	30	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	--	--
19...	980	--	--	--	--	10	10	20	2.2	.3	--
SEP											
08...	1500	--	--	--	--	--	30	--	--	--	--
22...	2000	--	--	--	--	--	50	--	1.9	--	--

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)
WATER YEAR 1979												
OCT												
13...	1000	4.3	280	4.8	12.5	41	97	97	.0	.0	23	9.5
24...	1400	.11	850	3.3	13.0	10	310	310	2.6	129	68	33
NOV												
06...	1600	.08	830	3.2	13.0	15	280	280	2.3	114	63	29
22...	0900	.26	490	3.5	7.0	8	180	180	1.0	50	43	18
30...	1530	.66	390	3.9	6.5	13	140	140	.6	30	31	14
DEC												
21...	1030	3.2	270	4.0	4.0	42	99	99	.5	25	23	10
JAN												
04...	1600	1.6	330	3.9	.5	17	110	110	.8	40	25	12
16...	1130	1.7	285	4.0	1.0	1	130	130	.6	30	29	13
FEB												
01...	1430	.66	395	3.6	.5	10	130	130	.8	40	30	14
14...	1030	.33	520	3.5	.5	8	160	160	1.3	65	38	17
26...	1130	11	160	4.1	2.0	12	60	60	.4	20	14	6.1
MAR												
13...	1230	.66	390	3.7	7.0	9	130	130	.8	40	31	13
26...	1530	1.2	345	3.9	5.0	10	110	110	.5	25	26	12
APR												
11...	1200	1.4	300	4.5	7.5	13	110	110	.3	15	25	11
30...	1000	.52	400	3.6	7.5	7	130	130	.5	25	32	13
MAY												
15...	1400	.39	425	3.8	20.5	25	140	140	.6	30	32	14
30...	1330	.64	520	3.7	18.0	4	150	150	1.1	55	35	16
JUN												
11...	1530	1.2	420	3.9	19.5	6	130	130	.8	40	30	13
28...	1000	.11	565	3.9	15.5	9	190	190	1.0	50	43	19
JUL												
10...	1030	.20	500	3.8	17.0	10	180	180	.8	40	43	18
26...	1400	.43	1200	3.5	19.0	16	380	380	4.6	228	86	39
AUG												
08...	1300	.16	1050	3.0	21.5	32	310	310	3.2	159	73	30
23...	1300	.88	370	4.5	19.0	35	130	130	.6	30	32	13
SEP												
05...	1600	.18	535	3.6	21.0	2	180	180	1.4	70	44	18
17...	1400	.30	755	3.7	17.0	12	230	230	2.5	124	54	23

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
WATER YEAR 1979											
OCT											
13...	5.4	11	.2	--	2.7	0	0	0	.0	100	4.6
24...	6.8	5	.2	--	2.7	0	0	0	.0	410	2.5
NOV											
06...	7.0	5	.2	--	2.4	0	0	0	.0	380	3.1
22...	6.2	7	.2	--	2.3	0	0	0	.0	220	4.5
30...	5.5	8	.2	--	2.0	0	0	0	.0	150	4.4
DEC											
21...	4.2	8	.2	--	1.7	0	0	0	.0	110	3.1
JAN											
04...	3.8	7	.2	--	1.5	0	0	0	.0	140	2.6
16...	4.5	7	.2	--	1.4	0	0	0	.0	130	3.3
FEB											
01...	5.0	7	.2	--	1.6	0	0	0	.0	170	4.3
14...	5.8	7	.2	--	1.7	0	0	0	.0	220	3.5
26...	2.3	7	.1	--	1.4	0	0	0	.0	71	2.9
MAR											
13...	4.8	7	.2	--	1.6	0	0	0	.0	160	3.2
26...	4.9	8	.2	--	1.7	0	0	0	.0	130	3.6
APR											
11...	4.9	9	.2	--	1.7	0	0	0	.0	120	2.7
30...	5.5	8	.2	--	1.9	0	0	0	.0	170	2.9
MAY											
15...	5.8	8	.2	--	1.9	0	0	0	.0	180	2.4
30...	5.4	7	.2	7.2	1.8	0	0	0	.0	200	2.4
JUN											
11...	4.6	7	.2	--	1.8	0	0	0	.0	150	3.1
28...	6.5	7	.2	8.5	2.0	0	0	0	.0	220	2.4
JUL											
10...	6.2	7	.2	--	2.2	0	0	0	.0	220	3.1
26...	9.7	5	.2	13	3.6	0	0	0	.0	550	2.0
AUG											
08...	7.8	5	.2	11	2.9	0	0	0	.0	430	2.9
23...	5.8	8	.2	7.9	2.1	0	0	0	.0	150	3.8
SEP											
05...	6.2	7	.2	8.6	2.4	0	0	0	.0	210	2.6
17...	6.7	6	.2	9.3	2.6	0	0	0	.0	330	3.0

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHOPHOSPHATE TOTAL (MG/L AS PO4)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
WATER YEAR 1979											
OCT											
13...	172	.23	.55	.78	1.3	5.9	.070	--	--	540	3
24...	585	.80	.12	.13	.25	1.1	.000	--	--	10000	1
NOV											
06...	521	.71	.13	.03	.16	.71	.000	--	--	--	0
22...	340	.46	.16	.00	.16	.71	.000	--	--	4400	0
30...	252	.34	.15	.00	.15	.66	.000	--	--	3000	0
DEC											
21...	175	.24	.13	.08	.21	.93	.000	--	--	1400	0
JAN											
04...	216	.29	.12	.00	.12	.53	.000	--	--	880	0
16...	198	.27	.13	.22	.35	1.6	.000	--	--	860	0
FEB											
01...	246	.33	.11	.16	.27	1.2	.000	--	--	3100	0
14...	330	.45	.13	.25	.38	1.7	.000	--	--	3900	0
26...	117	.16	.13	.18	.31	1.4	.000	--	--	1400	0
MAR											
13...	231	.31	.13	.07	.20	.89	.000	--	--	3100	0
26...	211	.29	.11	.17	.28	1.2	.000	--	--	1900	0
APR											
11...	188	.26	.07	.14	.21	.93	.000	--	--	1900	0
30...	252	.34	.06	.17	.23	1.0	.000	.00	.00	2000	0
MAY											
15...	289	.39	.07	.11	.18	.80	.000	.00	.00	2400	0
30...	321	.44	.10	.04	.14	.62	.010	.03	.03	3600	0
JUN											
11...	271	.37	.07	.10	.17	.75	.010	.03	.03	2800	0
28...	402	.55	.07	.10	.17	.75	.000	.00	.00	4100	0
JUL											
10...	361	.49	.07	.01	.08	.35	.000	--	.00	3200	0
26...	1000	1.36	.05	.27	.32	1.4	.020	--	.06	13000	0
AUG											
08...	835	1.14	.04	.36	.40	1.8	.000	--	.00	11000	0
23...	253	.34	.10	.34	.44	1.9	.030	--	.09	2400	0
SEP											
05...	385	.52	.06	.06	.12	.53	.010	--	.03	4000	0
17...	544	.74	.09	.17	.26	1.2	.000	--	.00	5900	0

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
WATER YEAR 1979											
OCT											
13...	1	0	3	3	8	8100	--	730	26	1300	--
24...	0	10	11	1	18	2700	--	2700	100	6400	--
NOV											
06...	0	--	--	--	--	1800	--	1800	270	5500	--
22...	0	0	3	2	6	1300	--	1300	16	3300	--
30...	0	0	4	1	4	2000	--	1500	35	2400	--
DEC											
21...	1	0	6	4	5	4300	--	2300	87	860	--
JAN											
04...	0	0	2	2	5	7000	--	6000	30	1200	--
16...	1	0	7	5	3	5600	--	4000	95	1000	--
FEB											
01...	1	10	10	30	5	7200	--	6600	200	1500	--
14...	0	10	1	2	5	7800	--	7000	8	2200	--
26...	0	0	8	0	4	4400	--	3000	68	460	--
MAR											
13...	1	0	3	0	5	6400	--	4600	43	1500	--
26...	0	0	0	0	4	5000	--	3600	7	1000	--
APR											
11...	0	0	2	7	3	2700	--	1300	17	840	--
30...	0	0	15	5	6	2500	500	2000	150	1300	0
MAY											
15...	0	10	4	3	6	2300	200	2100	54	1400	100
30...	0	10	4	8	6	9100	800	8300	60	1600	0
JUN											
11...	0	0	10	9	5	10000	3700	6300	42	1100	0
28...	1	10	0	10	8	2000	1100	950	1	2000	0
JUL											
10...	1	0	0	15	8	570	0	570	5	2100	0
26...	2	10	0	9	0	66000	0	66000	0	5700	0
AUG											
08...	2	10	1	19	19	29000	10000	19000	8	6400	100
23...	2	0	1	1	11	5400	0	5400	8	2000	200
SEP											
05...	0	0	1	2	6	6800	--	5900	8	3600	300
17...	1	10	0	4	9	28000	--	23000	4	4700	400

