UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

QUALITY OF WATER AND TIME OF TRAVEL IN HOBOLOCHITTO CREEK, PEARL RIVER COUNTY, MISSISSIPPI

Open-File Report 80-203

Prepared in cooperation with the

Mississippi Department of Natural Resources
Bureau of Pollution Control

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

QUALITY OF WATER AND TIME OF TRAVEL IN HOBOLOCHITTO CREEK, PEARL RIVER COUNTY, MISSISSIPPI

by Gene A. Bednar

Open-File Report 80-203

Prepared in cooperation with

Mississippi Department of Natural Resources
Bureau of Pollution Control

Jackson, Mississippi

1980

UNITED STATES DEPARTMENT OF THE INTERIOR
CECIL D. ANDRUS, Secretary
GEOLOGICAL SURVEY
H. William Menard, Director

For additional information write to:

U.S. Geological Survey
Water Resources Division
100 W. Capitol St., Suite 710
Jackson, Mississippi 39201

CONTENTS

ILLUSTRATIONS

TABLE

FACTORS FOR CONVERTING INCH-POUNDS UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

For use of those readers who may prefer to use international system (SI) units rather than the inch-pound system, the conversion factors for the terms used in this report are listed below:

Multiply inch-pound units	By	To obtain SI units
inch (in)	25.4	centimeter (cm)
foot (ft)	0.3048	meter (m)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)

°C=5/9 (°F-32) or °F=9/5 (°C)+32

National Geodetic Vertical Datum of 1929 is a geodetic datum derived from the average sea level measured over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, and as such does not necessarily represent local mean sea level at any particular place. To establish a more precise nomenclature, the term "NGVD of 1929" is used in place of "Sea Level Datum of 1929" or "mean sea level."

QUALITY OF WATER AND TIME OF TRAVEL IN HOBOLOCHITTO CREEK, PEARL RIVER COUNTY, MISSISSIPPI

by Gene A. Bednar

ABSTRACT

An intensive study of Hobolochitto Creek, including the lower parts of East and West Hobolochitto Creeks, was conducted on September 12-14, 1978. The quality-of-water data were collected during a period of generally low streamflow and seasonally high air temperatures. These data show that the quality of water in Hobolochitto Creek was generally good.

The dissolved-solids concentrations were less than 50 milligrams per liter, and the concentrations of nitrogen and phosphorus species were low. The 5-day biochemical oxygen demand generally was minimal, and dissolved-oxygen concentrations were at levels that could support aquatic life. Several water samples contained high fecal bacteria densities and there was evidence of the presence of wastes of human origin, particularly at the downstream sites on Hobolochitto Creek.

It was determined from a time-of-travel study that the rate of solute travel is very slow at low streamflow. A peak dye concentration traveled through a 3.7 mile reach of Hobolochitto Creek in 23.5 hours.

INTRODUCTION

Water is one of the most important natural resources of Mississippi. Even though there is an abundant supply of high quality water in Mississippi, there is a need for a comprehensive management plan for effective utilization and conservation of this resource. To attain this goal, the Mississippi Department of Natural Resources, Bureau of Pollution Control, has been designated the responsibility for developing a statewide waste-treatment management plan.

The U.S. Geological Survey in cooperation with the Bureau of Pollution Control is providing hydrologic data necessary for determining the waste-assimilation capacity of selected reaches of major freshwater and tidal streams within the state. The hydrologic data presented in this report are intended for use in developing a comprehensive long-range plan for effective management of the water resources.

This report summarizes and documents the results of a short-term intensive study of Hobolochitto Creek conducted on September 12-14, 1978. Chemical, physical, and bateriological data, time-of-travel data, discharge data, and stream geometry of Hobolochitto Creek and its two major tributaries are included in the report.

DESCRIPTION OF THE AREA

Location

The general area of the Hobolochitto Creek study is in the southwest corner of Pearl River County, Mississippi, in the vicinity of the city of Picayune. Picayune is situated in south Mississippi, about 30 miles inland of the Mississippi Gulf Coast and about 3 miles east of the Pearl River, which constitutes a part of the Mississippi-Louisiana state line. The location of the study area and data collection sites are shown in figure 1.

Cultural Features

Picayune is one of the larger trade and population centers in south Mississippi. The population of Picayune has increased from 7,834 in 1960 to 10,467 in 1970--an increase of about 34 percent. The Picayune Chamber of Commerce estimated a population of 12,250 for 1979. The city is located about 10 miles north of the National Space Technology Laboratories (NSTL). The facility has contributed to the population growth of the general area. The population of Pearl River County increased from 22,441 in 1960 to 27,802 in 1970--an increase of about 24 percent. In 1970, more than one-half (15,023) of the county residents lived in a rural area.

The economy of the area for many years has been based on forestry, agriculture, and livestock. Industrial, manufacturing, and NSTL development and expansion in recent years have added significantly to the economy. Some of the important industrial activities and products are chemicals, paints and varnishes, steel fabrication, wood products, and wood treatment and preservation. Mining of the sand and gravel deposits in the area is widespread.

Topography and Geology

The study area lies within the Piney Woods physiographic province. Hobolochitto Creek and the lower part of East and West Hobolochitto Creeks lie in the Pearl River alluvial plain. The land surface is generally flat and locally swampy. The dark colored and heavy soils of the swamps and flats are underlain with clay, and drainage is poor. The topography in the immediate area surrounding the alluvial plain is flat to gently rolling and underlain by the Pamilico Sand. The northern part of the area is underlain by clay, sand, and gravel of the Citronelle Formation and the uplands surrounding the upper part of East and West Hobolochitto Creek basins are underlain by the silty clay and shale of the Pascagoula and Graham Ferry Formations.

The land surface altitude ranges from about 40 feet above NGVD (National Geodetic Vertical Datum) of 1929 in the alluvial river bottoms to about 300 feet above NGVD of 1929 in the West Hobolochitto Creek basin north of the study area. Much of the area is forest covered although many acres of land have been deforested for farmland and livestock.

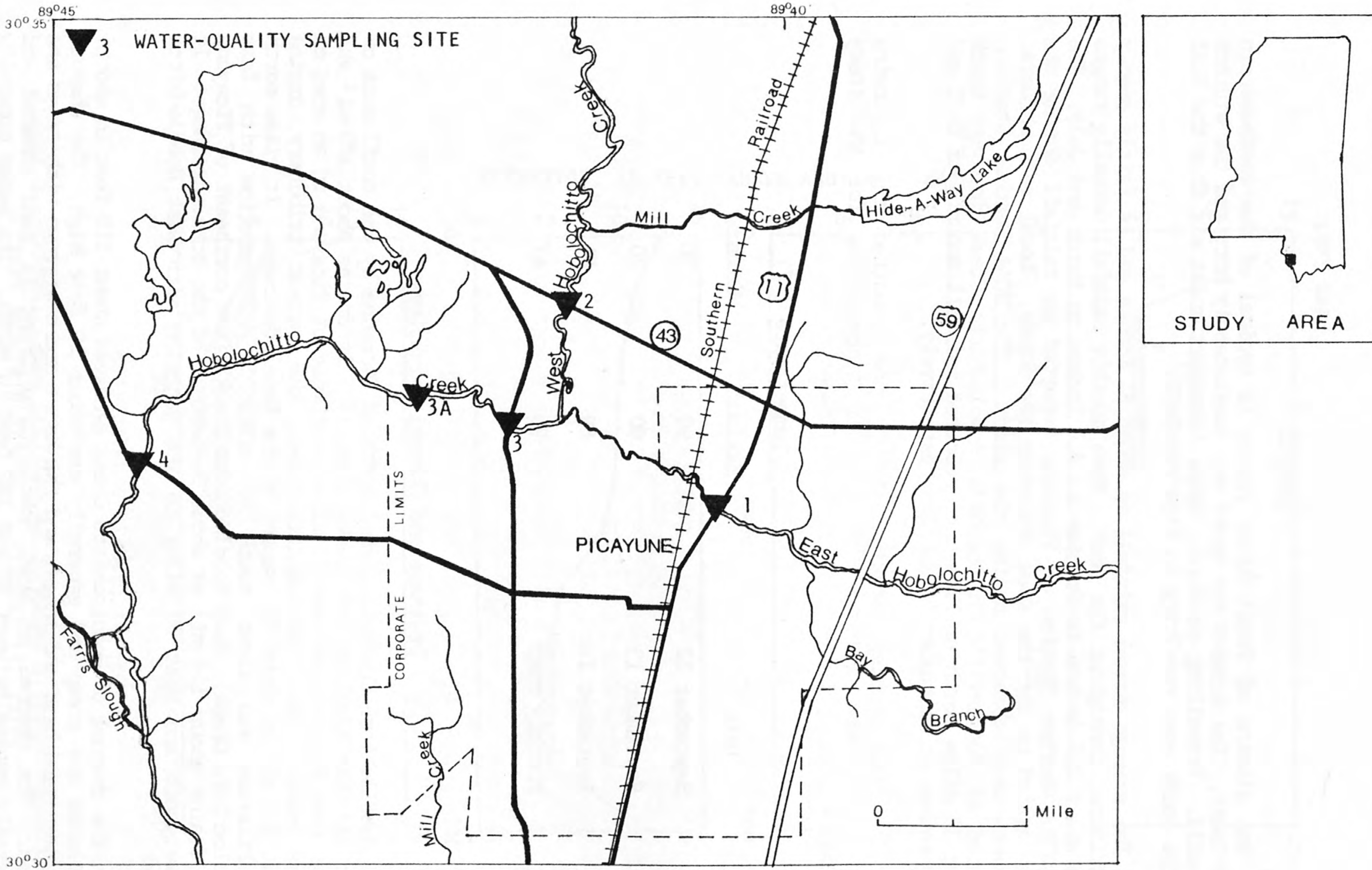

FIGURE 1.--STUDY AREA, WATER-QUALITY AND TIME-OF-TRAVEL SAMPLING SITES ON HOBOLOCHITTO CREEK AND TRIBUTARIES, SEPTEMBER 12-14, 1978.

