UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

# QUALITY OF WATER AND TIME-OF-TRAVEL IN BAKERS CREEK NEAR CLINTON, MISSISSIPPI

Open-File Report 82-427



Prepared in cooperation with the

Mississippi Department of Natural Resources
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by

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UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

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

Factors for converting inch-pound units to metric units are shown below to four significant figures. In the text, metric equivalents are shown only to the number of significant figures consistent with the accuracy of analytical determinations or measurement.

| Multiply | By | To obtain |
|---|---|---|
| inch (in) | 25.4 | millimeter (mm) |
| foot (ft) | 0.3048 | meter (m) |
| mile (mi) | 1.609 | kilometer (km) |
| square mile ($mi^2$) | 2.590 | square kilometer ($km^2$) |
| cubic foot per second ($ft^3/s$) | 0.02832 | cubic meter per second ($m^3/s$) |

Throughout this report water temperatures are reported in degrees Celsius. Temperatures may be converted to either the Celsius or Fahrenheit equivalent with the following formulas:

$$°F = 9/5\ (°C) + 32 \text{ or } °C = 5/9 \times (°F-32)$$

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada, formerly called "Mean Sea Level". NGVD of 1929 is referred to as sea level in this report.

# QUALITY OF WATER AND TIME-OF-TRAVEL IN BAKERS CREEK

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## ABSTRACT

A short-term intensive quality-of-water study was conducted during a period of generally low streamflow in Bakers Creek and its tributary, Lindsey Creek, near Clinton, Mississippi.

During the September 15-18, 1980 study, dissolved oxygen concentrations in Bakers Creek were less than 5 milligrams per liter. The specific conductance, 5-day biochemical oxygen demand, nutrient concentrations, and bacteria densities in Bakers Creek decreased downstream through the study reach. The mean specific conductance decreased from 670 micromhos per centimeter to 306 micromhos per centimeter. The 5-day biochemical oxygen demand decreased from 19 milligrams per liter to 2.8 milligrams per liter. The mean total nitrogen and phosphorus concentrations decreased from 10 and 7.1 milligrams per liter to 1.0 and 0.87 milligram per liter, respectively. The maximum fecal bacteria decreased from 7,200 colonies per 100 milliliter to 400 colonies per 100 milliliter.

The concentrations of mercury (0.4 micrograms per liter), iron (3,400 micrograms per liter), and manganese (1,100 micrograms per liter) in a sample collected at the downstream site exceeded recommended limits. Diazinon (0.01 micrograms per liter) and 2,4-D (0.02 micrograms per liter) were also present in the water. A bottom material sample contained DDD (2.5 micrograms per kilogram), DDE (2.7 micrograms per kilogram), and DDT (.3 micrograms per kilogram).

The tributary inflow from Lindsey Creek did not improve the water quality at downstream sites on Bakers Creek. The dissolved oxygen concentrations were generally less than 5.0 milligrams per liter at the sampling site on Lindsey Creek. The 5-day biochemical oxygen demand, the mean specific conductance, and fecal coliform densities were greater in the tributary than at the downstream site on Bakers Creek.

The average rate of travel through a 1.8 -mile reach of Bakers Creek was 0.06 foot per second or 0.04 miles per hour.

# INTRODUCTION

Water is one of the major resources of the state of Mississippi. In order to efficiently utilize and conserve this resource, the Mississippi Department of Natural Resources, Bureau of Pollution Control, is developing a statewide waste-treatment management program. In order to develop this program, the U.S. Geological Survey in cooperation with the Bureau of Pollution Control is providing water quality data necessary for determining the waste assimilation capacity of various freshwater and tidal streams in the state.

The water quality and time-of-travel data in this report are the result of a short-term intensive study on Bakers and Lindsey Creeks near Clinton from September 15 to September 18, 1980. Chemical, physical, bacteriological, and discharge data were collected at four sites (sites 2 through 5). Both water quality and time of travel data were collected at site 1. Three sites (A,B, and C) were used only for the time of travel study.

# DESCRIPTION OF THE AREA

## Location

The study area is located near the city of Clinton, Mississippi. Clinton is located in west-central Mississippi in Hinds County adjacent to the city of Jackson, Mississippi. Figure 1 shows the location of the study area, the water quality, and time of travel sampling sites.

## Cultural Features

Clinton is a rapidly growing city adjacent to Jackson, Mississippi. The preliminary 1980 census figures show the population of Clinton was 14,634. The population was 7,246 and 3,438 in 1970 and 1960, respectively, or a 100-percent population increase in each of the last two decades.

A variety of industries produce many products including steel products, wood products, wiring harnesses, boat accessories, packaging materials, and chemical coatings. The agricultural industry, including cotton and soybean farming, is an important part of the economy of the study area.

## Climate

The study area has a humid subtropical climate which is influenced by the continental land mass to the north and the Gulf of Mexico to the south. The summers are long and humid and the winters are normally short and mild. The average annual temperature at the NOAA (National Oceanic and Atmospheric Administration) weather-reporting station in Jackson is 65°F with an average August temperature of 76°F. The normal rainfall is 49 inches per year. Maximum temperatures attained during the study were above 90°F for three of the four days and greater than 100°F for two days. The maximum, minimum, and mean air temperatures reported by the Jackson NOAA weather station are listed in the following table.

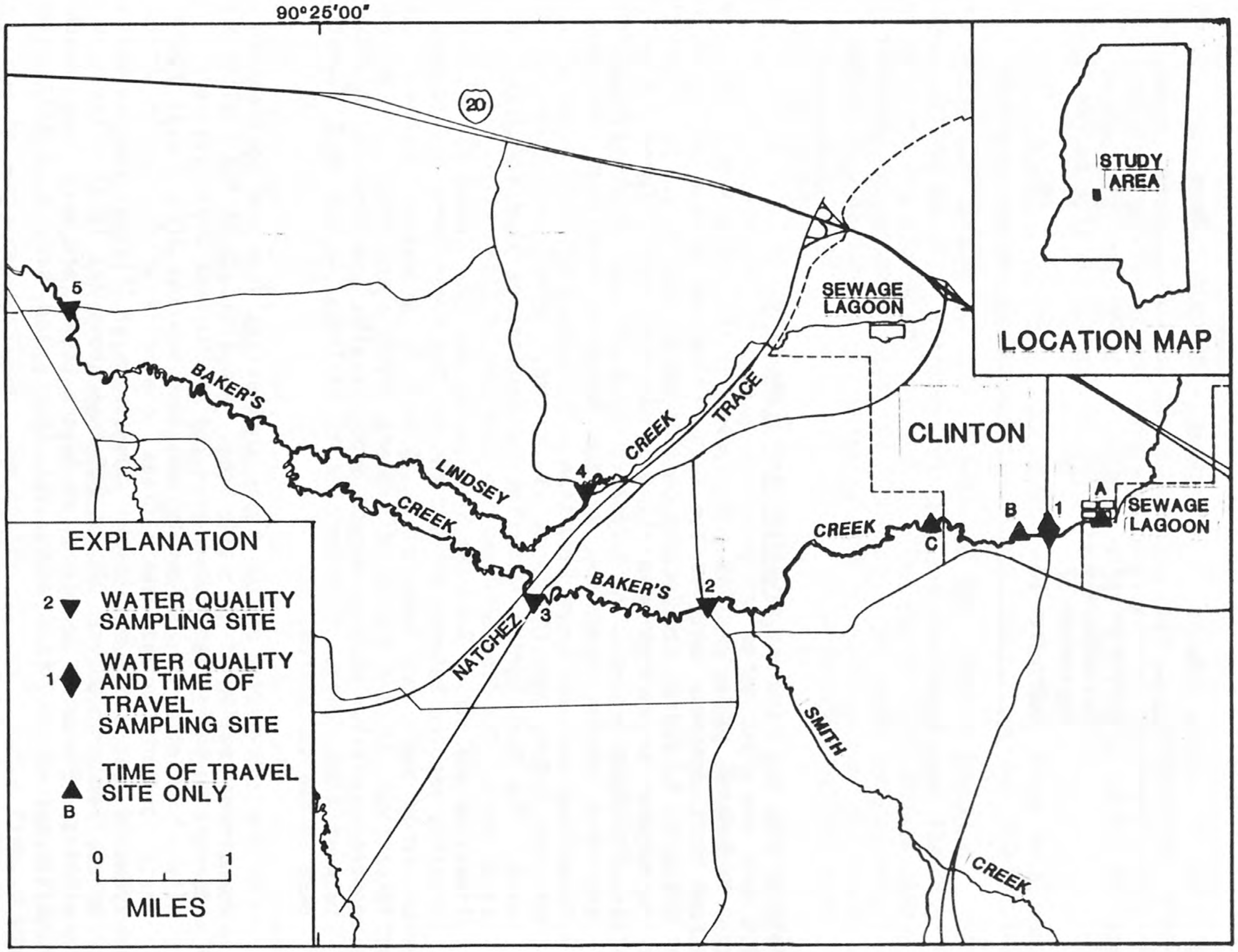


FIGURE 1.--LOCATION OF STUDY AREA, WATER-QUALITY SITES, AND TIME OF TRAVEL SITES ON BAKER'S AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

| Date | Temperature in degrees Fahrenheit Maximum | Minimum | Mean |
|---|---|---|---|
| September 15 | 104 | 69 | 87 |
| September 16 | 101 | 72 | 87 |
| September 17 | 80 | 67 | 74 |
| September 18 | 93 | 64 | 79 |

Moderate rainfall was observed during two days of the study. The rainfall was localized and the precipitation recorded at the Jackson NOAA weather station may only approximate the amount and time the rain fell in the study area. From 1500 to 1700 hours on September 16, 0.02 inch were reported. The following day a total of 0.12 inches fell from 0700 to 1100 hours.