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979											
OCT											
13...	1200	<.5	35	0	0	--	40	60	6.9	2.5	1
24...	6400	<.5	120	0	0	--	220	230	2.5	.2	2
NOV											
06...	5500	<.5	--	0	--	--	30	260	1.1	.2	0
22...	2800	<.5	63	0	0	--	100	120	2.1	.4	0
30...	2200	<.5	46	0	0	--	70	90	1.2	.4	0
DEC											
21...	860	<.5	30	0	0	--	50	70	2.8	.7	5
JAN											
04...	1200	<.5	39	0	0	--	70	80	1.1	.2	0
16...	1000	<.5	13	0	0	--	90	90	4.3	.2	0
FEB											
01...	1500	<.5	44	0	0	--	70	100	1.3	.1	0
14...	2200	<.5	77	0	0	--	120	310	1.6	.5	2
26...	460	<.5	19	0	0	--	20	50	4.4	--	1
MAR											
13...	1400	<.5	38	0	0	--	50	80	3.2	.1	0
26...	1000	<.5	35	0	0	--	50	50	1.7	.1	0
APR											
11...	840	<.5	39	0	0	--	50	60	2.0	.1	0
30...	1300	<.5	47	0	0	10	80	90	4.2	.1	0
MAY											
15...	1300	<.5	65	0	0	0	80	80	1.8	.1	1
30...	1600	<.5	37	0	0	0	90	90	7.5	.2	0
JUN											
11...	1100	<.5	44	0	0	40	40	80	5.0	.2	0
28...	2000	<.5	55	0	0	0	170	170	7.6	.1	2
JUL											
10...	2100	<.5	82	0	0	50	220	270	2.0	.1	0
26...	5700	<.5	1	0	0	40	380	420	3.0	.0	0
AUG											
08...	6300	<.5	110	0	0	0	320	320	2.9	.1	0
23...	1800	<.5	44	0	1	0	80	80	3.3	.5	0
SEP											
05...	3300	<.5	47	0	0	10	130	140	5.2	.2	2
17...	4300	<.5	78	0	0	60	140	200	4.4	.1	170

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
WATER YEAR 1980											
OCT											
02...	1030	1.4	320	5.0	15.0	6	120	120	.6	30	28
23...	1100	.30	410	4.3	12.5	17	160	160	.6	30	39
NOV											
09...	0930	.40	320	5.3	7.0	8	140	130	--	--	34
20...	1100	.42	310	5.6	7.0	0	140	140	--	--	34
DEC											
06...	1400	.70	310	5.7	4.5	1	120	120	--	--	30
20...	1000	.70	300	5.9	1.0	16	130	120	--	--	31
JAN											
10...	1300	.40	360	5.2	1.0	5	150	150	--	--	37
24...	1300	.50	335	5.3	.5	32	150	140	--	--	36
FEB											
12...	1300	.38	380	5.1	.5	34	160	160	--	--	40
28...	1000	.90	320	6.0	.5	14	140	130	--	--	33
MAR											
12...	1330	1.2	285	6.0	4.0	95	130	120	--	--	30
25...	1130	1.8	290	5.8	5.5	3	130	120	--	--	30
APR											
07...	1100	.90	300	6.0	9.0	11	120	110	--	--	28
24...	1130	.60	310	6.1	13.0	2	130	120	--	--	31
MAY											
09...	1200	.20	420	4.6	10.5	--	170	170	--	--	42
23...	1330	.95	370	6.3	17.0	15	140	130	--	--	34
JUN											
12...	1230	.20	470	4.8	22.0	--	180	180	1.2	60	44
24...	1330	.10	800	3.9	20.5	23	290	290	2.6	129	70
JUL											
10...	1115	.10	300	6.8	18.5	10	130	100	--	--	29
21...	1030	.05	690	4.0	23.0	--	250	250	1.8	89	60
AUG											
06...	1000	.20	610	3.8	21.0	--	--	--	1.2	60	--
19...	1300	.70	425	5.8	22.0	21	170	170	.4	20	40
SEP											
08...	1515	.15	720	3.4	24.5	--	280	280	1.9	94	66
22...	1230	.16	860	4.0	19.5	7	300	300	3.1	154	73

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
WATER YEAR 1980											
OCT											
02...	12	5.1	8	.2	7.5	2.4	0	0	0	.0	140
23...	15	6.7	13	.2	9.9	3.2	0	0	0	.0	180
NOV											
09...	13	5.8	13	.2	8.0	2.2	12	0	10	96	140
20...	14	5.3	12	.2	7.1	1.8	4	0	3	16	140
DEC											
06...	12	4.8	12	.2	6.5	1.7	6	0	5	19	140
20...	12	5.1	12	.2	6.7	1.6	6	0	5	12	130
JAN											
10...	15	5.4	11	.2	7.4	2.0	8	0	7	81	170
24...	14	5.1	11	.2	7.0	1.9	8	0	7	64	160
FEB											
12...	15	5.5	7	.2	7.2	1.7	2	0	2	25	190
28...	13	5.6	8	.2	7.1	1.5	9	0	7	14	160
MAR											
12...	13	4.2	7	.2	5.5	1.3	6	0	5	9.6	140
25...	13	3.8	6	.1	5.5	1.7	10	0	8	25	130
APR											
07...	12	4.9	8	.2	--	1.6	14	0	11	22	130
24...	12	4.6	7	.2	--	2.1	12	0	10	15	130
MAY											
09...	17	6.3	7	.2	--	2.3	1	0	1	40	200
23...	14	5.6	8	.2	--	4.2	18	0	15	2.3	150
JUN											
12...	18	6.4	7	.2	--	2.8	3	0	2	76	210
24...	28	7.0	5	.2	--	3.5	0	0	0	.0	380
JUL											
10...	13	6.7	10	.3	--	2.3	31	0	25	3.9	110
21...	24	7.2	6	.2	--	3.9	0	0	0	.0	310
AUG											
06...	--	--	--	--	--	--	0	0	0	.0	--
19...	16	6.5	8	.2	--	2.8	1	0	1	2.5	170
SEP											
08...	27	6.7	5	.2	--	2.8	0	0	0	.0	320
22...	29	7.6	5	.2	--	3.7	0	0	0	.0	390

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
WATER YEAR 1980											
OCT											
02...	2.4	221	.30	.12	.24	.36	1.6	.030	.09	2000	0
23...	2.6	285	.39	.05	.62	.67	3.0	.010	.03	2100	0
NOV											
09...	3.0	246	.33	.09	.16	.25	1.1	.010	.03	900	0
20...	2.8	224	.30	.08	.21	.29	1.3	.000	.00	700	0
DEC											
06...	2.9	215	.29	.15	.08	.23	1.0	.000	.00	820	0
20...	3.0	194	.26	.12	.20	.32	1.4	.010	.03	2200	0
JAN											
10...	2.6	263	.36	.16	.14	.30	1.3	.010	.03	2100	0
24...	3.3	260	.35	.11	.26	.37	1.6	.000	.00	2500	0
FEB											
12...	2.8	301	.41	.08	.60	.68	3.0	.010	.03	2000	0
28...	3.6	249	.34	.23	.20	.43	1.9	.020	.06	2200	0
MAR											
12...	2.8	196	.27	.18	.16	.34	1.5	.010	.03	480	0
25...	1.9	194	.26	.02	.20	.22	.97	.010	.03	1000	0
APR											
07...	2.5	216	.29	.15	.12	.27	1.2	.010	.03	1500	0
24...	2.2	239	.33	.10	.01	.11	.49	.010	.03	1500	0
MAY											
09...	2.8	352	.48	--	--	--	--	--	--	--	--
23...	6.7	249	.34	.15	1.4	1.6	6.9	.020	.06	1100	--
JUN											
12...	4.0	336	.46	--	--	--	--	--	--	--	--
24...	3.5	619	.84	.14	.18	.32	1.4	.000	.00	7000	--
JUL											
10...	3.2	220	.30	.21	.17	.38	1.7	.010	.03	900	--
21...	4.1	556	.76	--	--	--	--	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	--	--
19...	4.1	301	.41	.20	.11	.31	1.4	.010	.03	1400	--
SEP											
08...	3.6	540	.73	--	--	--	--	--	--	--	--
22...	3.2	690	.94	.20	.18	.38	1.7	.010	.03	--	--

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
WATER YEAR 1980											
OCT											
02...	2	10	0	10	3	8800	--	5900	1	2100	100
23...	2	0	0	11	7	2900	--	1700	3	2700	0
NOV											
09...	0	0	0	7	2	1400	--	760	0	1900	0
20...	0	0	0	8	2	1300	--	850	2	1700	0
DEC											
06...	0	10	0	12	2	1800	--	1400	0	1700	0
20...	0	10	0	5	4	1900	800	1100	0	1700	0
JAN											
10...	1	20	0	5	4	2200	700	1500	0	2400	100
24...	2	10	0	8	4	3900	1900	2000	1	2200	0
FEB											
12...	2	0	0	40	3	2200	500	1700	0	2700	0
28...	1	0	0	13	3	3000	1700	1300	4	1900	100
MAR											
12...	1	0	0	10	4	2200	1100	1100	2	1500	100
25...	0	0	0	4	2	2000	1200	830	1	1200	0
APR											
07...	2	0	0	6	5	1800	830	970	1	1700	0
24...	1	10	0	3	3	1500	790	710	2	1900	0
MAY											
09...	--	--	--	--	--	1100	300	800	0	3000	0
23...	--	--	--	--	--	2700	1400	1300	1	2100	200
JUN											
12...	--	--	--	--	--	3900	2400	1500	3	3800	0
24...	--	--	--	--	--	12000	11000	1100	5	6900	0
JUL											
10...	--	--	--	--	--	1800	1100	690	2	1900	200
21...	--	--	--	--	--	3600	0	3600	5	7500	300
AUG											
06...	--	--	--	--	--	6000	--	--	9	5500	--
19...	--	--	--	--	--	3000	900	2100	13	3200	100
SEP											
08...	--	--	--	--	--	8100	0	8100	5	7700	100
22...	--	--	--	--	--	--	--	8600	--	--	--