Climate

The climate of Pearl River County is typical of the southeastern Gulf Coast. The summers are humid and consistently hot, and the winters are mild. Prevailing southerly winds transport moist air from the Gulf to the study area resulting in high rainfall.

The average annual rainfall is about 61 inches and is fairly evenly distributed throughout the year. Mean monthly rainfall normally ranges from about 2.7 inches in October to 6.6 inches in March and July. The The NOAA Weather Station at Picayune reported no rainfall during the study period or for the week preceding the study. Local rain showers, however, were observed during the study. The NOAA Weather Station, located at Poplarville in the West Hobolochitto Creek drainage basin about 30 miles north of Picayune, reported rainfall amounts of 0.72 and 0.20 inches on September 10 and 12, respectively.

The NOAA Weather Station at Picayune reported the following maximum, minimum, and monthly mean air temperatures for the study period.

Date	Temperature (°F) Maximum	Temperature (°F) Minimum
September 12	90	70
September 13	90	70
September 14	89	81
Monthly mean	90	67

Drainage and Channel Morphology

Hobolochitto Creek is formed north of Picayune by the confluence of East and West Hobolochitto Creeks (fig. 1). It drains about 370 mi^2 and flows into Pearl River about 3 miles southwest of Picayune in an area of dense swamps. West Hobolochitto Creek, the largest tributary, drains about 230 mi^2 or about 62 percent of the total drainage. It rises north of Picayune and flows south 40 miles to its junction with East Hobolochitto Creek. East Hobolochitto Creek rises northeast of Picayune and drains about 110 mi^2 or about 30 percent of the total drainage. It flows south and west 30 miles to its junction with West Hobolochitto Creek.

The channel of Hobolochitto Creek averages about 110 feet in width; its banks are steep and generally are about 10 feet high. The channel has many sand bars and snags, and the banks are overgrown with trees and brush. The channel of West Hobolochitto Creek is sand covered and generally ranges between 50 and 140 feet in width. Its banks generally

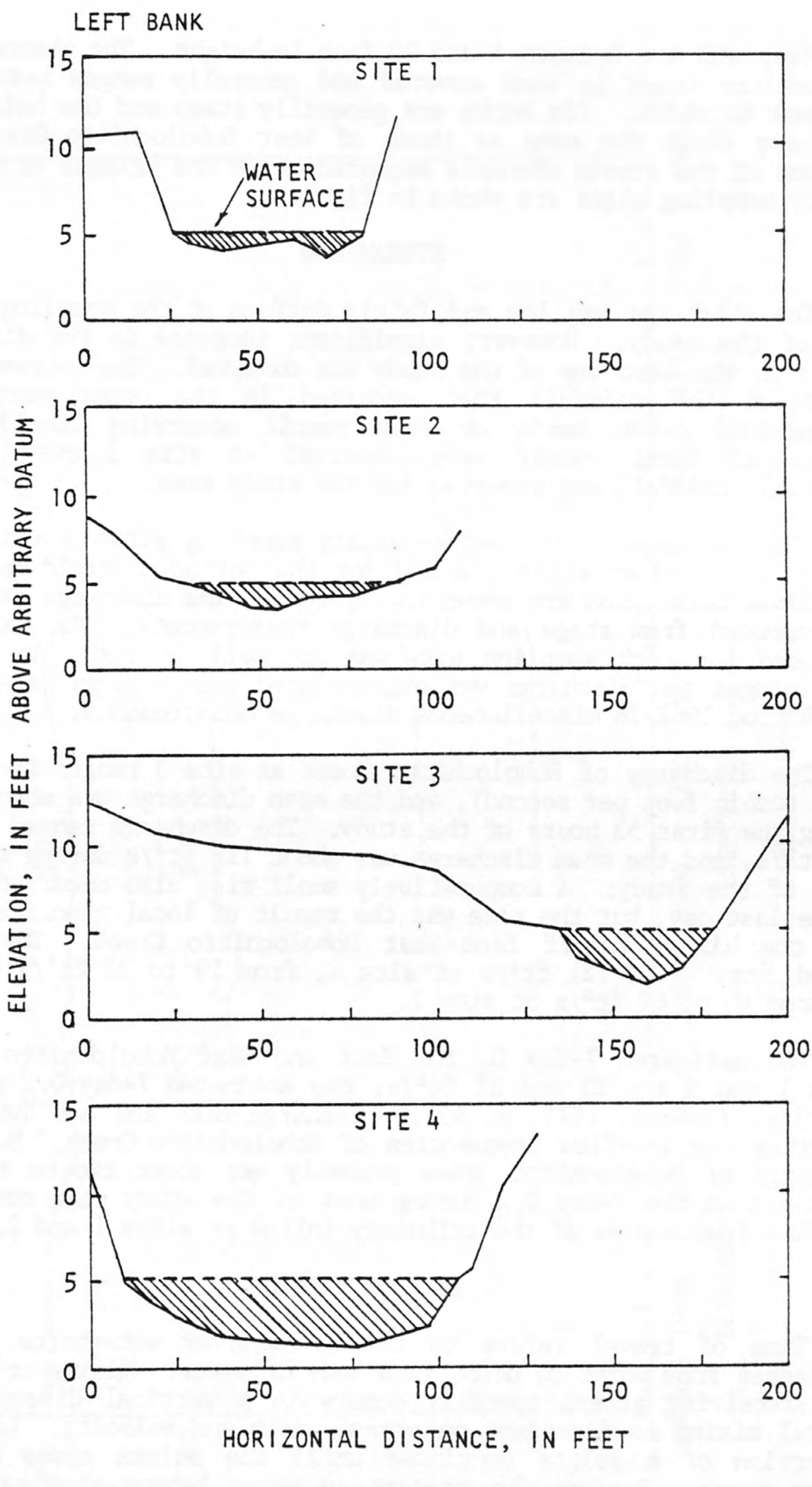

FIGURE 2.--CHANNEL CROSS SECTIONS AT SAMPLING SITES ON HOBOLOCHITTO CREEK AND TRIBUTARIES, SEPTEMBER 14, 1978.

are steep and are between 4 and 20 feet in height. The channel of East Hobolochitto Creek is sand covered and generally ranges between 50 to 100 feet in width. Its banks are generally steep and the height of its banks are about the same as those of West Hobolochitto Creek. Cross sections of the stream channels measured below the bridges at the water-quality sampling sites are shown in figure 2.

STREAMFLOW

The discharge was low and fairly uniform at the sampling sites for most of the study. However, significant increase in the discharge at site 3 on the last day of the study was observed. The increase was the result of the rainfall that occurred in the upper part of West Hobolochitto Creek basin or from runoff occurring locally. Brief periods of local runoff were observed at site 3 even though no measurable rainfall was reported for the study area.

The discharge at the water-quality sampling sites 3 and 4 for the study period and at sites 1 and 2 for the period of field measurements and sample collection are shown in figure 3. The discharge at each site was computed from stage and discharge measurements. The rating curve developed for each sampling site was not well defined. At the higher river stages the discharge was extrapolated from ratings established at site 4 from 1962-76 miscellaneous discharge measurements.

The discharge of Hobolochitto Creek at site 3 ranged from 65 to 95 ft^3/s (cubic feet per second), and the mean discharge was about 77 ft^3/s during the first 53 hours of the study. The discharge ranged from 95 to 120 ft^3/s, and the mean discharge was about 118 ft^3/s during the last 17 hours of the study. A comparatively small rise also occurred at site 4 on the last day, but the rise was the result of local runoff and was not from the higher runoff from West Hobolochitto Creek. The discharge ranged from 99 to 121 ft^3/s at site 4, from 19 to 22 ft^3/s at site 1, and from 40 to 44 ft^3/s at site 2.

The estimated 7-day Q_2 for East and West Hobolochitto Creeks at sites 1 and 2 are 23 and 32 ft^3/s; the estimated 7-day Q_{10} are 5.9 and 24 ft^3/s, (Tharpe, 1975, p. 49). Discharge data are not available for computing the low-flow frequencies of Hobolochitto Creek. However, the discharge of Hobolochitto Creek probably was about two to three times greater than the 7-day Q_{10} during most of the study when compared with low flow frequencies of the tributary inflow at sites 1 and 2.