## Geology and Topography

Several geologic units are exposed in the study area. The oldest and most upstream unit is the Yazoo Formation of the Jackson Group. Sites 1, A, and B, are located on this unit. The Forest Hill Formation is exposed in an approximately 0.5-mile-wide band between the Jackson and Vicksburg Groups. The Vicksburg Group includes in downstream order, the Mint Spring Formation of the Marianna Formation, the Glendon Formation, and the Byram Formation. The Forest Hill Formation consists of sand, clay, and thin beds of lignite. Site C is located on this unit. The Mint Spring Formation is composed of sand and fossilferous sandy marl. The Glendon Formation consists of alternating beds of sandy limestone and marl. Both the Mint Spring and the Glendon Formations are probably exposed between sites C and 3. The Byram Formation is composed of sandy marl and limey clay. Site 5 is probably located on this formation. In the valley of Bakers Creek these units are generally covered by alluvium and terrace deposits with indeterminate boundaries between them. Loess is restricted to hilltops in the most downstream part of the study area.

The topography of the study area varies from the upstream to the downstream section of the study area. The altitude of the lowland areas adjacent to the streams range from 260 to 300 feet above sea level. The city of Clinton is located in one such lowland area. Just south of these lowlands beyond Bakers Creek, are hills which rise to altitudes over 400 feet above sea level. Downstream of Clinton, the lowlands are broader and range from 220 to 260 feet above sea level. The adjacent hills to the north and south at Bakers Creek, are much lower reaching altitudes of 320 feet above sea level, and have a moderate slope.

Much of the land near the origin of Bakers Creek and several miles downstream is developed as residential areas of Clinton. In the non-residential areas, heavy vegetation covers the lowland adjacent to the streams flowing through the area. Large areas of lowlands are used to grow cotton and soybeans. Some of the upland areas are also used for agricultural purposes.

## STREAM CHARACTERISTICS

### Drainage

Bakers Creek originates in Clinton, flowing south past the Clinton sewage lagoons, then west-northwest through the study area, emptying into Fourteen-mile Creek approximately 18 miles southwest of Clinton. The drainage area is 8.6 $mi^2$ (square miles) at site 1, 22 $mi^2$ at site 2, 27 $mi^2$ at site 3, and approximately 45 $mi^2$ at site 5.

Lindsey Creek also originates in Clinton and flows west past an auxillary sewage lagoon and then south paralleling the Natchez Trace. The drainage area at site 4 is 7.6 $mi^2$.

### Channel Morphology and Stream Gradient

The channel of Bakers Creek ranged from 30 to 70 feet wide at the water quality sampling sites (fig. 2). The channel at site 1 was approximately 30 feet wide with steep 7 feet high banks. The channel at sites 2, 3, and 5 on Bakers Creek was approximately 70 feet wide. The banks were 10 to 14 feet high with steep right banks and more moderately sloping left banks. During the study the water depth was from 0.5 to 2.0 feet at sites 1, 3, and 5. However, the water was 7 feet deep at site 2. The channel of Lindsey Creek at site 4 was about 30 feet wide with nearly vertical 5 foot high banks. Water depth was about 2.0 feet. The altitude of Bakers Creek ranges from approximately 290 feet above sea level at time-of-travel site A in Clinton to 190 feet at site 5. The fall for this 16 mile stretch of Bakers Creek is 6.2 ft/mi. The mean fall from time-of-travel site A to time-of-travel site B is 9.5 ft/mi (feet per mile) and the fall from site A to site C is approximately 8 ft/mi.

### Streamflow

Low streamflow and or ponding caused the flow to be extremely sluggish at all sites on Bakers Creek and at site 4 on Lindsey Creek. The sluggish nature of the flow made reliable discharge measurements difficult to obtain.

Streamflow was usually less than 1.5 $ft^3/s$ at all sites throughout the study. The mean streamflow, most of which originated from Clinton's sewage lagoons, was 0.73 $ft^3/s$ at site 1 increasing to 1.3 $ft^3/s$ at site 3. The mean discharge was 0.19 $ft^3/s$ at site 4 on Lindsey Creek and 1.0 $ft^3/s$ at site 5 on Bakers Creek.

Differences in streamflow at the sampling sites was probably due to a variety of causes. Some ground-water inflow from the Forrest Hill Formation, the Mint Spring Formation, and the Glendon Formation occurred during the study period. Downstream of site 3, streamflow may decrease due to evapotransporation. Due to the extreme sluggish flow, discharge at site 5 may also have been influenced by rainfall occurring five days before the study began; however, sufficient data is not available to reliably determine the possible sources and their contribution to streamflow at site 5.

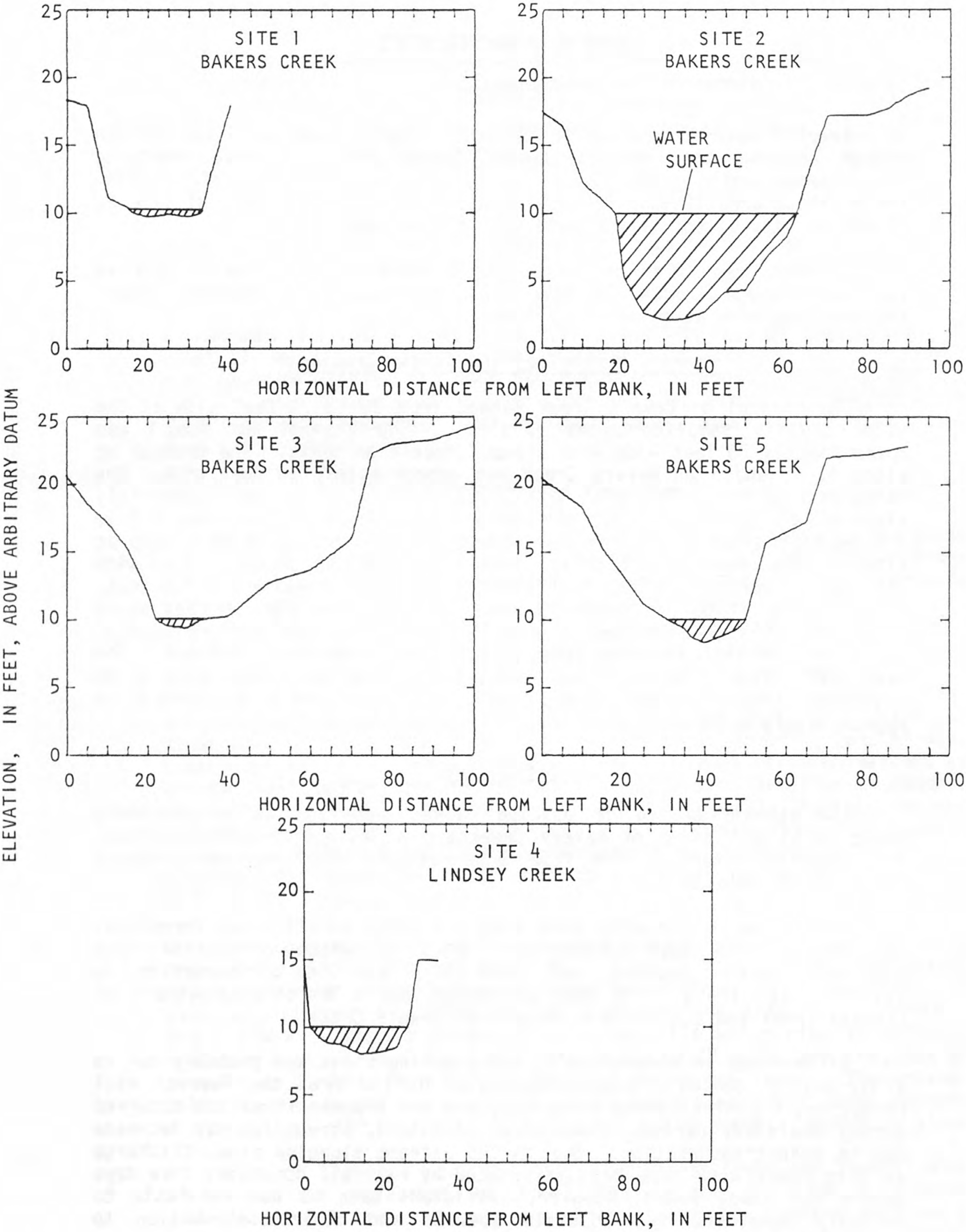


FIGURE 2.--CHANNEL CROSS SECTIONS AT THE WATER-QUALITY SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

Streamflow, caused by increased runoff from rainfall, increased approximately 0.2 to 0.3 $ft^3/s$ at each site on September 17. Discharges began to increase at approximately 0900 hours and peaked at 1500 hours at sites 1 to 4. However, streamflow at site 5 did not increase until 1500 hours and reached a maximum discharge at 1900 hours. The rise at site 5 may have been due to the effects of localized runoff in the upper part of the basin which reached site 5 at a later time. Also after the initial peak a secondary peak was observed at sites 3 and 5 (fig. 3). This may have been due to tributary inflow and local runoff.

The 7-day $Q_{10}$ (7-day minimum flow with a 10-year recurrence interval) was exceeded at two sites during the study. Discharge from Clinton's sewage disposal lagoon was the source of flow in Bakers Creek at site 1 during most of the study. No flow was observed upstream of the lagoons. The 7-day $Q_{10}$ at site 1 is estimated to be 0.09 $ft^3/s$ while the actual mean discharge was 0.73 $ft^3/s$. The mean discharge at site 3 on Bakers Creek (1.3 $ft^3/s$) was also greater than the 7-day $Q_{10}$ (0.38 $ft^3/s$). The mean discharge at site 5 on Bakers Creek and site 4 on Lindsey Creek was about equal to the 7-day $Q_{10}$ (Tharpe, 1975, p. 19). Discharge was 0.19 $ft^3/s$ at site 4 on Lindsey Creek and 1.0 $ft^3/s$ at site 5 on Bakers Creek.