Appendix 7.--Water-quality data, Station 03201700, Big four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1980											
OCT											
02...	2000	<.5	28	0	0	0	80	80	2.4	.5	5
23...	2700	<.1	33	0	0	0	110	110	4.3	.0	0
NOV											
09...	1900	.6	29	0	0	0	80	80	2.1	.1	0
20...	1700	.1	21	0	0	20	20	40	5.2	.2	0
DEC											
06...	1700	.2	24	0	0	0	60	60	4.3	.3	0
20...	1700	<.1	19	0	0	0	80	80	1.8	.4	0
JAN											
10...	2300	<.1	27	0	1	0	80	80	4.4	--	0
24...	2200	<.1	30	0	0	0	70	70	2.2	.4	0
FEB											
12...	2700	<.1	34	0	0	0	70	70	2.4	.0	0
28...	1800	.7	22	0	0	0	100	100	2.6	.3	0
MAR											
12...	1400	.1	22	1	0	0	50	50	5.2	.3	5
25...	1200	.1	16	0	0	0	110	110	1.2	.5	0
APR											
07...	1700	.1	24	0	0	0	60	80	14	.1	1
24...	1900	<.1	21	0	0	0	60	60	5.0	.6	3
MAY											
09...	3000	--	--	--	--	--	100	--	--	--	--
23...	1900	--	--	--	--	0	50	50	7.1	.5	--
JUN											
12...	3800	--	--	--	--	--	90	--	--	--	--
24...	6900	--	--	--	--	0	200	200	6.0	.2	--
JUL											
10...	1700	<.1	19	--	--	0	40	40	1.8	1.1	--
21...	7200	--	--	--	--	--	200	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	--	--
19...	3100	--	--	--	--	10	60	70	2.2	.4	--
SEP											
08...	7600	--	--	--	--	--	200	--	--	--	--
22...	10000	--	--	--	--	--	260	--	1.8	--	--

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
WATER YEAR 1979											
NOV											
06...	1400	.15	190	5.9	12.5	11	65	50	16	6.0	2.8
21...	1000	.23	130	5.9	7.5	7	56	45	14	5.2	2.4
30...	1230	.32	150	5.8	2.5	13	56	56	14	5.2	2.6
DEC											
09...	1115	1.5	--	--	--	--	--	--	--	--	--
22...	1200	.11	130	6.0	5.0	36	48	37	12	4.4	1.8
JAN											
04...	1330	.44	110	6.2	2.5	13	44	32	11	4.0	1.6
17...	1600	.44	130	6.6	1.5	4	52	41	13	4.8	2.0
FEB											
01...	1200	.22	100	6.1	.5	14	48	39	12	4.3	1.8
15...	1630	.22	120	6.1	-1.0	3	50	40	12	4.8	2.0
27...	1300	2.2	90	6.3	5.0	7	35	30	8.7	3.3	1.2
MAR											
13...	0900	.70	95	6.3	2.0	7	45	44	11	4.3	1.6
26...	1130	1.1	115	7.0	5.5	6	49	32	12	4.6	2.1
APR											
02...	1430	3.8	--	--	--	--	--	--	--	--	--
10...	1400	1.7	120	6.3	11.5	13	49	32	12	4.5	2.0
11...	1000	1.4	--	--	--	--	--	--	--	--	--
27...	1100	1.0	150	6.9	13.5	7	57	44	14	5.3	2.3
MAY											
15...	1100	.58	135	6.3	16.5	25	50	39	12	4.9	2.3
31...	1100	.49	140	7.1	14.0	7	52	38	13	4.8	2.2
JUN											
11...	0930	.70	120	7.3	14.5	10	52	34	13	4.7	2.0
28...	1430	.27	150	7.0	19.5	9	50	36	12	4.8	2.4
JUL											
09...	1230	.44	185	6.8	17.0	8	54	39	13	5.2	2.5
26...	1030	.37	130	6.6	19.5	0	53	38	13	5.0	2.3
AUG											
08...	0945	.44	150	6.7	19.5	37	53	42	13	5.0	2.5
23...	0900	.53	129	7.1	18.0	42	52	32	13	4.7	2.2
SEP											
05...	1300	.30	160	7.1	20.0	3	49	32	12	4.5	2.2
17...	1100	.37	125	6.9	14.5	5	48	32	12	4.4	2.0

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)
WATER YEAR 1979											
NOV											
06...	8	.2	--	2.0	18	0	15	36	57	1.6	102
21...	8	.1	--	1.8	14	0	11	28	45	1.6	93
30...	9	.2	--	1.7	1	0	1	2.5	51	1.6	90
DEC											
09...	--	--	--	--	--	--	--	--	--	--	--
22...	7	.1	--	1.5	14	0	11	22	42	1.2	85
JAN											
04...	7	.1	--	1.3	14	0	11	14	38	1.0	76
17...	8	.1	--	1.2	14	0	11	5.6	38	1.2	84
FEB											
01...	7	.1	--	1.4	10	0	8	13	42	1.4	79
15...	8	.1	--	1.4	12	0	10	15	44	1.2	85
27...	7	.1	--	1.3	6	0	5	4.8	32	.9	64
MAR											
13...	7	.1	--	1.3	1	0	1	.8	40	.9	75
26...	8	.1	--	1.3	21	0	17	3.4	40	.9	78
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	8	.1	--	1.6	20	0	16	16	35	.8	75
11...	--	--	--	--	--	--	--	--	--	--	--
27...	8	.1	--	1.8	16	0	13	3.2	50	1.1	98
MAY											
15...	9	.1	--	1.7	13	0	11	10	44	.7	92
31...	8	.1	3.8	1.6	17	0	14	2.2	45	.8	88
JUN											
11...	7	.1	--	1.7	22	0	18	1.8	41	.8	92
28...	9	.1	--	1.5	17	0	14	2.7	51	.9	88
JUL											
09...	9	.1	--	1.8	18	0	15	4.6	48	3.1	112
26...	8	.1	4.0	1.7	18	0	15	7.2	46	1.0	100
AUG											
08...	9	.2	4.2	1.7	13	0	11	4.2	48	.9	110
23...	8	.1	4.0	1.8	24	0	20	3.1	44	.3	85
SEP											
05...	9	.1	3.8	1.6	20	0	16	2.5	39	.9	104
17...	8	.1	3.5	1.5	20	0	16	4.0	47	1.2	86

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPHOSPHATE TOTAL (MG/L AS PO4)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
WATER YEAR 1979											
NOV											
06...	.14	.03	.01	.04	.18	.000	--	--	90	0	0
21...	.13	.17	.00	.17	.75	.000	--	--	80	0	0
30...	.12	.17	.08	.25	1.1	.000	--	--	110	0	0
DEC											
09...	--	--	--	--	--	--	--	--	--	--	--
22...	.12	.08	.07	.15	.66	.000	--	--	130	0	0
JAN											
04...	.10	.09	.00	.09	.40	.000	--	--	170	0	1
17...	.11	.10	.05	.15	.66	.000	--	--	80	0	1
FEB											
01...	.11	.09	.08	.17	.75	.000	--	--	180	0	1
15...	.12	.23	.34	.57	2.5	.000	--	--	90	0	0
27...	.09	.18	.00	.18	.80	.000	--	--	170	0	1
MAR											
13...	.10	.07	.02	.09	.40	.000	--	--	50	0	1
26...	.11	.09	.15	.24	1.1	.000	--	--	130	0	1
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	.10	.04	.12	.16	.71	.010	--	--	130	0	0
11...	--	--	--	--	--	--	--	--	--	--	--
27...	.13	.02	.06	.08	.35	.000	.00	.00	80	0	0
MAY											
15...	.13	.03	.12	.15	.66	.010	.03	.03	90	0	0
31...	.12	.06	.14	.20	.89	.000	.00	.00	160	0	0
JUN											
11...	.13	.05	.30	.35	1.6	.010	.03	.03	130	0	0
28...	.12	.03	.12	.15	.66	.030	.09	.09	280	0	1
JUL											
09...	.15	.07	.03	.10	.44	.000	--	.00	100	0	1
26...	.14	.06	.00	.06	.27	.040	--	.12	70	0	0
AUG											
08...	.15	.03	.26	.29	1.3	.010	--	.03	90	0	2
23...	.12	.08	.10	.18	.80	.000	--	.00	150	0	2
SEP											
05...	.14	.06	.00	.06	.27	.010	--	.03	190	0	0
17...	.12	.21	.37	.58	2.6	.010	--	.03	140	0	0

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
WATER YEAR 1979											
NOV											
06...	0	2	0	1	130	--	130	41	130	--	110
21...	0	16	1	2	100	--	10	76	300	--	20
30...	0	4	1	2	210	--	210	24	30	--	30
DEC											
09...	--	--	--	--	--	--	--	--	--	--	--
22...	0	1	1	2	250	--	80	10	30	--	30
JAN											
04...	0	2	0	1	100	--	70	24	30	--	30
17...	0	22	3	1	100	--	90	190	30	--	30
FEB											
01...	0	68	0	1	150	--	10	900	30	--	20
15...	0	1	2	2	70	--	10	13	30	--	30
27...	0	8	0	2	210	--	30	92	30	--	30
MAR											
13...	0	2	0	1	120	--	20	19	20	--	20
26...	0	0	0	1	100	--	20	5	20	--	10
APR											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	0	9	6	1	150	--	10	110	20	--	10
11...	--	--	--	--	--	--	--	--	--	--	--
27...	0	7	6	2	40	30	10	72	20	10	10
MAY											
15...	0	4	3	7	90	80	10	40	60	30	30
31...	0	6	9	1	400	400	0	38	40	10	30
JUN											
11...	0	12	9	1	100	90	10	28	20	0	20
28...	0	0	11	6	890	860	30	4	70	60	10
JUL											
09...	0	0	16	3	160	140	20	4	30	0	30
26...	0	0	5	0	250	240	10	5	10	0	10
AUG											
08...	0	1	20	3	440	420	20	5	50	30	20
23...	0	1	18	3	230	220	10	7	40	10	30
SEP											
05...	0	0	4	2	560	--	40	6	60	30	30
17...	0	0	2	3	310	--	0	1	30	0	30