TIME OF TRAVEL

Time of travel refers to the movement of waterborne solutes or substances from point to point in a body of water. Mixing or dispersion in a receiving stream normally occurs in a vertical direction first. Lateral mixing is dependent on stream width and velocity. Longitudinal dispersion of a solute continues until the solute moves out of the stream reach. Because dye tracers in water behave physically in the same manner as water molecules and soluble material, they are commonly used to measure the motion and dispersion characteristics of solutes.

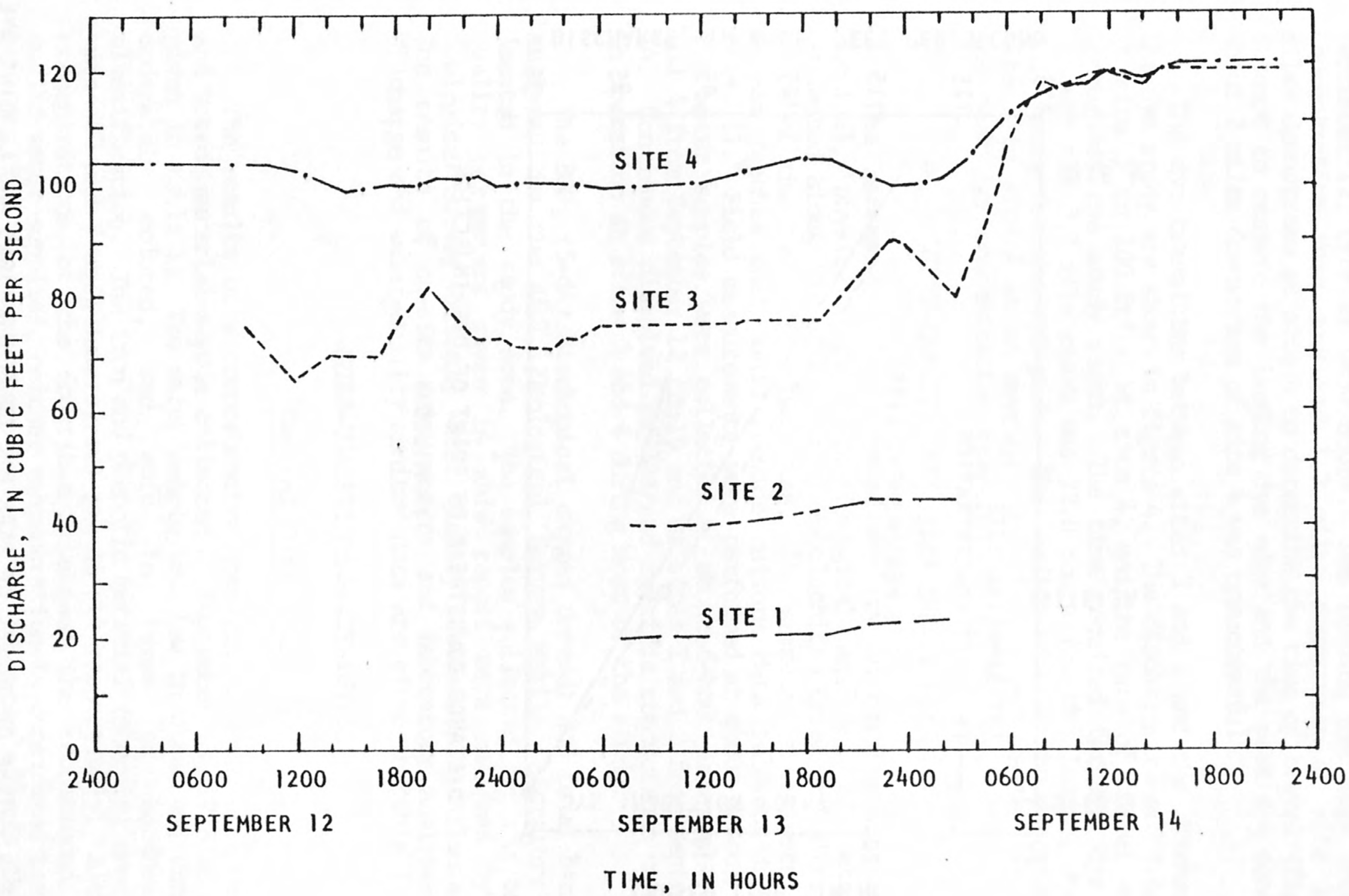

FIGURE 3.--DISCHARGE AT SAMPLING SITES ON HOBOLOCHITTO CREEK AND TRIBUTARIES, SEPTEMBER 12-14, 1978.

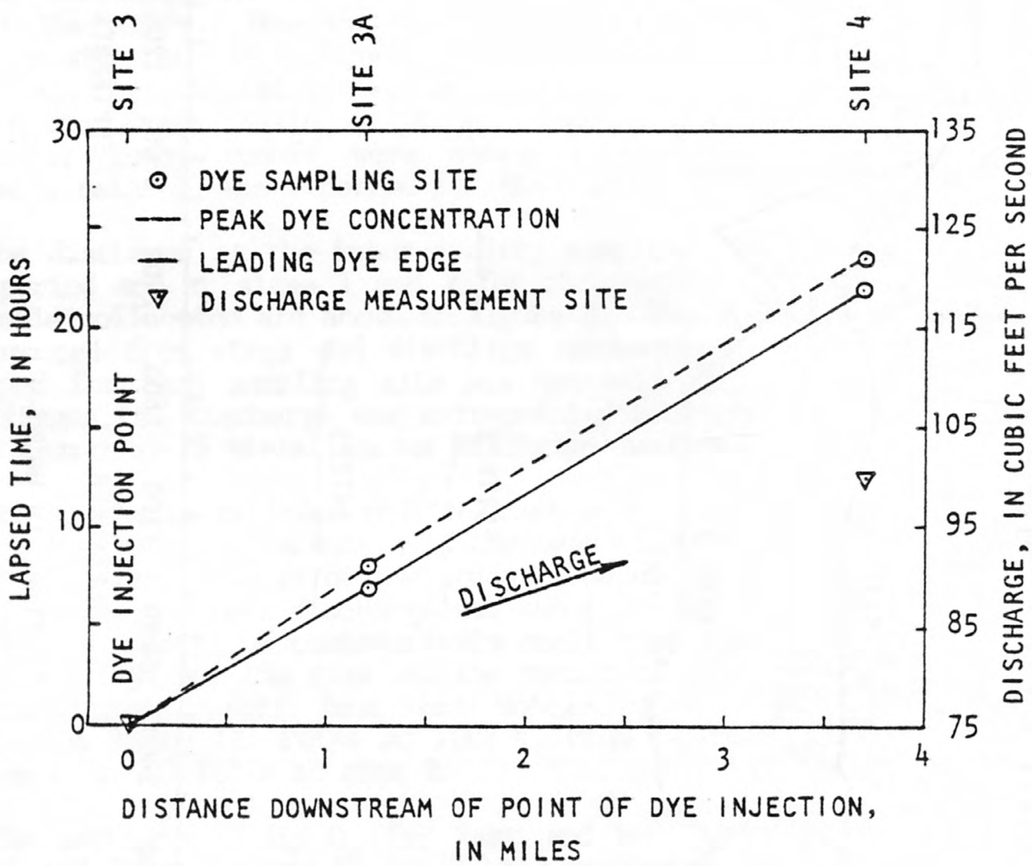

FIGURE 4.--TIME OF TRAVEL OF PEAK DYE CONCENTRATIONS AND LEADING DYE EDGE AND THE DISCHARGE IN HOBOLOCHITTO CREEK, SEPTEMBER 12-13, 1978.

Personnel of the Mississippi Air and Water Pollution Control Commission injected rhodamine WT dye in Hobolochitto Creek at site 3 on September 12, 1978 at 0630 hours. The leading dye edge and peak dye concentration were measured 1.2 miles downstream at site 3A and 3.7 miles downstream at site 4 to determine the time of travel (fig. 1). An attempt to measure the leading dye edge and the peak dye concentration about 2 miles downstream of site 4 was unsuccessful.

The dye traveltime between sites 3 and 4 and the discharge during the dye study are shown in figure 4. The discharge ranged from 75 ft^3/s at site 3 to 100 ft^3/s at site 4, and the rate of travel was uniform throughout the study reach. The time required for the dye to travel through the 3.7 mile reach was 22.0 hours for the leading dye edge and 23.5 hours for the dye peak. The leading edge of the dye traveled from site 3 to site 4 at an average rate of 0.17 mi/h (miles per hour), and the peak dye concentration traveled at an average rate of 0.16 mi/h.

WATER-QUALITY DATA COLLECTION AND ANALYSIS

The assessment of the water quality in this report is based on chemical, physical, and bacteriological analyses of water samples collected along the main stem of Hobolochitto Creek and along the lower parts of the two main tributaries. The sampling sites were located on stream reaches that would provide uniform data relevant to the study (fig. 1). Field measurements were performed at about 3-hour intervals, and water samples were collected at about 6-hour intervals at sites 3 and 4 from September 12 to 14 and at sites 1 and 2 from September 13 to 14. Continuous dissolved oxygen and specific conductance monitors were in operation at sites 3 and 4 during most of the study.