## TIME-OF-TRAVEL

Time-of-travel refers to the rate that dissolved substances move downstream while mixing vertically and laterally within the stream itself. A substance added to a stream will disperse first in the vertical direction. Lateral mixing is completed later depending upon the width of the stream and its velocity.

Rhodamine WT dye was the tracer dye because it behaves in the same manner as water particles. Thus, the rate of movement of the dye in Bakers Creek will be similar to the movement of solutes in the water.

The dye was injected at site A on Bakers Creek at 1315 hours on September 15. The peak dye concentration traveled 0.5 mile downstream to site 1 in 6 hours. The average rate of dye travel between the two sites was 0.12 ft/s. An additional 6.75 hours was required for the peak dye concentration to travel approximately 700 feet to site B. The average rate of travel from site A to B was 0.07 ft/s. The peak dye concentration traveled the approximately 1.8 miles from site A to site C in 51.5 hours. A small increase in discharge on September 17 may have caused a slight increase in the rate of travel through this section. The average rate of travel through the 1.8-mile reach from site A to C was 0.05 ft/s or 0.035 miles per hour (fig. 4).

## WATER-QUALITY-DATA COLLECTION AND ANALYSIS

The assessment of the water quality in the study area is based on chemical, physical, and bacteriological analysis of samples collected on Bakers and Lindsey Creeks. Four water-quality sampling sites were located on Bakers Creek and one on Lindsey Creek. Site 1 on Bakers Creek was located near the south edge of Clinton. The discharge from the Clinton sewage treatment lagoon entered Bakers Creek 0.5 mile

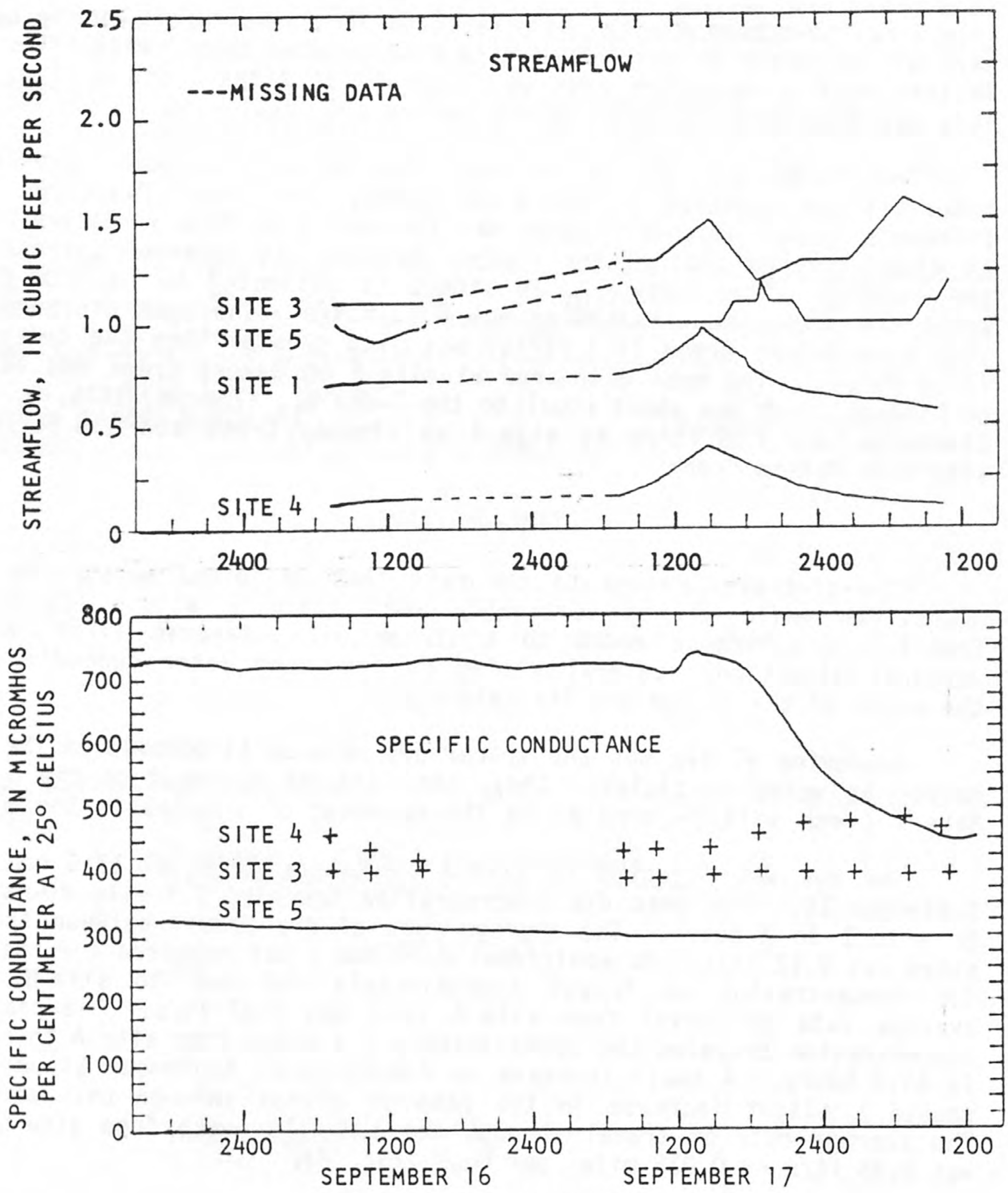


FIGURE 3.--STREAMFLOW AND SPECIFIC CONDUCTANCE AT THE WATER-QUALITY SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

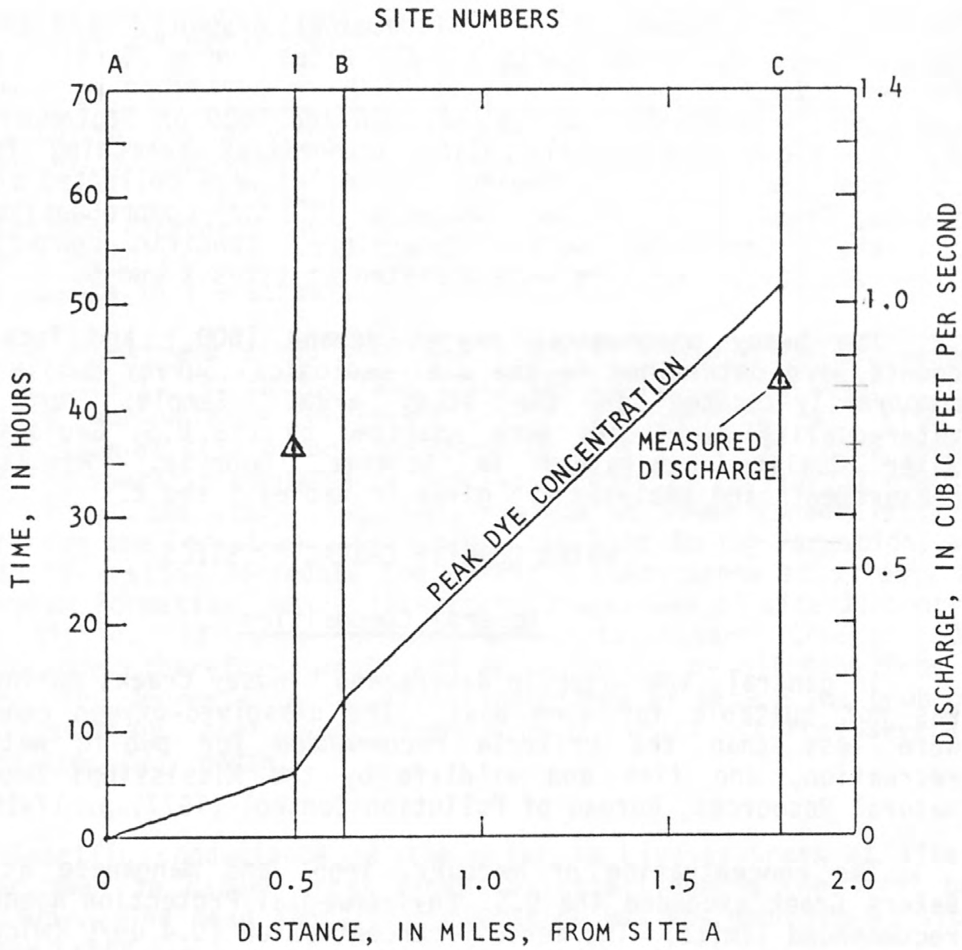


FIGURE 4.--TIME-OF-TRAVEL OF PEAK DYE CONCENTRATION AND DISCHARGE IN BAKERS CREEK, SEPTEMBER 15-17, 1980. (DYE INJECTED AT SITE A)

upstream from site 1. Site 2 was 4.0 miles downstream from site 1. Site 3 on Bakers Creek and site 4 on Lindsey Creek were located near the Natchez Trace. Site 4 on Lindsey Creek was 3.5 miles upstream of the confluence with Bakers Creek and approximately 2.75 miles downstream of one of Clinton's sewage lagoons. Site 5 was located approximately 3.0 miles downstream of the confluence of Bakers and Lindsey Creeks (fig. 1).

Field measurements were made at approximately 4-hour intervals. Nutrient samples were collected at approximately 8-hour intervals at all but site 2 on Bakers Creek. Biochemical oxygen demand and bacteria samples were collected twice at all sites, once starting at 1400 on September 16 and once starting at 0600, on September 17. Sampling was suspended between 1500 on September 16 and 0600 on September 17, 1980, at the request of local police authorities searching for escaped convicts. Water and bottom-material samples were collected at site 5 on Bakers Creek at 1520 on September 17 for comprehensive chemical analysis. Continuous water temperature, specific conductance, and dissolved oxygen monitors were operated at sites 1 and 5.

The 5-day biochemical oxygen demand ($BOD_5$) and fecal bacteria counts were determined in the U.S. Geological Survey Mobile Laboratory temporarily located in the study area. Samples for the other water-quality parameters were analyzed by the U.S. Geological Survey Water Quality Laboratory in Atlanta, Georgia. Results of all measurements and analyses are given in tables 1 and 2.