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979										
NOV										
06...	<.5	27	0	0	--	30	30	1.7	1.2	2
21...	<.5	16	0	0	--	0	0	5.4	.4	1
30...	<.5	14	0	0	--	10	10	1.6	.3	0
DEC										
09...	--	--	--	--	--	--	--	--	--	--
22...	<.5	14	0	0	--	0	30	2.9	.3	2
JAN										
04...	<.5	13	0	0	--	20	20	2.4	.2	1
17...	<.5	4	0	0	--	10	20	1.0	.1	0
FEB										
01...	<.5	5	0	0	--	10	20	2.7	.1	0
15...	<.5	18	0	0	--	10	70	1.3	1.6	4
27...	<.5	9	0	0	--	0	20	3.1	--	1
MAR										
13...	<.5	12	0	0	--	10	20	5.0	.0	0
26...	<.5	7	0	0	--	10	10	2.0	.0	5
APR										
02...	--	--	--	--	--	--	--	--	--	--
10...	<.5	23	0	0	--	10	20	7.7	.1	0
11...	--	--	--	--	--	--	--	--	--	--
27...	<.5	20	0	0	40	0	40	6.4	.1	0
MAY										
15...	<.5	30	0	0	0	30	30	3.8	.2	1
31...	<.5	15	0	0	10	10	20	11	.2	0
JUN										
11...	<.5	16	0	0	10	8	20	2.1	.1	0
28...	<.5	15	0	0	40	5	40	3.6	.3	2
JUL										
09...	<.5	24	0	0	20	6	30	3.4	.4	0
26...	<.5	0	0	0	2	8	10	3.9	.0	0
AUG										
08...	<.5	3	0	0	0	10	10	2.0	.2	0
23...	<.5	3	0	1	0	20	20	8.0	.2	0
SEP										
05...	<.5	3	0	0	110	10	120	6.1	.2	2
17...	<.5	3	0	0	20	0	20	2.9	.0	1

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
WATER YEAR 1980											
OCT											
02...	1430	.60	130	7.1	15.5	4	51	32	--	--	13
23...	1445	.60	130	6.4	11.5	21	53	37	--	--	13
NOV											
09...	1530	4.4	125	7.0	8.5	21	55	35	--	--	14
20...	1400	.60	140	7.0	11.5	29	53	38	--	--	13
DEC											
06...	1200	.50	140	7.9	6.5	1	57	41	--	--	14
20...	1400	.50	120	7.0	5.0	4	56	38	--	--	14
JAN											
10...	1600	.40	135	7.5	1.5	4	57	43	--	--	14
24...	1000	.40	120	7.5	.5	8	56	42	--	--	14
FEB											
12...	1200	.15	140	7.6	.5	10	60	45	--	--	15
28...	1200	.30	140	6.7	.5	75	60	43	--	--	15
MAR											
12...	1200	.30	130	7.3	3.5	82	57	40	--	--	14
25...	0930	.30	125	7.8	5.5	5	56	27	--	--	14
APR											
08...	1530	.20	133	6.8	11.5	16	56	38	--	--	14
24...	0945	.20	135	7.4	11.0	0	56	39	--	--	14
MAY											
09...	1000	.03	140	7.3	8.0	--	56	39	--	--	13
23...	1200	.10	160	8.0	15.0	15	65	52	--	--	16
JUN											
24...	1130	<.01	150	8.0	17.0	8	58	24	--	--	15
JUL											
10...	1030	.80	160	6.3	17.5	9	63	34	.6	30	15
AUG											
19...	1200	.06	170	6.9	20.5	13	63	36	.2	10	16

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
WATER YEAR 1980											
OCT											
02...	4.6	2.0	11	.1	3.8	1.8	24	0	20	3.1	39
23...	4.9	2.2	12	.1	4.1	1.9	19	0	16	12	46
NOV											
09...	4.8	2.3	12	.1	4.7	2.4	24	0	20	3.8	39
20...	5.0	2.3	13	.1	3.7	1.4	18	0	15	2.9	45
DEC											
06...	5.4	2.7	14	.2	4.1	1.4	20	0	16	.4	46
20...	5.1	2.3	8	.1	3.6	1.3	22	0	18	3.5	45
JAN											
10...	5.4	2.2	12	.1	3.6	1.4	17	0	14	.9	52
24...	5.2	2.3	8	.1	3.7	1.4	17	0	14	.9	45
FEB											
12...	5.5	2.4	8	.1	3.6	1.2	19	0	16	.8	49
28...	5.5	2.5	8	.1	3.7	1.2	21	0	17	6.7	51
MAR											
12...	5.3	2.1	7	.1	3.1	1.0	20	0	16	1.6	44
25...	5.2	1.9	7	.1	--	1.4	36	0	30	.9	42
APR											
08...	5.1	2.4	8	.1	--	1.4	22	0	18	5.6	45
24...	5.0	2.3	8	.1	--	1.9	20	0	16	1.3	47
MAY											
09...	5.6	2.6	9	.2	--	1.5	20	0	16	1.6	51
23...	6.2	2.9	9	.2	--	1.6	17	0	14	.3	55
JUN											
24...	5.0	2.5	8	.1	--	1.6	42	0	34	.7	50
JUL											
10...	6.2	3.6	11	.2	--	2.0	35	0	29	28	42
AUG											
19...	5.7	2.9	9	.2	--	2.1	34	0	28	6.8	45

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water year 1979 and 1980--Continued

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
WATER YEAR 1980											
OCT											
02...	.4	86	.12	.04	.06	.10	.44	.000	.00	60	0
23...	.7	90	.12	.00	.14	.14	.62	.010	.03	100	0
NOV											
09...	1.3	100	.14	.14	.29	.43	1.9	.040	.12	380	0
20...	.9	93	.13	--	--	--	--	--	--	270	0
DEC											
06...	1.0	--	--	.06	.12	.18	.80	.010	.03	80	0
20...	1.4	87	.12	2.5	.19	2.7	12	.010	.03	110	0
JAN											
10...	.9	97	.13	.13	.34	.47	2.1	.000	.00	200	0
24...	1.0	96	.13	.10	.09	.19	.84	.020	.06	60	0
FEB											
12...	1.1	106	.14	.07	.00	.07	.31	.000	.00	130	0
28...	1.1	104	.14	.20	.01	.21	.93	.010	.03	60	0
MAR											
12...	1.0	98	.13	.13	.10	.23	1.0	.010	.03	50	0
25...	.9	97	.13	.11	.45	.56	2.5	.000	.00	130	0
APR											
08...	1.2	91	.12	.07	.07	.14	.62	.010	.03	200	0
24...	.8	94	.13	.05	.07	.12	.53	.000	.00	110	0
MAY											
09...	.9	106	.14	--	--	--	--	--	--	--	--
23...	1.0	104	.14	.05	.00	.05	.22	.010	.03	50	--
JUN											
24...	.8	105	.14	.05	.01	.06	.27	.010	.03	20	--
JUL											
10...	.9	105	.14	.20	.09	.29	1.3	.000	.00	30	--
AUG											
19...	.9	99	.13	.20	.04	.24	1.1	.010	.03	50	--

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
WATER YEAR 1980											
OCT											
02...	1	10	0	8	1	90	--	20	0	30	0
23...	1	0	0	10	2	60	--	10	0	20	0
NOV											
09...	0	0	0	7	1	800	--	70	0	60	30
20...	0	0	0	5	1	250	--	10	0	30	10
DEC											
06...	0	10	0	3	0	50	--	10	0	20	0
20...	0	10	0	4	5	150	140	10	5	30	0
JAN											
10...	0	20	0	10	2	140	130	10	1	60	30
24...	0	10	0	2	1	20	10	10	0	30	10
FEB											
12...	2	10	0	29	1	30	20	10	0	30	0
28...	1	0	0	11	0	60	60	0	2	20	10
MAR											
12...	1	0	0	3	3	30	20	10	1	20	0
25...	0	0	0	5	0	100	90	10	0	20	0
APR											
08...	1	0	0	7	3	130	110	20	1	20	0
24...	0	0	0	3	2	80	60	20	1	20	0
MAY											
09...	--	--	--	--	--	30	10	20	0	20	10
23...	--	--	--	--	--	110	100	10	0	30	10
JUN											
24...	--	--	--	--	--	80	70	10	6	20	10
JUL											
10...	--	--	--	--	--	230	210	20	1	30	10
AUG											
19...	--	--	--	--	--	400	360	40	3	400	380

Appendix 8.--Water-quality data, Station 03201720, Hull Hollow Creek near Lake Hope, Ohio

water year 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
OCT											
02...	30	<.5	1	0	0	0	10	10	5.7	.1	0
23...	20	<.1	2	0	0	10	10	20	5.6	.1	2
NOV											
09...	30	.2	2	0	0	0	10	10	6.8	.8	0
20...	20	<.1	6	0	0	10	0	10	3.3	.2	0
DEC											
06...	20	<.1	3	0	0	0	20	20	4.1	.3	0
20...	30	<.1	3	0	0	0	30	30	3.0	.2	0
JAN											
10...	30	.4	2	0	0	0	20	20	1.7	.2	0
24...	20	.9	2	0	0	0	10	10	1.7	.1	0
FEB											
12...	30	<.1	3	0	0	0	10	10	1.2	.1	0
28...	10	.3	0	0	0	0	30	30	2.2	.1	0
MAR											
12...	20	<.1	28	0	0	0	10	10	3.4	.1	0
25...	20	.1	21	0	0	0	40	40	2.2	.2	2
APR											
08...	20	.1	2	0	0	7	3	10	5.8	.1	0
24...	20	<.1	1	0	0	6	4	10	11	.2	0
MAY											
09...	10	--	--	--	--	--	6	--	--	--	--
23...	20	--	--	--	--	5	5	10	11	.1	--
JUN											
24...	10	--	--	--	--	6	4	10	8.9	.4	--
JUL											
10...	20	--	--	--	--	0	10	10	1.9	.4	--
AUG											
19...	20	--	--	--	--	0	10	10	2.6	.2	--