The BOD_5 (5-day biochemical oxygen demand) and fecal bacteria were analyzed in the U.S. Geological Survey Mobile Laboratory centrally located in the study area. The samples collected for the other water quality parameters given in this report were analyzed by the U.S. Geological Survey National Water Quality Laboratory in Atlanta, Georgia. The results of on-site measurements and laboratory analyses, and the discharge and water-quality monitor data are given in table 1.

WATER-QUALITY CHARACTERISTICS

General Composition

The results of a comprehensive chemical analyses of a water sample and bottom material sample collected on September 14, 1978 at site 4 are given in table 1. The water sample was low in dissolved constituents, moderately colored, and soft in terms of hardness-of-water classification. The iron and phenolic material (phenols) concentrations were 880 and 9 ug/L (micrograms per liter) respectively. Although both concentrations of the constituents exceed the recommended limit for public water supplies, neither concentration is considered toxic to fish or wildlife. However, phenolic material in water affects the taste of fish at levels that do not appear to adversely affect fish physiology. It is recommended that phenolic material not exceed 1 ug/L for this reason (National Academy of Sciences and National Academy of Engineering, 1973).

The trace elements, insecticides, herbicides, and polychlorinated biphenyls (PCB) for both the water and bottom material samples were in concentrations that were either low or below detectable limits in the water and bottom material.

Specific Conductance and Dissolved Solids

The specific conductance of a water sample is a measure of its ability to conduct an electric current and is a measure of the degree of mineralization. The specific conductance values in this report are reported in micromhos per centimeter (umho/cm) at 25°C (Celsius). The dissolved solids concentration in water is proportional to specific conductance in a ratio ranging from 0.55 to 0.75 depending on the composition of the water (Hem, 1979, p. 99). Approximate dissolved-solids concentrations may be obtained by multiplying the specific conductance values given in table 1 by 0.71. The ratio is based on the sum of the various dissolved constituents and silica rather than the residue on evaporation which includes the weight contributed by color-producing organic matter.

The specific conductance of the water in Hobolochitto Creek was uniformly low and was generally higher at site 4 than site 3 during the study. The specific conductance ranged from 60 to 66 umho/cm at site 4 and from 48 to 56 umho/cm at site 3. The specific conductance was lowest at site 3 during the period of higher streamflow (fig. 5). The specific conductance of the water in East and West Hobolochitto Creeks was lower than at the downstream sites. The specific conductance ranged from 36 to 38 umho/cm in East Hobolochitto Creek and from 42 to 45 umho/cm in West Hobolochitto Creek during the period of sample collection (table 1).

The range of specific conductance of the water in Hobolochitto Creek and the tributaries indicate that the dissolved-solids concentrations in the study reach were low and less than 50 mg/L (milligrams per liter).

Water Temperature

Temperature is one of the most important factors in determining a stream's ability to assimilate waste material. It influences almost every physical property of water, every physical process that takes place in water, and all biological activity in the aquatic community.

The stream temperatures during the study did not vary significantly, ranging from 25.0°C (77°F) to 27.5°C (82°F) at all sites. Maximum water temperatures were reached about midday and remained warmest during the afternoon and evening hours. The range of stream temperatures varied between, but never obtained, the monthly mean maximum and minimum air temperatures, which is typical of a stream in a semitropical climate. Water-temperature data from a temperature recorder in operation at site 3 and field measurements at all sampling sites are given in table 1.

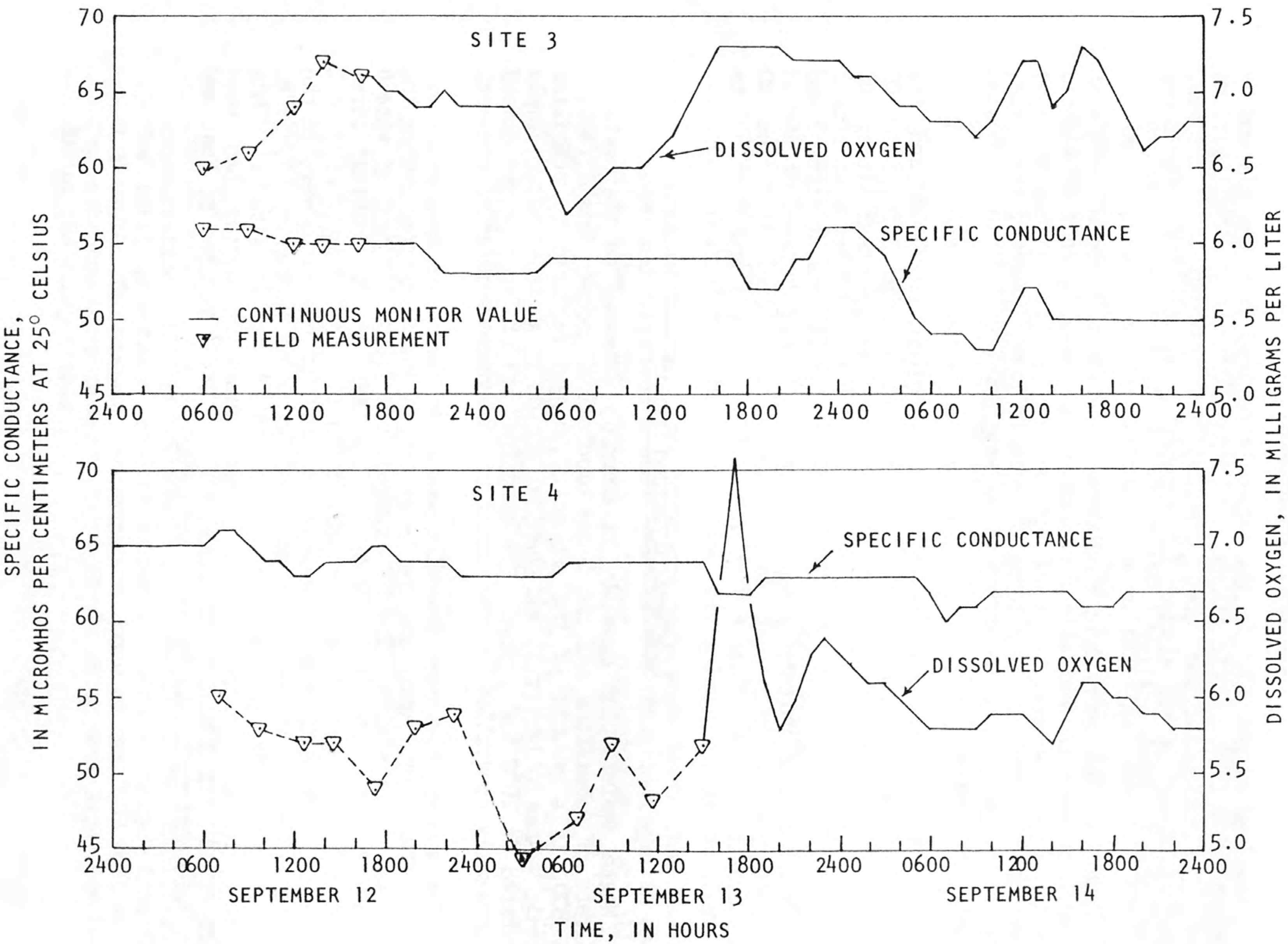

FIGURE 5.--SPECIFIC CONDUCTANCE AND DISSOLVED-OXYGEN CONCENTRATIONS IN HOBOLOCHITTO CREEK AT SITES 3 AND 4, SEPTEMBER 12-14, 1978.

Dissolved Oxygen

Dissolved oxygen (DO) in the water is derived from the air and by photosynthesis from aquatic plants. DO, normally present in all surface water, is essential to most chemical and biological processes. Dissolved oxygen, a key element for supporting aquatic life, can serve as an index to water quality.

Under average hydrologic conditions, a minimum DO concentration of 4.0 mg/L or more is desirable for maintaining a good balance of aquatic life in surface waters. A DO of 3.0 mg/L or less is considered to be hazardous or lethal to many forms of aquatic life; however, industrial water users may find a reduction in DO beneficial in reducing corrosion (Brown, and others, 1970, p. 126).

The DO at the sampling sites in Hobolochitto Creek and its tributaries was at levels that could support aquatic life. The DO levels at site 4 generally were lower than that at the other sites. DO concentrations during the study ranged from 6.2 to 7.3 mg/L at site 3 and from 4.9 to 7.6 mg/L at site 4. The DO fluctuations at sites 3 and 4 followed a diel pattern except during the higher streamflow period that occurred on the last day of the study (fig. 5). The DO concentrations ranged from 6.0 to 7.0 mg/L at site 1 and from 6.2 to 7.2 mg/L at site 2 during the period of sample collection (table 1).

Biochemical Oxygen Demand

Waste assimilation capacity is commonly assessed on the basis of the rate of reaeration and the 5-day biochemical oxygen demand (BOD_5). The BOD_5 is a measure of the amount of oxygen required to stabilize organic wastes by bacterial and chemical action in a closed water sample incubated at 20°C for 5 days. The reaction rate of 5-day oxygen demand is generally controlled by the amount of carbonaceous material present.