## WATER QUALITY CHARACTERISTICS

### General Composition

In general, the water in Bakers and Lindsey Creeks during the study was not suitable for some uses. The dissolved-oxygen concentrations were less than the criteria recommended for public water supply, recreation, and fish and wildlife by the Mississippi Department of Natural Resources, Bureau of Pollution Control (1977, p. 17-18).

The concentration of mercury, iron, and manganese at site 5 on Bakers Creek exceeded the U.S. Environmental Protection Agency's (1976) recommended limits. The mercury concentration (0.4 ug/L (micrograms per liter)) exceeded the recommended limit of 0.05 ug/L for fish and wildlife. The iron and manganese concentrations were 3,400 and 1,100 ug/L, respectively. The recommended limits for domestic water supplies are 300 ug/L and 50 ug/L for iron and manganese, respectively. Several pesticides and herbicides were present in the water and bottom material at site 5 on Bakers Creek. Diazinon (0.01 ug/L) and 2,4-D (0.02 ug/L) were present in the water and DDD (2.5 ug/kg (microgram per kilogram)), DDE (2.7 ug/kg), and DDT (0.3 ug/kg) were present in the bottom material.

## Specific Conductance

Specific conductance is the ability of water to conduct an electrical current. Increased specific conductance usually is due to an increase of dissolved solids and or ionic species. Distilled water has a very low conductance, less than one umho/cm (micromho per centimeter) at 25.0°C. Surface waters in Mississippi have a wide range of specific conductance from less than 50 umhos/cm in some inland streams to greater than 20,000 umhos/cm in estuaries along the Gulf Coast. The mean specific conductance in Bakers Creek ranged from 670 umhos/cm at site 1 to 306 umhos/cm at site 5. In Lindsey Creek, the mean specific conductance was 454 umhos/cm at site 4.

The specific conductance values at site 1 on Bakers Creek ranged from 706 to 740 umhos/cm during the first 48 hours of the study. A higher dissolved-solids concentration in the surface runoff may have caused the slight increase to 740 umhos/cm. After the rise the specific conductance decreased to 448 umhos/cm (fig. 3). The decreased specific conductance likely was the result of a general "flushing" of soluble constituents in the stream.

At downstream sites the mean specific conductance decreased from that at site 1, indicating less dissolved solids in the water. The mean specific conductance decreased from 413 umhos/cm at site 2, to 397 umhos/cm at site 3, and 306 umhos/cm at site 5. At these downstream sites the specific conductance was fairly uniform varying 31 umhos/cm or less through the study (fig. 5A). Inflow of lower conductivity ground water from the Forest Hill Formation, the Mint Spring Formation, and the Glendon Formation decreased the specific conductance at sites 2 and 3. The Byram Formation, which is exposed downstream of site 3, contributes very little, if any, ground water to Bakers Creek. Specific conductance, therefore, would not be decreased by dilution from ground water. The decrease in specific conductance at site 5 was probably due to dilution by local runoff from rainfall which occurred several days before the study began.

Specific conductance of the water in Lindsey Creek at site 4 was higher than in Bakers Creek except at site 1 during the first part of the study. The mean specific conductance was 454 umhos/cm at site 4 on Lindsey Creek.

## Water Temperature

Water temperature is an important property to consider when determining the waste assimilation capacity of a stream. The solubility of dissolved gases, rates of chemical reactions, and biological activity are affected by changing water temperatures. For example, the solubility of oxygen decreases with increasing stream temperature, the use of dissolved oxygen by chemical reactions and aquatic organisms increases with increasing temperature, and the mortality rate of fecal bacteria is higher at increased stream temperatures. The water temperature in Bakers Creek became progressively cooler downstream from

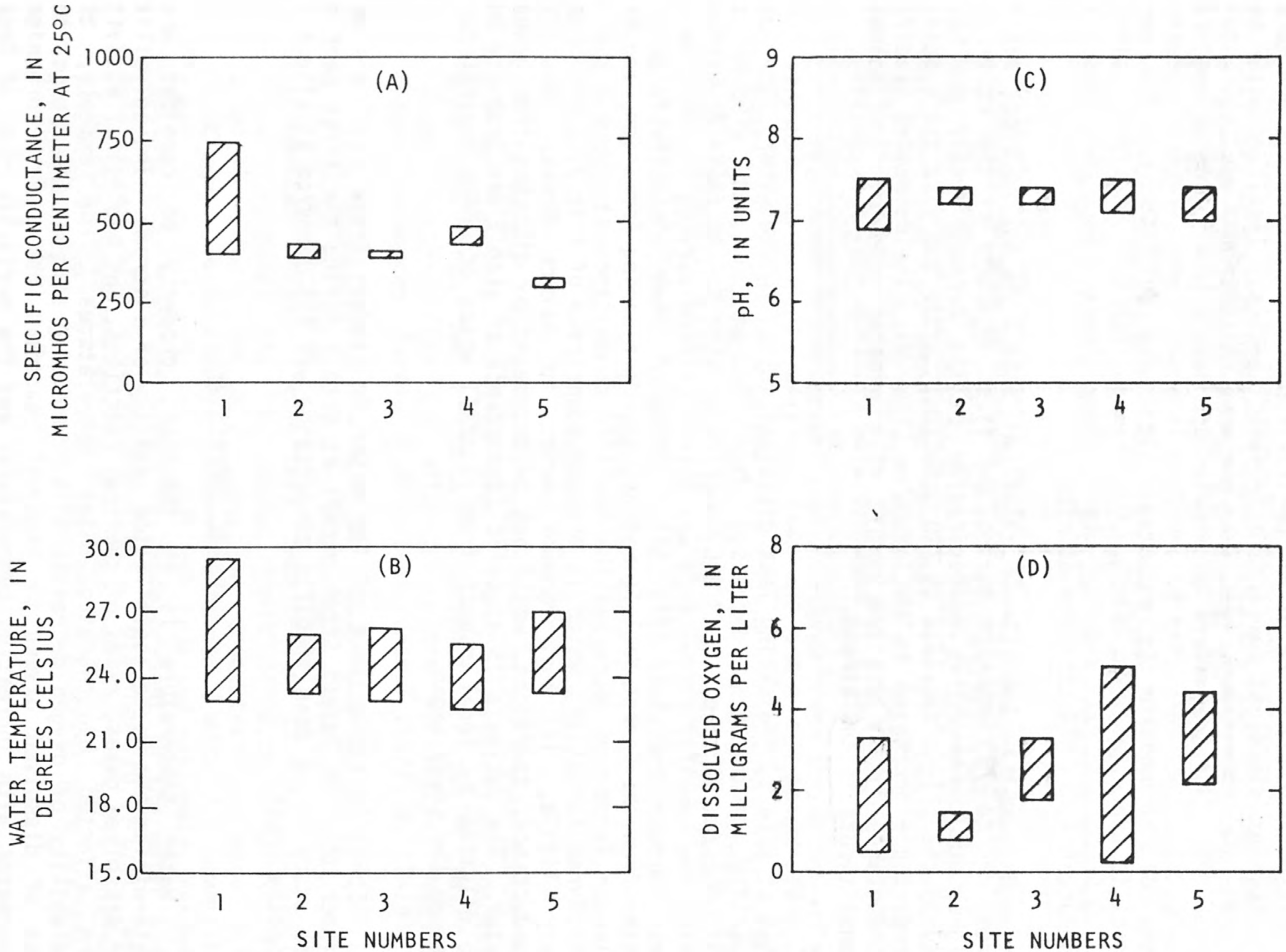


FIGURE 5.--RANGE IN SPECIFIC CONDUCTANCE, pH, WATER TEMPERATURE, AND DISSOLVED OXYGEN AT THE WATER-QUALITY SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

site 1 to site 3. The mean water temperature was 25.5°C at site 1, 25.0°C at site 2 and 24.0°C at site 3. The mean water temperature increased slightly further downstream at site 5 (25.0°C). The water was cooler in Lindsey Creek than in Bakers Creek. The mean water temperature was 23.5°C (74°F) at site 4.

The extremes in water temperatures in Bakers Creek were greater at site 1 than at the other sites (fig. 5B). The difference between the maximum and minimum water temperatures was 6.5°C at site 1 on Bakers Creek. The large fluctuation in water temperature at site 1 probably reflects the changing water temperatures of the shallow sewage lagoons. These temperature flucuations are due to solar heating during the day and radiation of heat into the atmosphere at night. The range in stream temperature was 3.5°C or less at the other sampling sites on Bakers and Lindsey Creeks. Water temperatures were probably moderated at sites 2 and 3 by inflow of groundwater. Due to the absence of moderating ground-water inflow, water temperatures at site 5 were slightly higher and had slightly greater variance than sites 2 and 3. Cloud cover and runoff also may have caused lower stream temperatures on the final day of the study (fig. 6).

## pH - Hydrogen Ion Activity

The pH of water is a measure of the hydrogen ion activity of that water. Theoretically, pure water at 25°C has a pH of 7.0. Water with pH values less than 7.0 are acidic. Water with a pH greater than 7.0 is basic. The pH of most streams in Mississippi that are not influenced by pollution generally is between 6.5 and 8.5. The pH values varied 0.6 units or less between the maximum and minimum at the water quality sampling sites on Bakers and Lindsey Creeks. The pH values ranged from 6.9 to 7.5 units at site 1; 7.2 to 7.4 units at sites 2 and 3, and 7.0 to 7.4 units at site 5 on Bakers Creek. The pH ranged from 7.1 to 7.5 at site 4 on Lindsey Creek. The range of pH values at the water quality sampling sites is shown in figure 5C.