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
WATER YEAR 1979											
OCT											
13...	1300	410	4.6	13.0	27	130	130	.4	20	32	13
24...	1300	1100	3.1	9.0	15	390	390	3.6	179	88	41
NOV											
06...	1500	1100	3.2	12.0	14	340	340	3.0	149	77	36
21...	1100	720	3.1	7.5	3	210	210	1.5	74	48	23
30...	1130	470	3.3	5.0	13	170	170	1.0	50	40	18
DEC											
21...	1430	275	4.1	4.5	27	94	94	.5	25	22	9.5
JAN											
04...	1430	350	3.6	1.0	25	110	110	.8	40	24	12
16...	1400	320	3.9	1.0	2	120	120	.6	30	27	13
FEB											
01...	1300	430	3.5	.5	10	140	140	.8	40	31	14
15...	1530	620	3.4	.0	4	190	190	1.8	89	42	20
27...	1400	270	3.9	5.0	13	76	76	.5	25	18	7.6
MAR											
13...	1000	450	3.5	2.5	12	140	140	1.3	65	33	15
26...	1330	350	4.1	6.0	17	110	110	.4	20	25	11
APR											
11...	1000	285	4.2	6.5	14	100	100	.4	20	24	10
30...	1100	480	3.4	10.0	9	150	150	1.0	50	35	16
MAY											
15...	1200	540	3.6	15.5	17	160	160	.9	45	36	16
30...	1230	570	3.6	14.5	4	160	160	1.0	50	36	16
JUN											
11...	1330	390	4.2	17.0	12	130	130	.6	30	31	12
28...	1330	780	3.3	18.5	10	250	250	2.5	124	55	27
JUL											
09...	1300	500	4.1	17.0	6	160	160	.5	25	37	16
26...	1100	1100	3.4	19.5	11	340	340	3.7	184	77	36
AUG											
08...	1015	1000	3.0	20.5	28	280	280	2.6	129	66	29
23...	1030	320	4.6	18.0	40	120	120	.4	20	30	12
SEP											
05...	1200	710	3.3	20.0	9	220	220	1.9	94	51	22
17...	1130	740	3.5	13.0	5	220	220	1.9	94	50	23

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
WATER YEAR 1979											
OCT											
13...	9.6	13	.4	--	2.5	0	0	0	.0	160	9.0
24...	20	10	.4	--	3.2	0	0	0	.0	540	16
NOV											
06...	18	10	.4	--	2.8	0	0	0	.0	470	15
21...	12	11	.4	--	2.4	0	0	0	.0	260	13
30...	9.5	10	.3	--	2.2	0	0	0	.0	200	9.5
DEC											
21...	5.1	10	.2	--	1.7	0	0	0	.0	110	4.6
JAN											
04...	5.1	9	.2	--	1.6	0	0	0	.0	140	4.7
16...	6.0	10	.2	--	1.4	0	0	0	.0	120	5.3
FEB											
01...	8.2	12	.3	--	1.7	0	0	0	.0	170	8.4
15...	11	11	.4	--	1.9	0	0	0	.0	270	8.6
27...	5.0	12	.3	--	1.4	0	0	0	.0	94	6.8
MAR											
13...	8.4	11	.3	--	1.7	0	0	0	.0	190	9.2
26...	7.3	13	.3	--	1.4	0	0	0	.0	120	8.5
APR											
11...	6.7	12	.3	--	1.6	0	0	0	.0	110	7.4
30...	9.1	11	.3	--	2.1	0	0	0	.0	220	8.2
MAY											
15...	11	13	.4	--	2.1	0	0	0	.0	200	9.4
30...	9.1	11	.3	11	1.9	0	0	0	.0	220	8.7
JUN											
11...	7.0	11	.3	--	1.8	0	0	0	.0	150	8.4
28...	18	13	.5	20	2.3	0	0	0	.0	350	15
JUL											
09...	15	17	.5	--	2.3	0	0	0	.0	190	14
26...	16	9	.4	19	3.2	0	0	0	.0	510	10
AUG											
08...	16	11	.4	19	2.8	0	0	0	.0	400	15
23...	8.2	12	.3	10	2.0	2	0	2	80	140	7.1
SEP											
05...	14	12	.4	16	2.4	0	0	0	.0	280	13
17...	16	14	.5	18	2.1	0	0	0	.0	280	18

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS PO4)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)
WATER YEAR 1979											
OCT											
13...	241	.33	.49	.30	.79	3.5	.010	--	--	2900	3
24...	794	1.08	.20	.19	.39	1.7	.120	--	--	10000	1
NOV											
06...	683	.93	.18	.09	.27	1.2	.000	--	--	12000	0
21...	404	.55	.16	.11	.27	1.2	.000	--	--	5800	0
30...	303	.41	.15	.11	.26	1.2	.010	--	--	3900	0
DEC											
21...	173	.24	.11	.07	.18	.80	.000	--	--	1600	0
JAN											
04...	219	.30	.12	.01	.13	.58	.000	--	--	3100	0
16...	193	.26	.12	.04	.16	.71	.000	--	--	1400	0
FEB											
01...	256	.35	.10	.24	.34	1.5	.000	--	--	3300	0
15...	395	.54	.19	.38	.57	2.5	.000	--	--	4500	0
27...	153	.21	.19	.07	.26	1.2	.000	--	--	2300	0
MAR											
13...	292	.40	.11	.16	.27	1.2	.000	--	--	4000	0
26...	201	.27	.12	.20	.32	1.4	.000	--	--	2400	0
APR											
11...	193	.26	.06	.12	.18	.80	.010	--	--	2700	0
30...	311	.42	.08	.20	.28	1.2	.000	.00	.00	3800	0
MAY											
15...	325	.44	.10	.16	.26	1.2	.000	.00	.00	3800	0
30...	315	.43	.08	.11	.19	.84	.000	.00	.00	4700	0
JUN											
11...	266	.36	.08	.09	.17	.75	.010	.03	.03	3000	0
28...	575	.78	.13	.08	.21	.93	.000	.00	.00	8300	0
JUL											
09...	341	.46	.14	.20	.34	1.5	.000	--	.00	2700	0
26...	839	1.14	.12	.25	.37	1.6	.030	--	.09	13000	0
AUG											
08...	647	.88	.11	.19	.30	1.3	.000	--	.00	9200	0
23...	237	.32	.10	.22	.32	1.4	.010	--	.03	2300	0
SEP											
05...	496	.67	.02	.10	.12	.53	.000	--	.00	6500	0
17...	470	.64	.12	.16	.28	1.2	.000	--	.00	7200	0

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio water years 1979 and 1980--Continued

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
water year 1979											
OCT											
13...	0	0	7	0	6	2200	--	500	43	1600	--
24...	0	10	12	1	20	5400	--	5000	71	5600	--
NOV											
06...	0	10	14	3	12	3800	--	3500	200	4600	--
21...	0	5	3	4	7	6000	--	4500	22	3000	--
30...	0	0	3	2	4	4900	--	2800	22	1900	--
DEC											
21...	1	0	3	1	7	3500	--	1200	10	710	--
JAN											
04...	1	10	1	0	5	5500	--	3700	11	1000	--
16...	1	0	1	6	4	4700	--	2300	16	880	--
FEB											
01...	0	10	6	0	4	5900	--	3900	93	1300	--
15...	0	10	1	2	8	8400	--	7900	4	2000	--
27...	0	0	19	2	5	3900	--	2000	220	600	--
MAR											
13...	1	0	1	0	6	7700	--	7000	10	1300	--
26...	1	0	1	0	4	3800	--	1500	16	830	--
APR											
11...	0	0	7	6	3	3000	--	680	60	720	--
30...	0	0	13	6	5	6100	1800	4300	170	1300	100
MAY											
15...	1	10	4	4	5	3700	1400	2300	37	1400	0
30...	0	0	2	11	6	5700	1600	4100	16	1400	0
JUN											
11...	0	0	10	6	5	5300	3000	2300	42	1100	0
28...	1	10	0	9	9	4300	300	4000	3	2700	0
JUL											
09...	2	0	0	16	6	1200	870	330	4	1400	0
26...	2	10	0	17	0	24000	0	24000	2	5500	0
AUG											
08...	2	10	1	14	14	6100	0	6100	6	4900	300
23...	3	0	1	1	5	3800	1700	2100	6	1400	100
SEP											
05...	0	0	0	0	8	4200	--	3700	10	3000	300
17...	0	10	0	5	7	12000	--	3400	4	2000	100