The amount of oxygen demanding wastes in the water apparently was low in the study reach, and the 5-day oxygen demand exerted during the study was not excessive. The BOD_5 ranged from 0.1 to 2.9 mg/L at site 4 and from 0.4 to 1.8 mg/L at site 3. The BOD_5 at the upstream sites ranged from 0.1 to 0.9 mg/L at site 1 to 0.0 to 2.8 mg/L at site 2 (table 1). The maximum BOD_5 observed at each of the sites were in the samples collected between 2200 and 2300 hours on September 13, 1978, just prior to the general increase in discharge at site 3. This increase in BOD_5 suggests that oxygen demanding wastes had been transported into Hobolochitto Creek and the lower reaches of East and West Hobolochitto Creeks by rural and urban runoff.

Nitrogen Compounds

Organic nitrogen compounds from sewage and certain kinds of industrial wastes are decomposed into inorganic nitrogen compounds by either aerobic or anaerobic bacteria. The concentrations of the nitrogen compounds yield information about the stage of decomposition. The occurrence of the various forms of nitrogen compounds may indicate the amount of oxidation that has occurred since the waste was discharged.

The concentrations of the various nitrogen compounds at all sampling sites generally were low during the study. The maximum, minimum, and mean concentrations of total, organic, and ammonia nitrogen in samples collected during the study are shown in figure 6. The total nitrogen concentrations at all sites ranged from 0.24 to 0.77 mg/L. Total and organic nitrogen were generally higher at sites 1 and 4 than at sites 2 and 3. The mean total nitrogen concentration at site 4 was 0.45 mg/L and the concentrations ranged from 0.31 to 0.63 mg/L. The The mean total nitrogen concentrations of the water entering the study area at sites 1 and 2 were 0.53 and 0.33 mg/L respectively. The organic nitrogen concentrations at all sites ranged from 0.21 to 0.64 mg/L and generally comprised between 75 and 90 percent of the total nitrogen in the respective samples.

Ammonia nitrogen concentrations were much lower than the organic nitrogen and comprised a small part of the total nitrogen in the water at all sites. The ammonia nitrogen concentrations at all sites generally were less than 0.05 mg/L; the maximum value observed was 0.09 mg/L at site 1 (fig. 6). The nitrite plus nitrate concentrations were low and in about the same concentrations as ammonia nitrogen. Nitrite plus nitrate concentrations in the water samples collected at all sites ranged from 0.01 to 0.08 mg/L (table 1).

Phosphorus

Phosphorus is one of the primary nutrients essential to aquatic plant growth. It has not been reported to be toxic, but enrichment of a body of water with the element does stimulate the growth of algae, which may cause entrophication. The critical concentration level of phosphorus needed to inhibit algal growth has been considered to be 0.1 mg/L, but this remains in question (Velz, 1970, p. 19).

The total phosphorus concentrations of the water entering the study area at sites 1 and 2 ranged from 0.02 to 0.03 mg/L and the phosphorus concentrations did not increase significantly at the downstream sites. The total phosphorus concentrations at site 4 ranged from 0.02 to 0.05 mg/L. The maximum concentration observed was 0.07 mg/L at site 3. The orthophosphorus concentrations at all sites were less than 0.05 mg/L during the study (table 1).

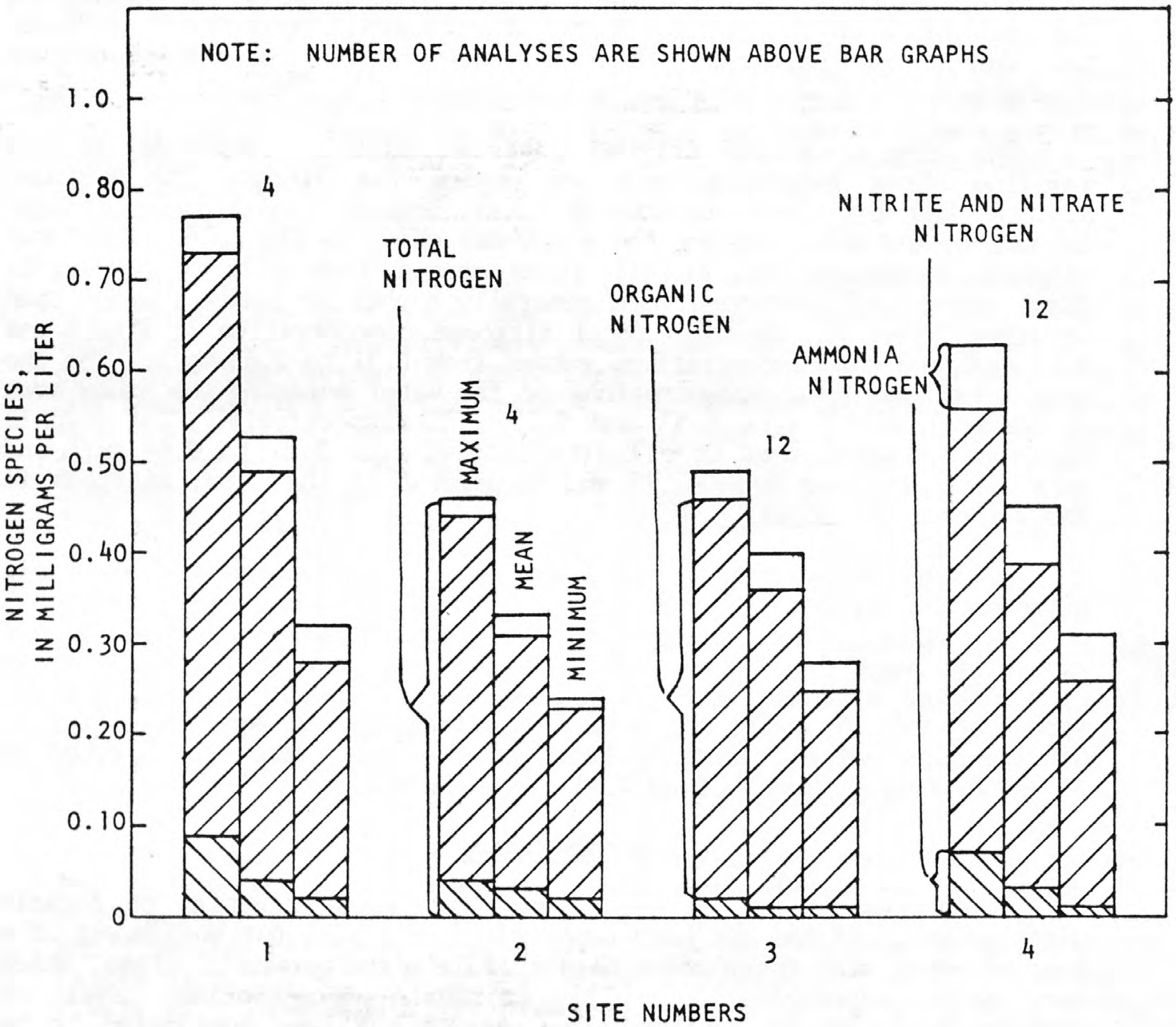

FIGURE 6.--MAXIMUM, MEAN, AND MINIMUM CONCENTRATIONS OF NITROGEN SPECIES AT SAMPLING SITES ON HOBOLOCHITTO CREEK ANT TRIBUTARIES, SEPTEMBER 12-14, 1978.

pH - Hydrogen Ion Activity

Freshwater streams generally possess a natural buffering system that regulates or limits the activity of hydrogen ions. The buffering system will maintain the water at a pH range of 6.5 to 8.5. Dilute waters having a low buffering capacity, in the presence of the acidic soils and tannic acid in the runoff from swamplands and dense pine forests characteristic of south Mississippi, may have pH values less than 5.0 (Mississippi Air and Water Pollution Control Commission, 1978, p. 27). The presence of industrial wastes in a stream can cause extreme pH changes depending on the chemical and physical composition of the waste effluent.

The pH of the water at all sites was fairly uniform during the study. The median pH values in the study area were 6.2 at site 1, 6.1 at site 2, 6.5 at site 3, and 6.4 at site 4. The minimum pH (5.7 units) was observed on the first day of the study at site 3. The pH of 19 samples collected at site 4 during the 1970-73 period ranged from 5.1 to 6.9 units. During the study the pH at site 4 ranged slightly higher, from 5.9 to 7.1 units (table 1).

Bacteria

The bacteria of the fecal coliform group and fecal streptococcus group are found in large numbers in enteric wastes of warmblooded animals, but are rarely present in soils or plant debris. A fecal coliform to fecal streptococcal bacteria ratio of less than 0.7 is evidence that wastes are of nonhuman origin; a ratio between 2.0 and 4.0 suggests a predominance of human wastes; and a ratio greater than 4.0 may be considered strong evidence that wastes are of human origin (Geldreich and Kenner, 1969). The population count of each bacterium in the report, determined by the membrane filter method, is reported in colonies per 100 milliliters of sample (col/100 mL) (Greeson and others, 1977, p. 53 and 59).