## Dissolved Oxygen

Dissolved oxygen is an essential element in many of the chemical and biological processes in a stream. Oxygen is required to support most types of organisms present in the aquatic environment. Streams with large loads of organic materials may have oxygen consuming organic or inorganic reactions that reduce the level of dissolved oxygen to levels that are unfavorable for some aquatic organisms. Large populations of algae may cause an increase in dissolved-oxygen concentrations during the daylight hours. Thus the dissolved oxygen content is an indication of the status of the water with respect to the balance between oxygen consuming and oxygen producing processes at the moment of sampling (Hem, 1970).

Dissolved oxygen concentrations suggest that oxygen-consuming processes decreased (reduced oxygen demand) downstream through the study area. Dissolved oxygen concentrations increased downstream from site 1 to site 5 on Bakers Creek but were below the daily average of 5.0 mg/L recommended for fish and wildlife, recreation, and a public-water

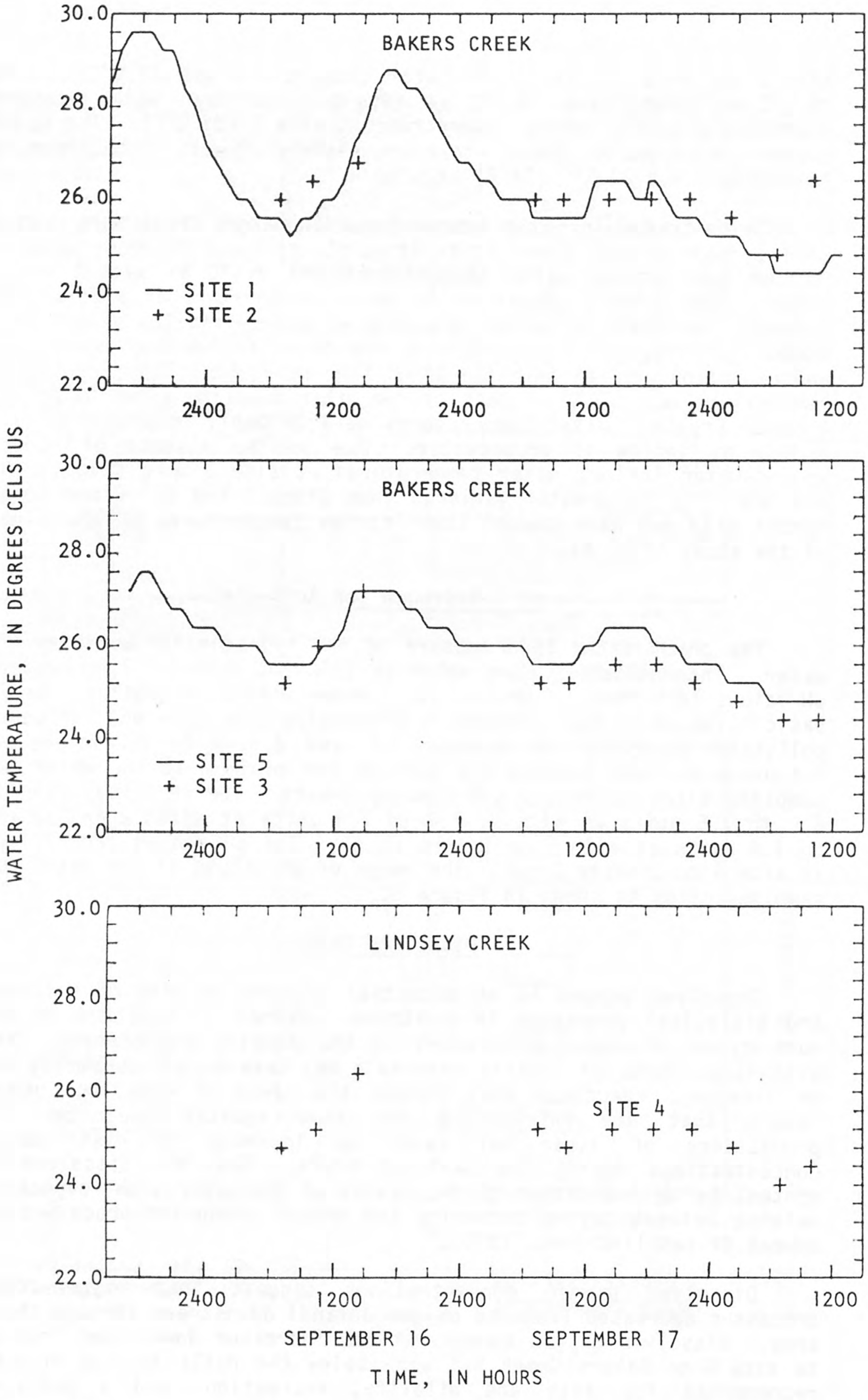


FIGURE 6.--WATER TEMPERATURE AT THE WATER-QUALITY SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

supply (Mississippi Department of Natural Resources, Bureau of Pollution Control, 1977, p. 17-18). The mean dissolved oxygen concentration was 0.9 mg/L at site 1 and increased to 1.2 mg/L at site 2, 2.3 mg/L at site 3, and 3.4 mg/L at site 5. At site 4 on Lindsey Creek the mean dissolved oxygen concentration was 1.8 mg/L.

Near anoxic conditions prevailed at site 1 throughout the study (fig. 7). From approximately 1800 to 0900 hours each day the oxygen level remained near 0.5 mg/L. A peak concentration was reached in the early afternoon of September 16 and 17. The slightly higher concentration on September 17 probably was due to inflow of nearly saturated surface runoff.

Generally dissolved oxygen concentrations at the downstream sites remained above 1.0 mg/L. Minimum concentrations were 0.8 mg/L at site 2, 1.8 mg/L at site 3 and 2.2 mg/L at site 5. Maximum dissolved oxygen concentrations occurred in the early afternoon reaching 1.5 and 3.3 mg/L at sites 2 and 3, respectively. The peak concentrations were probably due to production of oxygen by algal photosynthesis. Dissolved oxygen concentrations at site 5 rarely exceeded 4.0 mg/L during the study.

Dissolved oxygen concentrations at site 4 on Lindsey Creek reached a maximum value of 5.1 mg/L in the afternoon of September 17. The minimum observed value was 0.2 mg/L (fig. 5D).

## Biochemical Oxygen Demand

Five-day biochemical oxygen demand ($BOD_5$) is the amount of oxygen used by chemical reactions and biological activity at 20°C for a period of five days. The oxygen is used primarily by algae and bacteria in the decomposition of organic matter. This method is commonly used to estimate the organic carbon load of a stream. Normally, unpolluted streams carry a residual organic carbon load creating a $BOD_5$ of 1.0 to 2.0 mg/L or higher (Velz, 1970). Industrial and municipal effluents usually increase the $BOD_5$ load.

Generally $BOD_5$ in Bakers Creek decreased downstream. At site 1 the mean $BOD_5$ value was 19 mg/L. The biochemical oxygen demand generally were below 4.0 mg/L at the downstream sites averageing 3.6 and 2.8 mg/L at sites 3 and 5, respectively. The mean $BOD_5$ value at site 4 on Lindsey Creek was 4.0 mg/L. The mean $BOD_5$ values for each site are shown in figure 8.

## Nitrogen Compounds

Nitrogen is one of the major nutrients which affects the quality of freshwater. In addition to being a nutrient that stimulates primary productivity, organic nitrogen and ammonia nitrogen create an oxygen demand. The total nitrogen concentration is commonly reported as the sum of three species of nitrogen: ammonia nitrogen, nitrate plus nitrite nitrogen, and organic nitrogen. The mean total nitrogen in Bakers Creek decreased downstream from 10 mg/L at site 1 to 1.0 mg/L at site 5 (fig. 9). The mean total nitrogen concentration was 0.81 mg/L at site 4 on Lindsey Creek.