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979											
OCT											
13...	1600	<.5	49	0	0	--	80	90	4.3	.8	1
24...	5600	<.5	150	0	0	--	350	350	1.9	.4	0
NOV											
06...	10	<.5	150	0	0	--	310	320	1.1	.1	0
21...	2400	<.5	81	0	0	--	130	160	2.3	.3	0
30...	1900	<.5	53	0	0	--	100	100	.8	.2	4
DEC											
21...	710	<.5	36	0	0	--	50	110	3.7	.7	3
JAN											
04...	1000	<.5	44	0	0	--	90	90	1.2	.0	3
16...	880	<.5	19	0	0	--	90	110	2.9	.2	0
FEB											
01...	1300	<.5	39	0	0	--	80	80	2.2	.1	0
15...	2000	<.5	76	0	0	--	140	190	1.0	--	0
27...	600	<.5	32	0	0	--	30	60	8.7	--	0
MAR											
13...	1300	<.5	57	0	0	--	300	300	2.9	.2	4
26...	830	<.5	34	0	0	--	70	70	1.4	.2	2
APR											
11...	720	<.5	46	0	0	--	70	70	3.9	.2	0
30...	1200	<.5	70	0	0	20	120	140	1.4	.1	0
MAY											
15...	1400	<.5	76	0	0	0	120	120	4.6	.1	1
30...	1400	<.5	43	0	0	0	120	120	1.7	--	0
JUN											
11...	1100	<.5	48	0	0	10	60	70	1.8	.2	0
28...	2700	<.5	90	0	0	0	190	190	6.7	.1	0
JUL											
09...	1400	<.5	58	0	0	30	120	150	2.0	.3	0
26...	5500	<.5	0	0	0	30	330	360	3.4	.0	0
AUG											
08...	4600	<.5	100	0	0	0	260	260	1.8	.1	0
23...	1300	<.5	26	0	1	0	70	70	4.7	.5	0
SEP											
05...	2700	<.5	75	0	0	0	180	180	2.4	.1	2
17...	1900	<.5	79	0	0	40	130	170	3.8	.0	480

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
WATER YEAR 1980											
OCT											
02...	1500	490	3.9	15.5	18	160	160	1.6	79	34	17
23...	1515	725	3.3	11.5	6	200	200	1.7	84	47	21
NOV											
09...	1600	245	5.6	8.0	96	97	91	--	--	24	9.1
20...	1300	475	3.8	7.5	48	150	150	.9	45	35	16
DEC											
06...	1100	460	3.9	5.5	13	150	150	1.2	60	35	16
20...	1430	340	4.5	2.5	14	130	130	.6	30	31	13
JAN											
10...	1630	460	4.0	.5	5	160	160	1.2	60	37	16
24...	1015	385	4.2	.0	13	150	150	.8	40	36	15
FEB											
12...	1130	540	3.7	.5	20	180	180	1.4	70	42	18
28...	1300	380	4.2	.5	81	140	140	.8	40	34	14
MAR											
12...	1300	270	5.0	2.0	85	110	110	--	--	27	11
25...	1030	280	5.2	5.5	6	110	110	--	--	26	11
APR											
08...	1545	370	4.5	12.0	15	130	130	.8	40	30	13
24...	1030	330	4.7	10.0	7	120	120	.5	25	29	12
MAY											
09...	1030	540	3.8	8.0	--	180	180	1.2	60	40	19
23...	1230	490	4.1	15.0	18	160	160	1.2	60	38	16
JUN											
12...	1130	490	4.2	12.5	--	170	170	1.4	70	40	18
24...	1200	890	3.4	17.5	16	280	280	2.8	139	63	29
JUL											
10...	0930	315	7.3	17.5	3	120	110	--	--	30	11
21...	1230	720	3.7	23.0	--	230	230	1.7	84	52	24
AUG											
06...	1530	690	3.5	24.0	--	--	--	1.4	70	--	--
19...	1100	420	5.8	20.0	12	160	150	.3	15	39	15
SEP											
08...	1600	750	3.4	20.0	--	270	270	2.0	99	63	28
22...	1200	830	4.0	17.0	16	260	--	2.2	109	58	27

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)
WATER YEAR 1980											
OCT											
02...	7.9	10	.3	10	2.4	0	0	0	.0	200	6.1
23...	12	18	.4	15	3.2	0	0	0	.0	260	7.7
NOV											
09...	5.8	16	.3	9.2	3.4	8	0	7	32	94	3.9
20...	9.5	19	.3	11	1.8	0	0	0	.0	190	6.5
DEC											
06...	10	20	.4	12	1.8	0	0	0	.0	180	6.2
20...	7.4	17	.3	8.9	1.5	0	0	0	.0	150	5.6
JAN											
10...	8.7	17	.3	11	1.8	0	0	0	.0	210	7.5
24...	7.9	16	.3	9.7	1.8	0	0	0	.0	180	6.5
FEB											
12...	9.9	11	.3	12	1.7	0	0	0	.0	230	7.2
28...	8.7	12	.3	10	1.5	0	0	0	.0	180	7.4
MAR											
12...	5.8	10	.2	6.9	1.1	2	0	2	32	120	5.8
25...	5.4	9	.2	7.0	1.6	6	0	5	61	100	4.9
APR											
08...	7.8	12	.3	--	1.6	0	0	0	.0	160	5.1
24...	7.0	11	.3	--	2.0	0	0	0	.0	150	5.5
MAY											
09...	11	12	.4	--	2.0	0	0	0	.0	220	7.2
23...	9.4	11	.3	--	2.9	0	0	0	.0	190	7.1
JUN											
12...	11	12	.4	--	2.3	0	0	0	.0	220	9.1
24...	15	10	.4	--	2.9	0	0	0	.0	360	10
JUL											
10...	7.3	11	.3	--	2.2	18	0	15	1.4	120	5.2
21...	16	13	.5	--	3.3	0	0	0	.0	290	5.1
AUG											
06...	--	--	--	--	--	0	0	0	.0	--	--
19...	10	12	.3	--	2.5	7	0	6	18	170	7.0
SEP											
08...	13	9	.3	--	2.9	0	0	0	.0	310	9.3
22...	15	11	.4	--	3.5	--	--	--	--	370	10

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio water years 1979 and 1980--Continued

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
WATER YEAR 1980											
OCT											
02...	325	.44	.09	.22	.31	1.4	.030	.09	4800	0	2
23...	410	.56	.02	.35	.37	1.6	.000	.00	4200	0	1
NOV											
09...	170	.23	.20	1.4	1.6	7.1	.220	.67	10000	0	2
20...	292	.40	--	--	--	--	--	--	2900	0	1
DEC											
06...	281	.38	.15	.17	.32	1.4	.000	.00	3300	6	0
20...	236	.32	.14	.20	.34	1.5	.010	.03	3200	0	0
JAN											
10...	310	.42	.11	.13	.24	1.1	.000	.00	3900	0	0
24...	284	.39	.11	.38	.49	2.2	.010	.03	3700	0	0
FEB											
12...	372	.51	.08	.39	.47	2.1	.010	.03	4300	0	2
28...	283	.38	.19	.21	.40	1.8	.010	.03	3400	0	1
MAR											
12...	189	.26	.16	.06	.22	.97	.010	.03	290	0	1
25...	196	.27	.16	.11	.27	1.2	.010	.03	1000	0	0
APR											
08...	253	.34	.11	.14	.25	1.1	.020	.06	2900	0	1
24...	236	.32	.10	.19	.29	1.3	.010	.03	2100	0	0
MAY											
09...	392	.53	--	--	--	--	--	--	--	--	--
23...	320	.44	.13	.84	.97	4.3	.030	.09	3400	--	--
JUN											
12...	363	.49	--	--	--	--	--	--	--	--	--
24...	614	.84	.19	.13	.32	1.4	.010	.03	9000	--	--
JUL											
10...	230	.31	.20	.16	.36	1.6	.010	.03	1500	--	--
21...	508	.69	--	--	--	--	--	--	--	--	--
AUG											
06...	--	--	--	--	--	--	--	--	--	--	--
19...	303	.41	.14	.11	.25	1.1	.010	.03	610	--	--
SEP											
08...	545	.74	--	--	--	--	--	--	--	--	--
22...	625	.85	.18	.09	.27	1.2	.010	.03	--	--	--

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
WATER YEAR 1980											
OCT											
02...	10	0	12	7	21000	--	15000	2	2000	200	1800
23...	10	1	15	7	5900	--	5400	0	2300	0	2300
NOV											
09...	0	0	20	15	25000	--	460	10	990	220	770
20...	0	0	8	4	4200	--	1800	0	1600	0	1600
DEC											
06...	10	0	6	3	5700	--	2800	0	1500	0	1500
20...	10	0	4	4	3300	2400	890	1	1300	0	1300
JAN											
10...	20	0	7	5	6000	3400	2600	2	1700	0	1700
24...	10	0	1	4	5400	4000	1400	0	1700	0	1700
FEB											
12...	10	0	53	4	4600	1200	3400	0	2100	0	2100
28...	0	2	12	3	6500	4300	2200	14	1400	0	1400
MAR											
12...	0	0	2	4	3000	2400	640	4	980	0	980
25...	0	0	4	2	2700	2000	670	0	820	0	820
APR											
08...	10	0	4	7	9100	7000	2100	0	1200	0	1200
24...	0	0	3	6	2700	2200	550	1	1300	100	1200
MAY											
09...	--	--	--	--	2200	600	1600	0	2000	0	2000
23...	--	--	--	--	6500	4600	1900	1	1900	100	1800
JUN											
12...	--	--	--	--	1900	900	1000	2	2400	0	2400
24...	--	--	--	--	3500	0	3500	6	4100	0	4100
JUL											
10...	--	--	--	--	2600	2000	630	2	1500	0	1500
21...	--	--	--	--	10000	9000	1000	0	3900	0	3900
AUG											
06...	--	--	--	--	1300	--	--	9	3600	--	--
19...	--	--	--	--	1500	840	660	6	2100	100	2000
SEP											
08...	--	--	--	--	2300	0	2300	3	4400	100	4300
22...	--	--	--	--	--	--	1600	--	--	--	5300