The highest fecal coliform densities observed were 6,000 (estimated) col/100 mL at site 1 and 6,600 col/100 mL at site 4. The highest median count was 990 col/100 mL at site 4; the lowest was 120 col/100 mL at site 1. The highest fecal streptococcal bacteria density was 3,900 col/100 mL at site 1. The highest median counts were 480 col/mL at site 2 and 390 col/100 mL at site 1; the lowest counts were 200 and 180 col/100 mL at sites 3 and 4, respectively (fig. 7).

The fecal coliform to fecal streptococcal bacteria ratio of most of the samples collected during the study was less than 4.0 particularly at the upstream sites. None of the samples collected at site 1 and one of four samples collected at site 2 had ratios that exceeded 4.0. The ratios exceeded 4.0 in three of 12 samples collected at site 3 and seven of 12 samples collected at site 4. The evidence of wastes of human origin was more apparent at site 4 than at the upstream sites. Evidently, these wastes are from local sources in the study area and very little waste originated from the tributary inflow.

NOTE: NUMBER OF ANALYSES ARE SHOWN ABOVE BAR GRAPHS

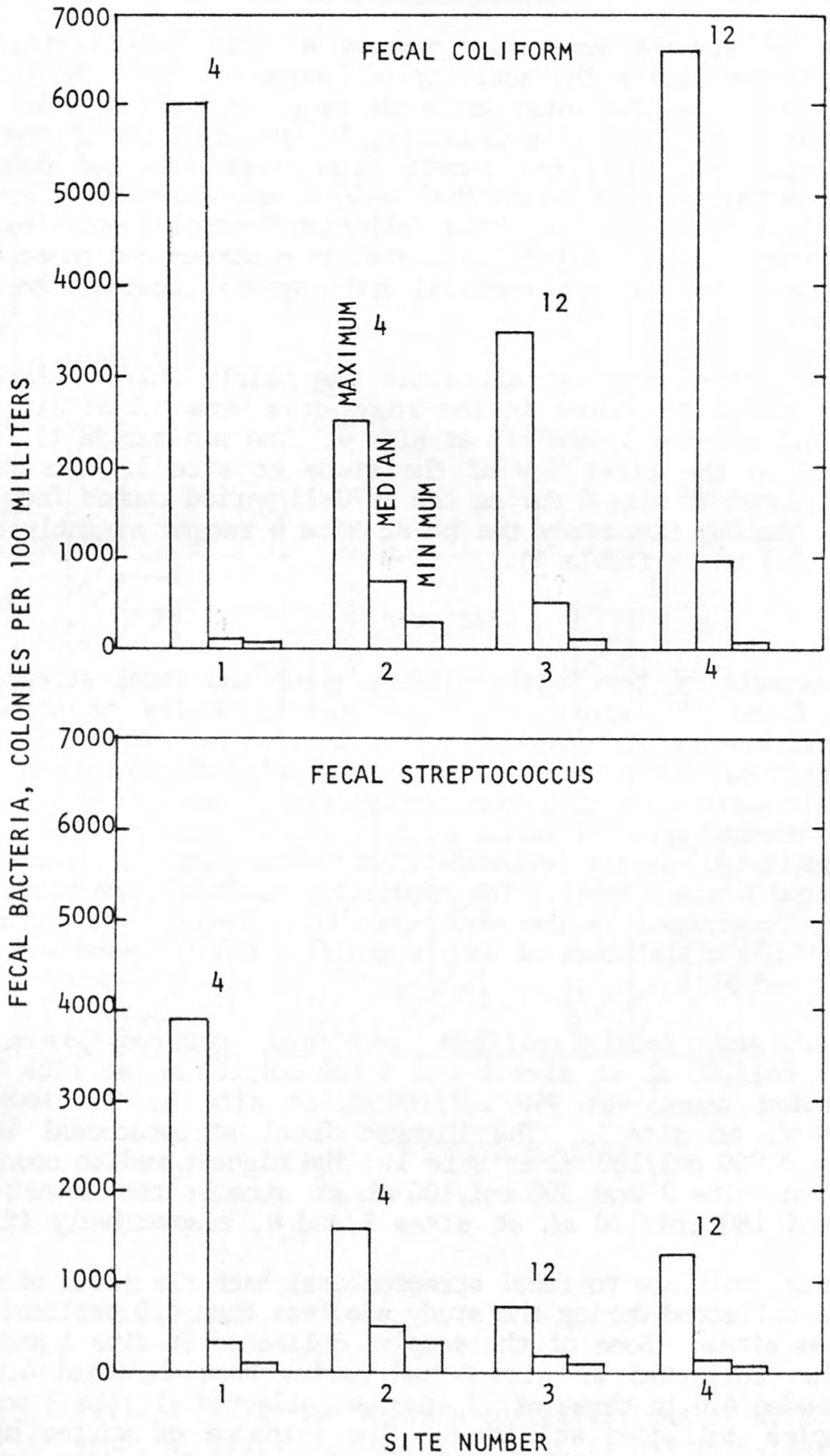

FIGURE 7.--MAXIMUM, MEDIAN, AND MINIMUM CONCENTRATIONS OF FECAL COLIFORM AND FECAL STREPTOCOCCAL BACTERIA AT SAMPLING SITES ON HOBOLOCHITTO CREEK AND TRIBUTARIES, SEPTEMBER 12-14, 1978.

SUMMARY

Hobolochitto Creek is formed at the confluence of East and West Hobolochitto Creeks. An intensive quality-of-water study was conducted on September 12-14, 1978, on Hobolochitto Creek and the lower parts of both tributaries. East and West Hobolochitto Creeks account for about 95 percent of the total drainage. The discharge of Hobolochitto Creek generally was uniform and was about two to three times the 7-day Q_{10} during most of the study. However, the mean discharge at site 3 increased from 77 to 118 ft^3/s during the last 17 hours of the study. The discharge in the lower part of the study area at site 4 was affected slightly by local runoff during the latter part of the study. The increase in discharge at site 3 was attributed to rainfall in the upper part of the West Hobolochitto Creek basin. There was no rainfall reported in the study area, but local rainshowers and some runoff was observed. The average maximum air temperature during the study was 90°F, which equaled the monthly mean maximum air temperature. Water temperatures ranged from 25.0° to 27.5°C (77° to 82°F).

The specific conductance and dissolved-solids concentrations in the water at all sampling sites were uniformly low and generally were lowest in the two tributaries. The specific conductance were less than 55 umho/cm at 25°C in the tributaries and less than 66 umho/cm in Hobolochitto Creek at the downstream site.

The 5-day biochemical oxygen demand was low and was less than 3.0 mg/L at all sites, and dissolved-oxygen concentrations at the upstream sites generally ranged between 6.0 to 7.2 mg/L. Dissolved-oxygen concentrations were generally lower in Hobolochitto Creek at site 4 than at the upstream sites. The dissolved-oxygen concentrations at this downstream site ranged from 4.9 to 7.6 mg/L.

Total nitrogen concentrations ranged from 0.24 to 0.77 mg/L at all sites. The organic nitrogen comprised most of the total nitrogen concentrations and were less than 0.64 mg/L. Ammonia nitrogen and nitrite plus nitrate concentrations were generally low and were less than 0.09 mg/L and 0.08 mg/L, respectively. The maximum total phosphorus concentration observed during the study was 0.07 mg/L.

The fecal bacteria concentrations in several water samples were high, and the presence of wastes of human origin was indicated. The fecal coliform to fecal streptococcal ratios exceeded 4.0 in 10 of 24 samples in Hobolochitto Creek and 1 of 8 samples in the tributary inflow at sites 1 and 2. The concentrations of fecal bacteria were variable. The fecal coliform bacteria concentrations ranged from 54 to 6,600 col/100 mL, and the fecal streptococcal bacteria ranged from 85 to 3,900 col/100 mL.

A time-of-travel study was conducted on a 3.7 mile reach of Hobolochitto Creek. The leading dye edge traveled through the study reach in 22.0 hours and the peak dye concentration in 23.5 hours - an average rate of travel of 0.17 and 0.16 mi/h, respectively.

SELECTED REFERENCES

Brown, E., Skougstad, M. W., and Fishman, J. J., 1970, Methods for collection and analysis of water samples for dissolved minerals and gases: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A1, 160 p.

Geldreich, E. E., and Kenner, B. A., 1969, Concepts of fecal streptococci in stream pollution: Water Pollution Control Federation Journal, v. 41, no. 8, pt. 2, p. 336-352.

Greeson, P. E., and others, ed., 1977, Methods for collection and analysis of aquatic biology and microbiology samples: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A4, 332 p.

Hem, J. D., 1970, Study and interpretations of the chemical characteristics of natural water: second edition, U.S. Geological Survey Water-Supply Paper 1473, 363 p.

Mississippi Air and Water Pollution Control Commission, 1978, 305(B) Water quality report for State of Mississippi, Progress report, 1977-78: 94 p.