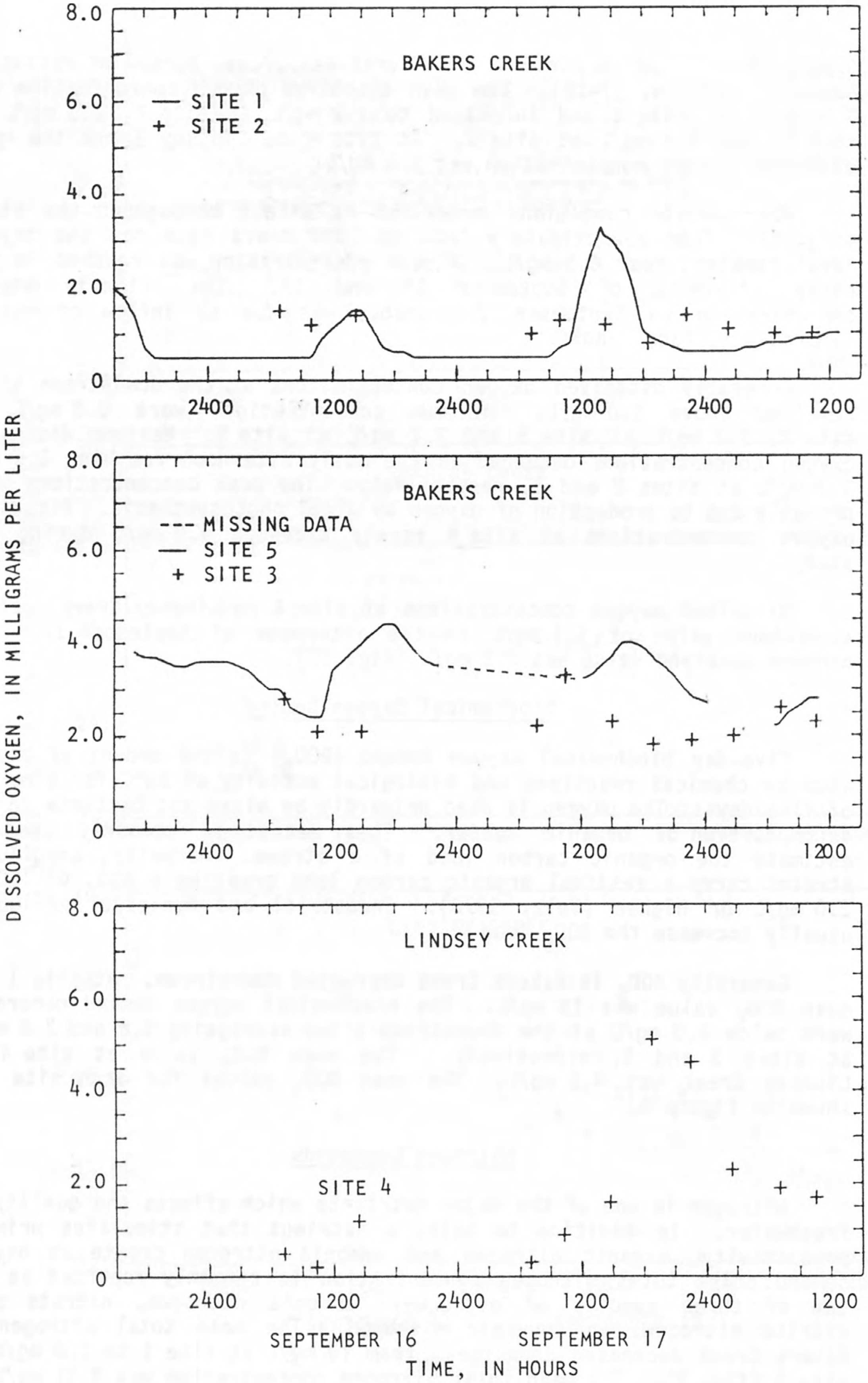


FIGURE 7.--DISSOLVED OXYGEN AT THE SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

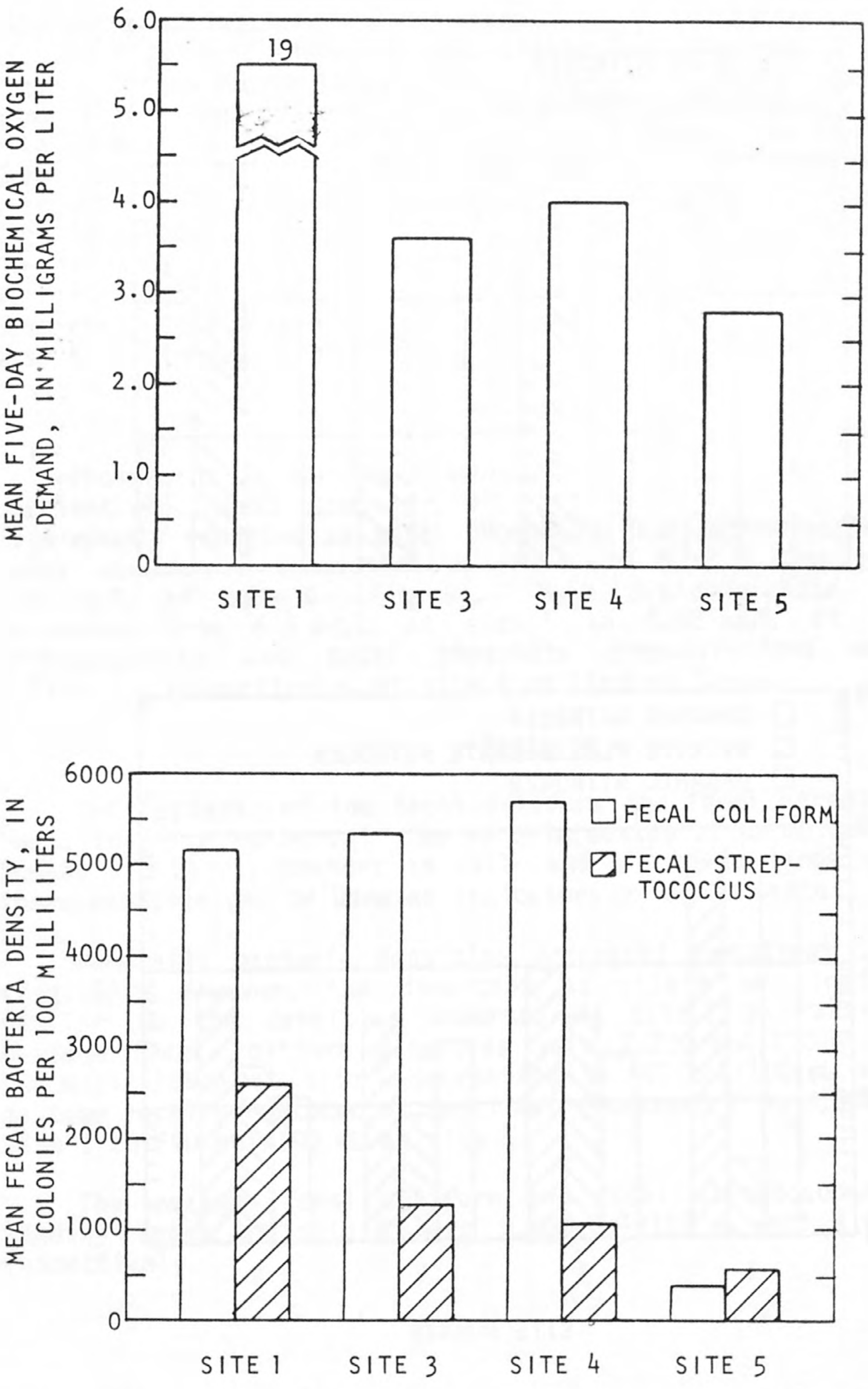


FIGURE 8.--MEAN FIVE-DAY BIOCHEMICAL OXYGEN DEMAND AND MEAN FECAL BACTERIA DENSITY AT THE SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

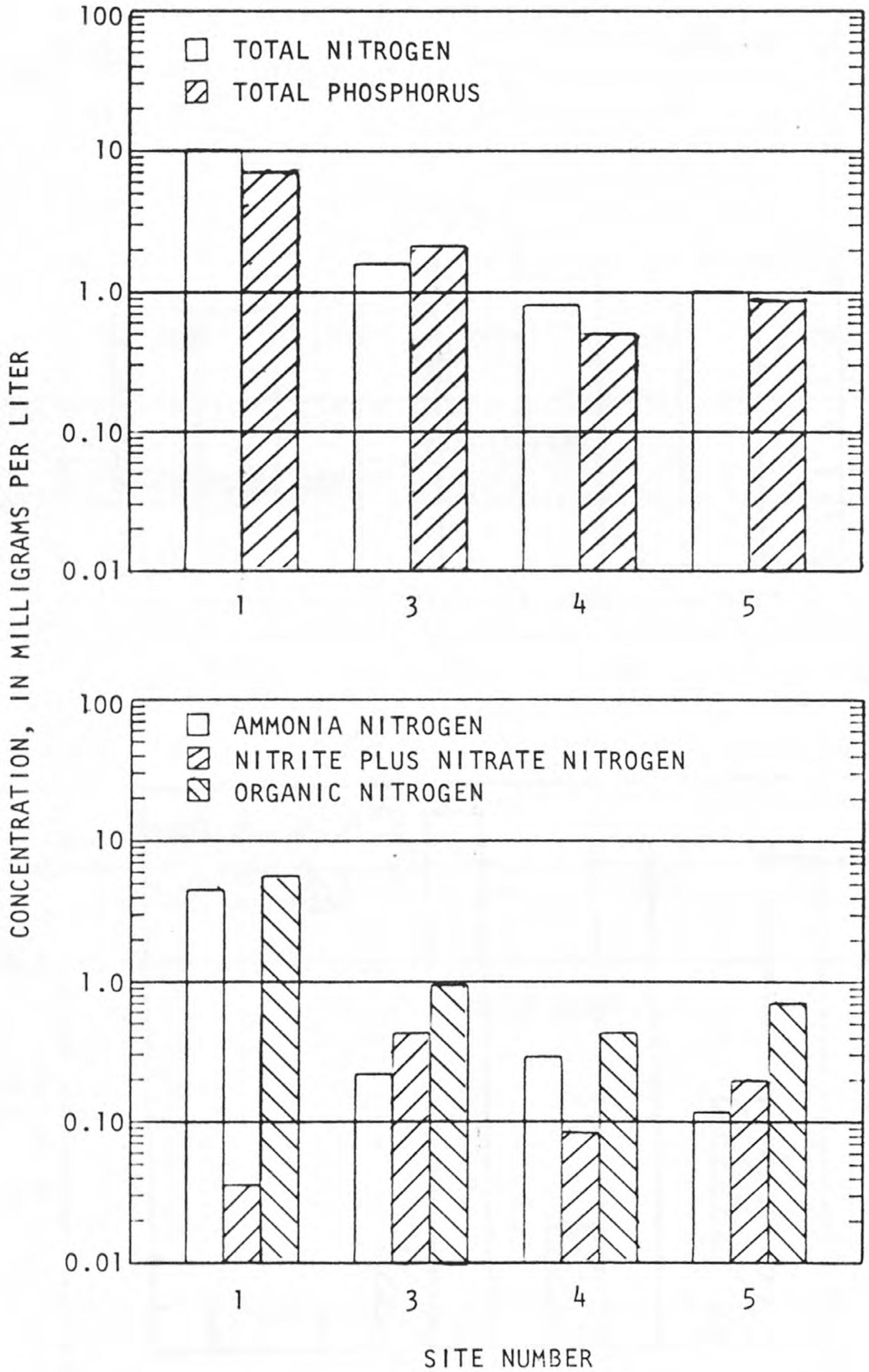


FIGURE 9.--MEAN NITROGEN AND PHOSPHORUS CONCENTRATIONS AT THE SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980.