Appendix 9.--Water-quality data, Station 03201722, Sandy Run below Hull Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1980										
OCT										
02...	<.5	49	0	0	10	110	120	3.5	1.0	0
23...	<.1	60	0	0	0	160	160	1.5	.1	0
NOV										
09...	.1	35	0	0	60	40	100	6.2	100	0
20...	<.1	39	0	0	20	70	90	4.6	.2	4
DEC										
06...	1.0	45	0	0	0	130	130	4.3	.4	0
20...	.1	26	0	0	0	100	100	2.9	.2	0
JAN										
10...	<.1	39	0	0	0	110	110	4.3	.1	0
24...	.4	36	0	0	0	120	120	4.2	.5	0
FEB										
12...	<.1	48	0	0	0	130	130	1.4	--	0
28...	.3	29	0	0	0	90	90	1.9	.2	0
MAR										
12...	.1	25	0	0	0	50	50	1.2	.4	0
25...	.1	23	0	0	0	120	120	3.5	.8	7
APR										
08...	.1	31	0	0	0	70	70	2.1	.3	0
24...	<.1	25	0	0	10	50	60	4.0	.2	0
MAY										
09...	--	--	--	--	--	120	--	--	--	--
23...	--	--	--	--	0	160	160	5.5	1.0	--
JUN										
12...	--	--	--	--	--	90	--	--	--	--
24...	--	--	--	--	0	210	210	9.2	.2	--
JUL										
10...	.3	22	--	--	0	50	50	1.2	.7	--
21...	--	--	--	--	--	280	--	--	--	--
AUG										
06...	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	10	60	70	2.9	.5	--
SEP										
08...	--	--	--	--	--	20	--	--	--	--
22...	--	--	--	--	--	230	--	1.7	--	--

Appendix 10.--Water-quality data, well RM-1 in Big Four Hollow near Lake Hope, Ohio, June 26, 1980

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
JUN 26...	1200	6700	2.4	18.0	190	720	720	94	4670	39	150

DATE	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)
JUN 26...	18	5	.3	2.2	0	0	0	.1	5300	.2	17400

DATE	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)
JUN 26...	23.7	.02	1.9	1.9	8.5	.290	.89	180000	520000	0

DATE	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)
JUN 26...	520000	90	13000	12000	1400	0	4100	4100	4.5	.8

Appendix 11.--Water-quality data, surface mine seep 15 (392218082191500) in Big Four Hollow near Lake Hope, Ohio, April 8 and 25, 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
APR											
08...	1345	--	360	6.0	8.5	43	95	13	20	11	4.0
25...	1100	.01	310	5.9	9.5	23	89	8	20	9.4	3.7

DATE	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
APR										
08...	8	.2	4.6	100	0	82	160	110	1.6	194
25...	8	.2	4.4	98	0	80	197	85	1.3	178

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
APR										
08...	.26	.00	.49	.49	2.2	.910	2.8	900	0	5
25...	.24	.00	.40	.40	1.8	.160	.49	300	0	4

Appendix 11.--Water-quality data, surface mine seep 15 (392218082191500) in Big Four Hollow near Lake Hope, Ohio, April 8 and 25, 1980--Continued

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
APR										
08...	0	0	7	5	33000	0	33000	2	7600	0
25...	0	0	4	0	26000	0	26000	2	6700	0

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	PHENOLS (UG/L)
APR										
08...	7600	.2	10	0	0	30	0	30	8.6	7
25...	6700	.1	5	0	0	9	1	10	3.1	2

Appendix 12.--Water-quality data, surface mine seep 16 (392218082191600) near Lake Hope, Ohio,

March 17 and 25, 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)
MAR											
17...	1100	.01	400	6.2	9.5	36	140	0	36	13	3.9
APR											
08...	1330	--	450	6.1	9.5	48	160	40	39	16	3.7
25...	1200	<.01	335	6.1	10.0	40	160	45	39	14	3.3

DATE	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)
MAR											
17...	5	.1	8.6	4.7	177	0	150	179	85	1.5	226
APR											
08...	5	.1	--	6.3	150	0	120	191	110	2.0	265
25...	4	.1	--	6.3	170	0	140	170	89	1.7	279

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ANTI-MONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)
MAR											
17...	.31	.03	.67	.70	3.1	.060	.18	1500	0	2	0
APR											
08...	.36	.00	.77	.77	3.4	.030	.09	600	0	2	0
25...	<.38	.00	.56	.56	2.5	.050	.15	200	0	1	0

Appendix 12.--Water-quality data, surface mine seep 16 (392218082191600) near Lake Hope, Ohio, March 17 and 25, 1980--Continued

DATE	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
MAR										
17...	0	10	1	32000	0	32000	3	4900	0	4900
APR										
08...	0	3	5	29000	0	29000	1	6600	0	6600
25...	0	4	1	23000	0	23000	0	6800	0	6800

DATE	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	PHENOLS (UG/L)
MAR										
17...	.2	9	0	0	0	30	30	8.0	2.2	0
APR										
08...	.1	3	0	0	10	0	10	5.3	.5	0
25...	.2	1	0	0	7	3	10	8.1	.5	0

Appendix 13.--Water-quality, mine entrance 88, above Big Four Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
WATER YEAR 1979											
OCT 12...	1500	4000	2.5	15.0	--	1500	1500	56	2780	290	190
OCT 25...	1300	--	2.2	11.0	130	1700	1700	39	1940	320	230
JAN 04...	1700	2500	2.9	10.5	36	800	800	16	794	180	86
MAR 13...	1500	2300	2.8	11.0	53	1000	1000	21	1040	200	130
MAY 30...	1430	5400	2.8	11.0	85	1100	1100	36	1790	58	230

DATE	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)
OCT 12...	21	3	.2	2.2	0	0	0	.0	3200	1.3	4990
OCT 25...	21	3	.2	2.6	0	0	0	.0	3400	1.5	5760
JAN 04...	15	4	.2	3.2	0	0	0	.0	1500	1.4	2240
MAR 13...	16	3	.2	2.6	0	0	0	.0	1800	1.1	3080
MAY 30...	21	4	.3	1.5	0	0	0	.0	3700	1.5	6050

Appendix 13.--Water-quality, mine entrance 88, above Big Four Hollow Creek near Lake Hope, Ohio

water years 1979 and 1980--Continued

DATE	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, ORTHOPHOSPHATE TOTAL (MG/L AS PO4)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
WATER YEAR 1979											
OCT 12...	6.79	.01	1.4	1.4	6.2	.020	--	--	0	1	1
OCT 25...	7.83	.00	1.5	1.5	6.6	.090	--	--	14000	1	1
JAN 04...	3.05	.00	.74	.74	3.3	.020	--	--	32000	0	1
MAR 13...	4.19	.00	.84	.84	3.7	.010	--	--	53000	0	2
MAY 30...	8.23	.00	1.3	1.3	5.8	.030	.09	.09	110000	0	2

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT 12..	600	2	3	61	460000	--	440000	9	19000	--	19000
OCT 25...	70	1	2	95	730000	--	720000	23	1600	--	1600
JAN 04...	30	0	0	32	230000	--	230000	0	6600	--	6600
MAR 13...	40	0	2	44	310000	--	310000	22	8800	--	8800
MAY 30...	80	1	18	210	630000	0	630000	0	17000	0	17000

Appendix 13.--Water-quality, mine entrance 88, above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979										
OCT 12...	<.5	100	0	0	--	2000	2000	.2	.8	1
OCT 25...	<.5	81	2	0	--	300	300	3.5	.3	0
JAN 04...	.6	110	0	0	--	760	760	1.4	.3	2
MAR 13...	<.5	66	0	0	--	1100	1100	2.1	.2	0
MAY 30...	<.5	39	2	0	0	2500	2500	9.4	.2	0

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)
WATER YEAR 1980											
NOV 20...	1500	4500	2.9	12.0	160	1100	1100	64	3180	140	190
MAR 14...	1330	5200	4.5	7.0	300	1200	1200	43	2140	72	250
25...	1300	5600	3.6	8.0	240	1700	1700	46	2280	170	310
APR 07...	1300	5400	3.5	9.0	230	1600	1600	49	2430	150	290
24...	1300	5500	3.6	8.5	230	2500	2500	50	2480	190	490
MAY 02...	1430	5600	3.6	9.0	--	--	--	62	3080	--	--
22...	1430	5500	3.5	11.0	--	--	--	58	2880	--	--

Appendix 13.--Water-quality, mine entrance 88, above Big Four Hollow Creek near Lake Hope, Ohio water years 1979 and 1980--Continued

DATE	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)
WATER YEAR 1980											
NOV											
20...	25	13	.3	27	2.2	0	0	0	.0	3300	.1
MAR											
14...	24	4	.3	32	8.2	0	0	0	.0	4700	.6
25...	24	3	.3	--	8.6	0	0	0	.0	4600	.6
APR											
07...	24	3	.3	--	8.7	0	0	0	.0	4800	.8
24...	23	2	.2	--	8.1	0	0	0	.0	5500	.3
MAY											
02...	--	--	--	--	--	0	0	0	.0	5300	--
22...	--	--	--	--	--	0	0	0	.0	5200	--

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)	ARSENIC TOTAL (UG/L AS AS)
NOV											
20...	5110	6.95	.04	1.4	1.4	6.4	.730	2.2	73000	0	16
MAR											
14...	7960	10.8	.04	2.4	2.4	11	.050	.15	110000	0	2
25...	7900	10.7	.18	1.9	2.1	9.2	.120	.37	120000	0	2
APR											
07...	8020	10.9	.09	1.8	1.9	8.4	.060	.18	100000	0	16
24...	8330	<11.3	.15	2.2	2.4	10	.060	.18	120000	0	3
MAY											
02...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--

Appendix 13.--Water-quality, mine entrance 88, above Big Four Hollow Creek near Lake Hope, Ohio water years 1979 and 1980--Continued