National Academy of Sciences and National Academy of Engineering, 1973 [1974], Water quality criteria, 1972: U.S. Environmental Protectior Agency Report EPA R3-73-033, 594 p.

Tharpe, E. J., 1975, Low flow characteristics of Mississippi streams: Mississippi Board of Water Commissioners Bulletin 75-1, 60 p.

U.S. Department of Commerce, Bureau of Census, 1970, Census of population, number of inhabitants, Mississippi: U.S. Government Printing Office, 30 p.

Velz, C. J., 1970, Applied stream sanitation: New York, John Wiley, 619 p.

HYDROLOGIC DATA

TABLE 1. RESULTS OF LABORATORY ANALYSIS, FIELD DETERMINATIONS, HOURLY DISCHARGE AND CONTINUOUS MONITOR VALUES, HOBOLOCHITTO CREEK AND TRIBUTARIES, SEPTEMBER 12-14, 1978.

02492350 - EAST HOBOLOCHITTO CREEK AT SITE 1
LAT 30°32'05" LONG 089°40'29"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
13...	0715	19	38	6.2	25.0	6.0
13...	0940	20	38	6.2	25.0	6.0
13...	1310	19	38	6.0	25.0	6.3
13...	1440	20	38	6.2	26.0	6.4
13...	1700	20	36	6.4	26.0	7.0
13...	1930	20	37	6.8	26.0	7.0
13...	2230	22	37	6.0	26.0	6.8
14...	0235	22	37	6.1	25.5	6.3

TABLE 1. - CONTINUED

02492350 - EAST HOBOLOCHITTO CREEK AT SITE 1
LAT 30°32'05" LONG 089°40'29"

DATE	TIME	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)
SEP								
13...	0715	19	.1	110	640	.04	.00	.04
13...	1310	18	.2	*6000	3900	.04	.00	.04
13...	1700	25	.3	120	140	.04	.00	.04
13...	2230	25	.9	120	120	.04	.00	.04

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC 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, ORTHO. TOTAL (MG/L AS P)
SEP							
13...	.03	.59	.62	.66	2.9	.02	.01
13...	.04	.30	.34	.38	1.7	.02	.01
13...	.02	.26	.28	.32	1.4	.02	.00
13...	.09	.64	.73	.77	3.4	.03	.01

* ESTIMATED COLONY COUNT BASED ON SMALLEST FILTERED VOLUME.

TABLE 1. - CONTINUED

02492450 - WEST HOBOLOCHITTO CREEK AT SITE 2
LAT 30°33'18" LONG 089°41'31"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
13...	0745	40	44	6.2	25.0	6.2
13...	1005	40	43	6.8	25.5	6.6
13...	1255	40	43	6.6	26.0	6.7
13...	1415	40	44	6.5	26.5	7.1
13...	1615	42	45	7.0	27.0	7.2
13...	1915	43	43	7.4	26.0	6.9
13...	2250	44	42	6.4	26.0	7.0
14...	0250	44	43	6.4	25.0	6.8

TABLE 1. - CONTINUED

02492450 - WEST HOBOLOCHITTO CREEK AT SITE 2
LAT 30°33'18" LONG 089°41'31"

DATE	TIME	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)
SEP								
13...	0745	14	.0	*1200	1600	.02	.01	.03
13...	1255	14	.0	2500	560	.02	.01	.03
13...	1615	15	.3	240	390	.02	.00	.02
13...	2250	13	2.8	300	400	.01	.00	.01

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC 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, ORTHO. TOTAL (MG/L AS P)
SEP							
13...	.04	.28	.32	.35	1.6	.02	.01
13...	.03	.40	.43	.46	2.0	.02	.01
13...	.02	.24	.26	.28	1.2	.02	.01
13...	.02	.21	.23	.24	1.1	.02	.00

* NONIDEAL COLONY COUNT

TABLE 1. - CONTINUED

02492500 - HOBOLOCHITTO CREEK AT SITE 3
LAT 30°32'36" LONG 089°41'54"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
12...	0900	75	56	6.0	25.0	6.6
12...	1200	65	55	6.1	26.0	6.9
12...	1410	70	55	6.2	26.5	7.2
12...	1630	67	55	7.1	26.0	7.1
12...	1700	70	55	--	26.0	7.1
12...	1800	75	55	--	26.0	7.0
12...	1900	79	55	--	26.0	7.0
12...	1945	84	55	6.8	26.0	6.9
12...	2000	82	55	--	26.0	6.9
12...	2100	78	54	--	26.0	6.9
12...	2200	75	53	6.9	26.0	7.0
12...	2300	73	53	--	26.0	6.9
12...	2400	73	53	--	26.0	6.9
13...	0100	72	53	--	26.0	6.9
13...	0200	72	53	6.7	26.0	6.9
13...	0300	72	53	--	25.5	6.8
13...	0400	73	53	--	25.5	6.6
13...	0500	73	54	--	25.0	6.4
13...	0600	75	54	6.8	25.0	6.2
13...	0700	75	54	--	25.0	6.3
13...	0800	75	54	--	25.0	6.4
13...	0900	75	54	--	25.0	6.5
13...	0925	75	54	6.7	25.0	6.5
13...	1000	75	54	--	25.5	6.5
13...	1100	75	54	--	25.5	6.5
13...	1200	75	54	--	25.5	6.6
13...	1225	75	54	6.3	25.5	6.6
13...	1300	75	54	--	25.5	6.7
13...	1400	75	54	6.5	26.0	6.9
13...	1500	76	54	--	26.5	7.1
13...	1600	76	54	7.2	27.0	7.3
13...	1700	76	54	--	27.0	7.3
13...	1800	76	52	--	27.0	7.3
13...	1900	76	52	7.2	27.0	7.3
13...	2000	79	52	--	27.0	7.3
13...	2100	82	54	--	26.5	7.2
13...	2200	86	54	--	26.0	7.2
13...	2300	90	56	6.3	25.0	7.2
13...	2400	89	56	--	25.0	7.2

TABLE 1. - CONTINUED

02492500 - HOBOLOCHITTO CREEK AT SITE 3
LAT 30°32'36" LONG 089°41'54"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
14...	0100	86	56	--	25.0	7.1
14...	0200	83	55	--	25.0	7.1
14...	0300	80	54	--	25.0	7.0
14...	0310	79	54	6.2	25.0	7.0
14...	0400	87	52	--	25.0	6.9
14...	0500	95	50	--	25.0	6.9
14...	0600	107	49	6.6	25.0	6.8
14...	0700	113	49	--	25.0	6.8
14...	0800	116	49	--	25.0	6.8
14...	0900	117	48	--	25.5	6.7
14...	0930	117	48	6.0	25.5	6.7
14...	1000	117	48	--	26.0	6.8
14...	1034	117	50	--	26.0	6.9
14...	1100	117	50	--	26.5	7.0
14...	1200	119	52	--	26.5	7.2
14...	1235	120	52	6.5	27.0	7.3
14...	1300	119	52	--	27.0	7.2
14...	1400	117	50	--	27.0	6.9
14...	1415	117	50	6.3	27.0	6.8
14...	1500	119	50	--	27.5	7.0
14...	1600	120	50	6.4	27.5	7.3
14...	1700	120	50	--	27.5	7.2
14...	1800	120	50	--	27.0	7.0
14...	1900	120	50	--	27.0	6.8
14...	1950	120	50	6.5	26.5	6.6
14...	2000	120	50	--	26.5	6.6
14...	2100	120	50	--	26.0	6.7
14...	2200	119	50	--	26.0	6.7
14...	2220	119	50	6.5	26.0	6.8

TABLE 1. - CONTINUED

02492500 - HOBOLOCHITTO CREEK AT SITE 3
LAT 30°32'36" LONG 089°41'54"

WATER QUALITY DATA, WATER YEAR OCTOBER 1977 TO SEPTEMBER 1978

DATE	TIME	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	OXYGEN DEMAND, BIOCHEMICAL, 5 DAY (MG/L)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)
SEP								
12...	0605	13	.4	120	200	.03	.01	.04
12...	1200	19	.9	180	200	.03	.01	.04
12...	1630	20	.6	*1500	200	.04	.01	.05
12...	2200	19	1.0	3500	420	.04	.00	.04
13...	0600	14	.9	820	180	.04	.00	.04
13...	1225	19	.5	460	660	.03	.01	.04
13...	1600	15	.6	260	300	.03	.01	.04
13...	2300	17	1.8	640	380	.03	.01	.04
14...	0600	16	.5	* 460	300	.03	.01	.04
14...	1235	15	.5	280	180	.02	.01	.03
14...	1600	20	.7	800	120	.02	.01	.03
14...	2220	19	.8	680	200	.03	.01	.04

* NONIDEAL COLONY COUNT.