Generally the concentration of each nitrogen species decreased downstream. The mean organic nitrogen was 5.7 mg/L at site 1, 0.95 mg/L at site 3, and 0.70 mg/L at site 5. After the peak discharge at 1430 hours on September 17 the organic nitrogen concentration at site 1 decreased to less than 1.0 mg/L (table 2). The mean organic nitrogen concentration was 0.44 mg/L at site 4 on Lindsey Creek. The mean ammonia nitrogen concentrations were 4.5 mg/L at site 1, 0.22 mg/L at site 3, and 0.12 mg/L at site 5 on Bakers Creek. In Lindsey Creek the mean ammonia nitrogen concentration was 0.29 mg/L at site 4. The mean nitrate-plus-nitrite-nitrogen concentration increased from 0.04 mg/L at site 1 to 0.43 mg/L at site 3 and then decreased to 0.20 mg/L at site 5. The increase between sites 1 and 3 probably was due to the process of nitrification (the oxidizing of ammonia into nitrite and then nitrate by bacteria). The mean nitrate-plus-nitrite concentration was 0.08 mg/L at site 4 on Lindsey Creek.

## Phosphorus

Phosphorus is the least abundant of the major nutrients and is the nutrient which most commonly limits biological productivity. Phosphorus is commonly reported as total phosphorus and orthophosphate. The mean total phosphorus concentration decreased from 7.1 mg/L at site 1 to 0.87 mg/L at site 5 (fig. 9). Mean orthophosphate concentrations decreased from 6.5 mg/L at site 1 to 0.68 mg/L at site 5. Mean orthophosphate and total phosphate concentrations were 0.50 and 0.74 mg/L, respectively, at site 4 on Lindsey Creek.

## Bacteria

The bacteria of the fecal coliform and fecal streptococcal groups found in large numbers in the enteric wastes of warmblooded animals and humans are rarely present in soils and plants in large numbers. Thus, these bacteria can be used as indicators of human wastes.

Generally bacteria densities decreased downstream in Bakers Creek (fig. 8). However, the densities at site 4 on Lindsey Creek were similar to the densities observed at site 1 on Bakers Creek. The maximum fecal coliform densities were 7,200 col/100 mL (colonies per 100 milliliter) at site 1 decreasing to 400 col/100 mL at site 5. The maximum fecal streptococcal densities decreased from 3,600 col/100 mL at site 1 to 790 col/100 mL at site 5.

The maximum fecal coliform and fecal streptococcal bacteria in Lindsey Creek at site 4 were 9,600 col/100 mL and 1,650 col/100 mL, respectively.

## SUMMARY

An intensive water-quality study was conducted on Bakers and Lindsey Creeks near Clinton, Mississippi, during September 15-18, 1980. Except for a small rise on the last day, the streamflow was fairly steady during most of the study. The mean streamflow was 0.73 $ft^3/s$ at site 1 and 1.0 $ft^3/s$ at the most downstream site. The mean streamflow of the tributary, Lindsey Creek, was 0.19 $ft^3/s$ at site 4. The discharge was approximately eight times greater than the 7-day $Q_{10}$ at site 1 on Bakers Creek and equal to the 7-day $Q_{10}$ at sites 4 and 5 on Lindsey and Bakers Creeks, respectively. The flow was sluggish through the study reach with the time of travel through the 1.8-mile reach on Bakers Creek from the sewage lagoon to site C was 0.05 feet per second.

Due to low dissolved-oxygen concentrations, the water in Bakers Creek may be unsuitable for many uses. However, water quality did improve downstream. Dissolved oxygen concentrations ranged from 0.5 to 3.3 mg/L at site 1; 1.8 to 3.3 mg/L at site 3; and 2.2 to 4.4 mg/L at site 5 which were below the daily average of 5.0 mg/L recommended for fish and wildlife, recreation, and domestic water supplies.

Specific conductance values, 5-day biochemical oxygen demand, nutrient concentrations and bacteria densities decreased downstream on Bakers Creek. The mean specific conductance was 670 umhos/cm at site 1, and 306 umhos/cm at site 5. The 5-day biochemical oxygen demand was 19 mg/L at site 1 and 2.8 mg/L at site 5. The concentration of mean total nitrogen was 10 mg/L at site 1 and 1.0 mg/L at site 5. The mean total phosphorus concentrations also decreased from 7.1 mg/L at site 1 to 0.87 mg/L at site 5. The maximum fecal coliform densities in Bakers Creek decreased from 7,200 col/100 mL at site 1 to 400 col/100 mL at site 5. The maximum fecal streptococcal bacteria in Bakers Creek decreased from 3,600 col/100 mL at site 1 to 790 col/100 mL at site 5.

There were substances present in a sample of water at site 5 on Bakers Creek in concentrations equal to or greater than recommended limits. Mercury (0.4 ug/L), iron (3,400 ug/L), and manganese (1,100 ug/L) concentrations exceeded U.S. Environmental Protection Agency's recommended limits. Several other metals were present in concentrations that were below recommended limits. The insecticides diazinon (0.01 ug/L) and 2,4-D (0.02 ug/L) were present in the water. The bottom material sample contained residuals of DDD (2.5 ug/kg), DDE (2.7 ug/kg), and DDT (0.3 ug/kg).

The tributary inflow from Lindsey Creek did not improve the water quality of Bakers Creek. The dissolved oxygen concentrations were less than 4.0 mg/L during nine of eleven field measurements and ranged from 0.2 mg/L to 5.1 mg/L during the study. The mean specific conductance was 454 umhos/cm. The mean $BOD_5$ was 4.0 mg/L and the mean total nitrogen and phosphorus concentrations were 0.81 and 0.74 mg/L, respectively. The maximum fecal coliform and fecal streptococcal bacteria were 9,600 col/100 mL and 1,650 col/100 mL, respectively.

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# HYDROLOGIC DATA

TABLE 1.--RESULTS OF FIELD DETERMINATIONS, HOURLY DISCHARGE, AND CONTINUOUS MONITOR VALUES AT SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980

07290060 - BAKERS CREEK AT SITE 1 - LAT 32°18'28", LONG 90°19'33"

| DATE | TIME | STREAM-FLOW, INSTAN-TANEOUS (CFS) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH FIELD (UNITS) | TEMPER-ATURE, WATER (DEG C) | OXYGEN, DIS-SOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 15... | 1500 | .64 | 725 | 7.6 | 28.0 | -- |
| 15... | 1530 | -- | 726 | -- | 28.5 | 2.0 |
| 15... | 1600 | -- | 727 | -- | 29.0 | 1.8 |
| 15... | 1700 | -- | 729 | -- | 29.5 | 1.4 |
| 15... | 1800 | -- | 729 | -- | 29.5 | .7 |
| 15... | 1900 | -- | 727 | -- | 29.5 | .5 |
| 15... | 2000 | -- | 723 | -- | 29.0 | .5 |
| 15... | 2100 | -- | 722 | -- | 29.0 | .5 |
| 15... | 2200 | -- | 722 | -- | 28.0 | .5 |
| 15... | 2300 | -- | 717 | -- | 27.5 | .5 |
| 15... | 2400 | -- | 715 | -- | 26.5 | .5 |
| 16... | 0100 | -- | 717 | -- | 26.0 | .5 |
| 16... | 0200 | -- | 718 | -- | 25.5 | .5 |
| 16... | 0300 | -- | 718 | -- | 25.0 | .5 |
| 16... | 0400 | -- | 718 | -- | 25.0 | .5 |
| 16... | 0500 | -- | 718 | -- | 24.5 | .5 |
| 16... | 0600 | -- | 717 | -- | 24.5 | .5 |
| 16... | 0645 | .70 | 717 | 7.5 | 24.5 | .5 |
| 16... | 0700 | .70 | 717 | -- | 24.5 | .5 |
| 16... | 0800 | .71 | 718 | -- | 24.0 | .5 |
| 16... | 0900 | .71 | 719 | 7.5 | 24.5 | .5 |
| 16... | 1000 | .72 | 720 | -- | 24.5 | .5 |
| 16... | 1100 | .72 | 721 | -- | 25.0 | .9 |
| 16... | 1200 | .72 | 721 | -- | 25.0 | 1.1 |
| 16... | 1300 | .72 | 723 | -- | 25.5 | 1.3 |
| 16... | 1400 | .72 | 725 | 7.5 | 26.5 | 1.5 |
| 16... | 1500 | .72 | 727 | -- | 27.0 | 1.5 |
| 16... | 1600 | .72 | 729 | -- | 28.0 | 1.1 |
| 16... | 1700 | .72 | 730 | -- | 28.5 | .7 |
| 16... | 1800 | .72 | 729 | -- | 28.5 | .6 |
| 16... | 1900 | .73 | 726 | -- | 28.0 | .6 |
| 16... | 2000 | .73 | 721 | -- | 28.0 | .5 |
| 16... | 2100 | .73 | 718 | -- | 27.5 | .5 |
| 16... | 2200 | .73 | 716 | -- | 27.0 | .5 |
| 16... | 2300 | .73 | 715 | -- | 26.5 | .5 |
| 16... | 2400 | .73 | 717 | -- | 26.0 | .5 |
| 17... | 0100 | .73 | 719 | -- | 26.0 | .5 |
| 17... | 0200 | .74 | 720 | -- | 25.5 | .5 |
| 17... | 0300 | .74 | 721 | -- | 25.5 | .5 |