DATE	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
WATER YEAR 1980										
NOV										
20...	90	0	90	5	50000	30000	7	18000	0	18000
MAR										
14...	120	0	70	250	1100000	320000	1	45000	4000	41000
25...	80	0	3	370	950000	950000	0	73000	0	73000
APR										
07...	80	0	2	310	1200000	93000	0	53000	0	53000
24...	90	0	2	270	1100000	1100000	0	66000	8000	58000
MAY										
02...	--	--	--	--	1300000	1300000	--	55000	0	55000
22...	--	--	--	--	1100000	1100000	--	42000	0	42000

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
NOV										
20...	2.0	520	1	0	0	3700	3700	5.2	.2	0
MAR										
14...	.1	97	0	0	0	4900	4900	5.8	.1	0
25...	.1	2400	3	0	0	6700	6700	1.9	.3	0
APR										
07...	.2	120	4	0	0	6100	6100	8.4	.1	1
24...	<.1	110	9	0	0	5500	5500	7.6	.3	0
MAY										
02...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--

Appendix 14.--Water-quality data, mine entrance 89A above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
WATER YEAR 1979										
MAR 13...	1600	1300	3.0	9.5	15	370	370	5.6	278	89

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
MAR 13...	35	10	6	.2	2.8	0	0	0	.0	560

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
MAR 13...	1.1	897	1.22	.03	.35	.38	1.7	.000	9600	0

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
MAR 13...	1	10	0	0	10	41000	41000	91	2200	2100

Appendix 14.--Water-quality data, mine entrance 89A above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
WATER YEAR 1979									
MAR 13...	<.5	83	0	0	240	240	1.1	.1	0

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
WATER YEAR 1980											
MAR											
14...	1430	.01	3410	3.3	6.5	97	1000	1000	22	1090	190
25...	1400	--	3100	3.4	7.5	110	1500	1500	16	794	340
APR											
07...	1400	--	3300	3.4	8.0	130	1600	1600	19	943	330
24...	1330	<.01	3200	4.7	9.0	120	1200	1200	12	596	200
MAY											
02...	1400	--	3050	5.6	9.5	--	--	--	--	--	--
22...	1500	<.01	2400	4.8	9.0	--	--	--	10	497	--

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	SODIUM+POTASSIUM DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
MAR											
14...	130	11	2	.2	16	5.2	0	0	0	.0	2200
25...	150	13	2	.1	--	6.3	0	0	0	.0	1800
APR											
07...	190	17	2	.2	--	8.4	0	0	0	.0	2600
24...	180	17	3	.2	--	8.5	0	0	0	.0	2300
MAY											
02...	--	--	--	--	--	--	33	0	27	133	2600
22...	--	--	--	--	--	--	26	0	21	659	1700

Appendix 14.--Water-quality data, mine entrance 89A above Big Four Hollow Creek near Lake Hope, Ohio, water years 1979 and 1980--Continued

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	ANTIMONY, TOTAL (UG/L AS SB)
WATER YEAR 1980											
MAR											
14...	2.5	3490	4.75	.33	.95	1.3	5.7	.030	.09	54000	0
25...	2.0	3050	4.15	.15	.82	.97	4.3	.100	.31	3700	0
APR											
07...	2.9	4160	5.66	.27	.93	1.2	5.3	.110	.34	37000	0
24...	2.7	3870	<5.26	.33	1.2	1.5	6.8	.010	.03	19000	0
MAY											
02...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--

DATE	ARSENIC TOTAL (UG/L AS AS)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)
MAR											
14...	19	50	0	30	200	390000	130000	260000	3	63000	2000
25...	17	30	0	3	10	160000	0	160000	0	71000	0
APR											
07...	16	30	0	8	150	190000	40000	150000	0	88000	0
24...	4	20	5	2	66	170000	30000	140000	0	86000	12000
MAY											
02...	--	--	--	--	--	180000	10000	170000	--	82000	2000
22...	--	--	--	--	--	900000	0	900000	--	42000	0

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	ZINC, SUSPENDED RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	PHENOLS (UG/L)
MAR											
14...	61000	.1	230	0	0	0	4700	4700	2.9	.1	3
25...	71000	.1	1600	0	0	0	4500	4500	5.9	.2	0
APR											
07...	88000	.2	460	2	0	0	4900	4900	3.7	.1	0
24...	74000	.1	690	1	0	0	4000	4000	2.0	.7	0
MAY											
02...	80000	--	--	--	--	--	--	--	--	--	--
22...	42000	--	--	--	--	--	--	--	--	--	--

Appendix 15.--Water-quality data, mine entrance 90B near Lake Hope, Ohio,

May 2 and 22, 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	ACIDITY TOTAL HEATED (MG/L AS H)	ACIDITY (MG/L AS CACO3)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)
MAY									
02...	1330	--	1200	3.4	12.0	6.0	298	0	0
22...	1530	.05	1750	3.2	10.5	10	497	0	0

DATE	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
MAY									
02...	0	.0	810	74000	6000	68000	3500	500	3000
22...	0	.0	1200	110000	10000	100000	3700	0	3700

Appendix 16.--Daily rainfall, in inches, at Sandy Run near Lake Hope, Ohio, 82184701

water years 1979 and 1980

SUMMATION VALUES

DAY	WATER YEAR 1979 OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								---	.01	.16	.03	.06
2								---	.00	.00	.58	.00
3								---	.05	.00	.00	.20
4								---	.01	.46	.00	.02
5								---	.00	.00	.00	.00
6								---	.62	.00	.00	.00
7								---	.24	.00	.00	.00
8								---	.82	.00	.12	.00
9								---	.00	.68	.00	.00
10								---	.16	.03	.34	.00
11								---	.00	.00	1.36	.00
12								---	.00	.04	.00	.00
13								---	.00	.06	.01	.89
14								---	.00	.00	.02	1.10
15								---	.00	.00	.00	.01
16								---	.00	.01	.00	.00
17								.00	.01	.00	.02	.00
18								.00	.16	.00	.18	.01
19								.00	.02	.00	.91	.00
20								.00	.80	.00	1.11	.00
21								.02	.59	.00	.11	1.68
22								.00	.05	.00	.31	.51
23								.66	.00	.06	.14	.01
24								.19	.01	.26	.30	.00
25								.35	.01	.63	.01	.01
26								.14	.00	.07	.73	.00
27								.82	.00	.03	.01	.23
28								.00	.00	.58	.02	.98
29								.01	.12	.18	.01	.00
30								.00	.48	.00	.00	.00
31								.55	---	.00	.01	---
TOTAL								2.74	4.16	3.25	6.33	5.43

Appendix 16.--Daily rainfall, in inches, at Sandy Run near Lake Hope, Ohio, 82184701
water years 1979 and 1980--Continued

SUMMATION VALUES

water year 1980

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.57	.10	.04	.00	.00	.00	.00	.17	.00	.09	.19
2	.21	.01	.04	.03	.00	.00	.01	.00	.59	.00	.00	.01
3	.01	.00	.11	.01	.00	.00	.06	.00	.00	.50	.57	.00
4	.19	.01	.01	.02	.00	.00	.05	.00	.00	.00	.00	.00
5	.00	.00	.00	.06	.00	1.10	.00	.00	.00	.19	.02	.00
6	.39	.02	.16	.04	.13	.00	.00	.00	.74	.00	.01	.00
7	.00	.02	.00	.45	.01	.00	.00	.00	.13	.00	.17	.00
8	.57	.00	.00	.02	.01	.30	.67	.00	.00	.53	.00	.00
9	.09	.67	.00	.03	.00	.00	.07	.00	.17	1.26	.03	.53
10	.00	.15	.00	.00	.00	.00	.01	.00	.18	.07	.02	.00
11	.11	.00	.00	.73	.00	.00	.03	.04	.00	.00	1.19	.00
12	.26	.00	.40	.04	.00	.05	.32	1.08	.00	1.03	.02	.01
13	.00	.00	.62	.06	.00	.95	.32	.11	.00	.02	.00	.00
14	.00	.00	.00	.04	.05	.00	.55	.00	.01	.00	.14	.66
15	.01	.05	.01	.01	.11	.10	.04	.00	.24	.01	.13	.00
16	.11	.00	.01	.00	.37	.00	.00	.01	.29	.00	.00	.00
17	.01	.00	.08	.03	.11	.03	.00	.72	.00	.00	.09	.01
18	.00	.01	.14	.00	.01	.00	.01	.06	.00	.00	.06	.00
19	.00	.03	.02	.00	.00	.00	.00	.22	.08	.00	.45	.00
20	.01	.01	.05	.00	.17	.05	.00	.03	.00	.00	1.02	.00
21	.00	.00	.02	.01	.10	.83	.00	.01	.00	1.47	.70	.00
22	.00	.03	.00	.00	.01	.00	.00	.00	.00	1.60	.00	.09
23	.12	.01	.12	.02	.08	.18	.00	.21	.06	.00	.00	.11
24	.01	.45	.29	.03	.00	.19	.00	.07	.01	.00	.00	.00
25	.00	.51	.23	.43	.00	.00	.00	.07	.00	.00	.00	.00
26	.00	.34	.00	.00	.01	.00	.02	.00	.00	---	.00	.00
27	.06	.00	.00	.00	.11	.00	.13	.00	.59	---	.00	.00
28	.13	.11	.01	.00	.07	.78	.07	.00	.15	.00	.00	.00
29	.01	.02	.01	.00	.01	.01	.01	.00	.70	.00	.47	.00
30	.01	.01	.04	.03	---	.51	.00	.25	.00	.00	.53	.00
31	.00	---	.05	.00	---	.06	---	.38	---	.00	.00	---
TOTAL	2.41	3.03	2.52	2.13	1.36	5.14	2.37	3.26	4.11	6.68	5.71	1.61