TABLE 1. - CONTINUED

02492500 - HOBOLOCHITTO CREEK AT SITE 3
LAT 30°32'36" LONG 089°41'54"

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, ORGANIC 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, ORTHO. TOTAL (MG/L AS P)
SEP							
12...	.02	.40	.42	.46	2.0	.02	.01
12...	.01	.27	.28	.32	1.4	.07	.01
12...	.01	.31	.32	.37	1.6	.03	.02
12...	.01	.43	.44	.48	2.1	.03	.02
13...	.00	.38	.38	.42	1.9	.03	.02
13...	.01	.27	.28	.32	1.4	.03	.02
13...	.00	.24	.24	.28	1.2	.03	.02
13...	.02	.42	.44	.48	2.1	.03	.01
14...	.01	.24	.25	.29	1.3	.03	.02
14...	.01	.41	.42	.45	2.0	.03	.02
14...	.00	.42	.42	.45	2.0	.03	.02
14...	.01	.44	.45	.49	2.2	.03	.02

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
11...	1825	104	65	--	26.5	6.3
11...	1900	104	65	--	--	--
11...	2000	104	65	--	--	--
11...	2100	104	65	--	--	--
11...	2200	104	65	--	--	--
11...	2300	104	65	--	--	--
11...	2400	104	65	--	--	--
12...	0100	104	65	--	--	--
12...	0200	104	65	--	--	--
12...	0300	104	65	--	--	--
12...	0400	104	65	--	--	--
12...	0500	104	65	--	--	--
12...	0600	104	65	--	--	--
12...	0700	104	66	5.9	25.0	6.0
12...	0800	104	66	--	--	--
12...	0900	103	65	--	--	--
12...	0945	103	64	6.1	25.5	5.8
12...	1000	103	64	--	--	--
12...	1100	102	64	--	--	--
12...	1200	102	63	--	--	--
12...	1230	101	63	6.2	26.0	5.7
12...	1300	101	63	--	--	--
12...	1400	100	64	--	--	--
12...	1435	99	64	6.4	26.0	5.7
12...	1500	99	64	--	--	--
12...	1600	99	64	--	--	--
12...	1700	100	65	--	--	--
12...	1715	100	65	6.8	26.0	5.4
12...	1800	100	65	--	--	--
12...	1900	100	64	--	--	--
12...	2000	100	64	5.9	26.0	5.8
12...	2100	100	64	--	--	--
12...	2200	100	64	--	--	--
12...	2230	100	63	6.8	26.0	5.9
12...	2300	100	63	--	--	--
12...	2400	100	63	--	--	--
13...	0100	101	63	--	--	--
13...	0200	101	63	--	--	--
13...	0230	101	63	6.8	26.0	4.9

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
13...	0300	101	63	--	--	--
13...	0400	100	63	--	--	--
13...	0500	100	63	--	--	--
13...	0600	99	64	--	--	--
13...	0645	99	64	6.2	26.0	5.2
13...	0700	99	64	--	--	--
13...	0800	100	64	--	--	--
13...	0900	100	64	6.6	25.0	5.7
13...	1000	100	64	--	--	--
13...	1100	100	64	--	--	--
13...	1155	101	64	6.2	26.0	5.3
13...	1200	101	64	--	--	--
13...	1300	102	64	--	--	--
13...	1400	102	64	--	--	--
13...	1500	103	64	--	--	--
13...	1510	103	65	6.5	26.5	5.7
13...	1600	103	62	--	--	6.6
13...	1645	104	62	6.8	27.0	7.6
13...	1700	104	62	--	--	7.2
13...	1800	104	62	--	--	6.7
13...	1900	104	63	--	--	6.1
13...	1945	103	63	7.1	26.5	5.7
13...	2000	103	63	--	--	5.8
13...	2100	102	63	--	--	6.0
13...	2200	101	63	--	--	6.3
13...	2215	100	63	6.8	26.0	6.4
13...	2300	100	63	--	--	6.4
13...	2400	100	63	--	--	6.3
14...	0100	101	63	--	--	6.2
14...	0200	101	63	--	--	6.1
14...	0220	101	63	6.7	26.0	6.1
14...	0300	103	63	--	--	6.1
14...	0400	106	63	--	--	6.0
14...	0500	109	63	--	--	5.9
14...	0600	112	62	--	--	5.8
14...	0630	114	60	6.4	26.0	5.8
14...	0700	115	60	--	--	5.8
14...	0800	116	61	--	--	5.8
14...	0900	117	61	6.4	26.0	5.8

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
SEP						
14...	1000	117	62	--	--	5.9
14...	1007	117	62	6.5	26.5	5.9
14...	1100	118	62	--	--	5.9
14...	1200	120	62	--	--	5.9
14...	1205	120	62	6.5	26.5	5.9
14...	1300	118	62	--	--	5.8
14...	1400	117	63	6.0	27.0	5.7
14...	1500	120	62	--	--	5.9
14...	1545	121	61	6.3	27.0	6.1
14...	1600	121	61	--	--	6.1
14...	1700	121	61	--	--	6.1
14...	1800	121	61	--	--	6.0
14...	1900	121	62	--	--	6.0
14...	1905	121	62	6.3	26.0	6.0
14...	2000	121	62	--	--	5.9
14...	2100	121	62	--	--	5.9
14...	2200	121	62	6.3	25.5	5.8

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	TIME	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)
SEP								
12...	0700	18	.8	*54	100	.06	.00	.06
12...	1230	19	.5	*73	310	.05	.01	.06
12...	1715	16	.5	780	180	.05	.01	.06
12...	2230	19	.4	3300	580	.06	.01	.07
13...	0645	17	.4	*2100	180	.05	.01	.06
13...	1155	19	.1	*6600	300	.05	.01	.06
13...	1645	16	.4	*81	*100	.05	.01	.06
13...	2215	31	2.9	*1300	*85	.05	.01	.06
14...	0630	17	.6	*1200	280	.05	.01	.06
14...	1205	16	.5	*330	180	.05	.00	.05
14...	1545	17	.4	1200	120	.05	.00	.05
14...	2200	24	.7	*88	1300	.08	.00	.08

* NONIDEAL COLONY COUNT.

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC 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, ORTHO. TOTAL (MG/L AS P)
SEP							
12...	.02	.42	.44	.50	2.2	.04	.02
12...	.02	.47	.49	.55	2.4	.05	.02
12...	.02	.30	.32	.38	1.7	.04	.05
12...	.03	.27	.30	.37	1.6	.04	.02
13...	.02	.23	.25	.31	1.4	.04	.02
13...	.02	.38	.40	.46	2.0	.04	.02
13...	.02	.31	.33	.39	1.7	.04	.02
13...	.03	.49	.52	.58	2.6	.04	.02
14...	.03	.34	.37	.43	1.9	.03	.02
14...	.01	.33	.34	.39	1.7	.02	.03
14...	.01	.32	.33	.38	1.7	.04	.03
14...	.07	.48	.55	.63	2.8	.04	.03

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	TIME	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO
SEP								
14...	1905	50	8	0	1.7	.9	8.4	1.3

DATE	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)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)
SEP									
14...	18	0	15	14	3.8	6.0	.0	14	53

DATE	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	ARSENIC TOTAL (UG/L AS AS)	ARSENIC TOTAL IN BOTTOM MATERIAL (UG/G AS AS)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G)
SEP									
14...	44	.07	17.3	1	0	1	<10	<10	<10

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)
SEP									
14...	0	<10	1	<10	880	200	5	20	70

DATE	MANGA-NESE, RECOV. FM BOT-TOM MA-TERIAL (UG/G)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY RECOV. FM BOT-TOM MA-TERIAL (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, TOTAL IN BOT-TOM MA-TERIAL (UG/G)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN)
SEP									
14...	<10	<.5	.0	3	<10	0	0	10	<10

DATE	CARBON, ORGANIC TOTAL (MG/L AS C)	PHENOLS (UG/L)	OIL AND GREASE, TOTAL RECOV. GRAVI-METRIC (MG/L)
SEP			
14...	6.6	9	1

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	NAPH- THA- LENES, POLY- CHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	CHLOR- DANE, TOTAL (UG/L)	CHLOR- DANE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
SEP									
14...	.0	0	.00	.00	.0	.0	0	.00	.0

DATE	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- AZINON, TOTAL (UG/L)	DI- AZINON, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DI- ELDRIN TOTAL (UG/L)	DI- ELDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ENDO- SULFAN, TOTAL (UG/L)
SEP									
14...	.00	.0	.00	.0	.00	.0	.00	.0	.00

DATE	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR, TOTAL (UG/L)	HEPTA- CHLOR, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	HEPTA- CHLOR EPOXIDE TOTAL (UG/L)	HEPTA- CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)
SEP									
14...	.00	.0	.00	.0	.00	.0	.00	.0	.00

TABLE 1. - CONTINUED

02492502 - HOBOLOCHITTO CREEK AT SITE 4
LAT 30°32'23" LONG 089°44'25"

DATE	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG)	METHYL TRITHION, TOTAL (UG/L)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG)
SEP									
14...	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4-D, TOTAL (UG/L)
SEP									
14...	.00	.00	.0	.00	0	0	.00	.0	.00

DATE	2,4-D, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4,5-T TOTAL (UG/L)	2,4,5-T TOTAL IN BOTTOM MATERIAL (UG/KG)	SILVEX, TOTAL (UG/L)	SILVEX, TOTAL IN BOTTOM MATERIAL (UG/KG)
SEP					
14...	0	.00	0	.00	.0