TABLE 1.--CONTINUED

07290060 - BAKERS CREEK AT SITE 1 - LAT 32°18'28", LONG 90°19'33"

| DATE | TIME | STREAM-FLOW, INSTAN-TANEOUS (CFS) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH FIELD (UNITS) | TEMPER-ATURE, WATER (DEG C) | OXYGEN, DIS-SOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 17... | 0400 | .74 | 722 | -- | 25.0 | .5 |
| 17... | 0500 | .74 | 722 | -- | 25.0 | .5 |
| 17... | 0600 | .74 | 721 | -- | 25.0 | .5 |
| 17... | 0640 | .74 | 721 | 7.3 | 25.0 | .5 |
| 17... | 0700 | .75 | 722 | -- | 24.5 | .5 |
| 17... | 0800 | .76 | 720 | -- | 24.5 | .5 |
| 17... | 0900 | .77 | 717 | -- | 24.5 | .5 |
| 17... | 1000 | .78 | 713 | 7.2 | 24.5 | .7 |
| 17... | 1100 | .82 | 706 | -- | 24.5 | .8 |
| 17... | 1200 | .86 | 708 | -- | 24.5 | 1.9 |
| 17... | 1300 | .90 | 736 | -- | 25.5 | 2.7 |
| 17... | 1400 | .94 | 740 | -- | 25.5 | 3.3 |
| 17... | 1420 | .98 | 735 | 7.2 | 25.5 | 3.1 |
| 17... | 1500 | .94 | 733 | -- | 25.5 | 3.0 |
| 17... | 1600 | .90 | 728 | -- | 25.5 | 2.7 |
| 17... | 1700 | .86 | 723 | -- | 25.0 | 2.1 |
| 17... | 1800 | .82 | 711 | -- | 25.0 | 1.1 |
| 17... | 1815 | .78 | 703 | 7.2 | 25.5 | 1.0 |
| 17... | 1900 | .75 | 690 | -- | 25.5 | .9 |
| 17... | 2000 | .72 | 664 | -- | 25.0 | .8 |
| 17... | 2100 | .69 | 636 | -- | 24.5 | .7 |
| 17... | 2200 | .67 | 608 | 7.1 | 24.5 | .6 |
| 17... | 2300 | .66 | 580 | -- | 24.5 | .6 |
| 17... | 2400 | .65 | 554 | -- | 24.0 | .6 |
| 18... | 0100 | .64 | 538 | -- | 24.0 | .6 |
| 18... | 0200 | .63 | 524 | 7.0 | 24.0 | .6 |
| 18... | 0300 | .63 | 512 | -- | 24.0 | .6 |
| 18... | 0400 | .62 | 502 | -- | 23.5 | .7 |
| 18... | 0500 | .62 | 492 | -- | 23.5 | .7 |
| 18... | 0600 | .61 | 483 | -- | 23.5 | .8 |
| 18... | 0625 | .61 | 481 | 6.9 | 23.0 | .8 |
| 18... | 0700 | .60 | 475 | -- | 23.0 | .8 |
| 18... | 0800 | .59 | 469 | -- | 23.0 | .8 |
| 18... | 0900 | .58 | 461 | -- | 23.0 | .9 |
| 18... | 1000 | .57 | 452 | 7.0 | 23.0 | .9 |
| 18... | 1100 | -- | 448 | -- | 23.0 | .9 |
| 18... | 1200 | -- | 448 | -- | 23.5 | 1.0 |
| 18... | 1300 | -- | 453 | -- | 23.5 | 1.0 |

TABLE 1.--CONTINUED

07290065 - BAKERS CREEK AT SITE 2 - LAT 32°18'05", LONG 90°22'09"

| DATE | TIME | STREAM-FLOW, INSTAN-TANEOUS (CFS) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH FIELD (UNITS) | TEMPER-ATURE, WATER (DEG C) | OXYGEN, DIS-SOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 16... | 0700 | -- | 422 | 7.4 | 25.0 | 1.5 |
| 16... | 1010 | -- | 411 | 7.4 | 25.5 | 1.2 |
| 16... | 1420 | -- | 394 | 7.3 | 26.0 | 1.4 |
| 17... | 0715 | -- | 410 | 7.3 | 25.0 | 1.0 |
| 17... | 1010 | -- | 417 | 7.2 | 25.0 | 1.3 |
| 17... | 1435 | -- | 412 | 7.2 | 25.0 | 1.2 |
| 17... | 1830 | -- | 425 | 7.4 | 25.0 | .8 |
| 17... | 2215 | -- | 420 | 7.3 | 25.0 | 1.4 |
| 18... | 0215 | -- | 422 | 7.3 | 24.5 | 1.1 |
| 18... | 0645 | -- | 408 | 7.3 | 23.5 | 1.0 |
| 18... | 1020 | -- | 402 | 7.3 | 25.5 | 1.0 |

07290070 - BAKERS CREEK AT SITE 3 - LAT 32°18'06", LONG 90°23'27"

| DATE | TIME | STREAM-FLOW, INSTAN-TANEOUS (CFS) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH FIELD (UNITS) | TEMPER-ATURE, WATER (DEG C) | OXYGEN, DIS-SOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 16... | 0725 | 1.0 | 404 | 7.4 | 24.0 | 2.8 |
| 16... | 1035 | 1.1 | 400 | 7.4 | 25.0 | 2.1 |
| 16... | 1450 | 1.1 | 404 | 7.4 | 26.5 | 2.1 |
| 17... | 0745 | 1.2 | 389 | 7.2 | 24.0 | 2.2 |
| 17... | 1030 | 1.2 | 389 | 7.3 | 24.0 | 3.3 |
| 17... | 1500 | 1.5 | 395 | 7.3 | 24.5 | 2.3 |
| 17... | 1900 | 1.2 | 399 | 7.3 | 24.5 | 1.8 |
| 17... | 2245 | 1.3 | 399 | 7.3 | 24.0 | 1.9 |
| 18... | 0245 | 1.3 | 397 | 7.3 | 23.5 | 2.0 |
| 18... | 0720 | 1.6 | 395 | 7.3 | 23.0 | 2.6 |
| 18... | 1040 | 1.5 | 396 | 7.4 | 23.0 | 2.3 |

TABLE 1.--CONTINUED

07290080 - LINDSEY CREEK AT SITE 4 - LAT 32°18'49", LONG 90°23'01"

| DATE | TIME | STREAM-FLOW, INSTANTANEOUS (CFS) | SPECIFIC CONDUCTANCE (MICROMHOS) | PH FIELD (UNITS) | TEMPERATURE, WATER (DEG C) | OXYGEN, DISSOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 16... | 0715 | .12 | 459 | 7.2 | 23.5 | .5 |
| 16... | 1025 | .14 | 436 | 7.2 | 24.0 | .2 |
| 16... | 1430 | .15 | 434 | 7.2 | 25.5 | 1.2 |
| 17... | 0725 | .16 | 432 | 7.1 | 24.0 | .3 |
| 17... | 1020 | .22 | 435 | 7.1 | 23.5 | .9 |
| 17... | 1445 | .40 | 437 | 7.2 | 24.0 | 1.6 |
| 17... | 1845 | .29 | 458 | 7.4 | 24.0 | 5.1 |
| 17... | 2230 | .20 | 474 | 7.5 | 24.0 | 4.6 |
| 18... | 0230 | .15 | 477 | 7.4 | 23.5 | 2.3 |
| 18... | 0710 | .12 | 484 | 7.4 | 22.5 | 1.9 |
| 18... | 1030 | .11 | 468 | 7.4 | 23.0 | 1.7 |

TABLE 1.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 33°24'15"

| DATE | TIME | STREAM-FLOW, INSTAN-TANEOUS (CFS) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH FIELD (UNITS) | TEMPER-ATURE, WATER (DEG C) | OXYGEN, DIS-SOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 15... | 1700 | -- | 325 | 7.4 | 26.5 | 3.8 |
| 15... | 1800 | -- | 326 | -- | 27.0 | 3.7 |
| 15... | 1900 | -- | 325 | -- | 27.0 | 3.7 |
| 15... | 2000 | -- | 324 | -- | 26.5 | 3.6 |
| 15... | 2100 | -- | 323 | -- | 26.0 | 3.5 |
| 15... | 2200 | -- | 321 | -- | 26.0 | 3.5 |
| 15... | 2300 | -- | 321 | -- | 25.5 | 3.6 |
| 15... | 2400 | -- | 319 | -- | 25.5 | 3.6 |
| 16... | 0100 | -- | 318 | -- | 25.5 | 3.6 |
| 16... | 0200 | -- | 317 | -- | 25.0 | 3.6 |
| 16... | 0300 | -- | 317 | -- | 25.0 | 3.5 |
| 16... | 0400 | -- | 316 | -- | 25.0 | 3.4 |
| 16... | 0500 | -- | 314 | -- | 25.0 | 3.2 |
| 16... | 0600 | -- | 315 | -- | 24.5 | 3.0 |
| 16... | 0700 | -- | 314 | -- | 24.5 | 3.0 |
| 16... | 0740 | 1.0 | 314 | 7.2 | 24.5 | 2.8 |
| 16... | 0800 | .98 | 314 | -- | 24.5 | 2.6 |
| 16... | 0900 | .95 | 316 | -- | 24.5 | 2.5 |
| 16... | 1000 | .93 | 315 | -- | 24.5 | 2.4 |
| 16... | 1100 | .91 | 315 | 7.2 | 25.0 | 2.4 |
| 16... | 1200 | .93 | 315 | -- | 25.0 | 3.4 |
| 16... | 1300 | .95 | 313 | -- | 25.5 | 3.6 |
| 16... | 1400 | .97 | 313 | -- | 26.5 | 3.8 |
| 16... | 1500 | .98 | 313 | -- | 26.5 | 4.0 |
| 16... | 1515 | 1.0 | 313 | 7.3 | 26.5 | 4.1 |
| 16... | 1600 | -- | 312 | -- | 26.5 | 4.2 |
| 16... | 1700 | -- | 311 | -- | 26.5 | 4.4 |
| 16... | 1800 | -- | 310 | -- | 26.5 | 4.4 |
| 16... | 1900 | -- | 310 | -- | 26.0 | 4.1 |
| 16... | 2000 | -- | 309 | -- | 26.0 | 3.8 |
| 16... | 2100 | -- | 309 | -- | 25.5 | 3.6 |
| 16... | 2200 | -- | 309 | -- | 25.5 | 3.5 |
| 16... | 2300 | -- | 307 | -- | 25.5 | -- |
| 16... | 2400 | -- | 307 | -- | 25.0 | -- |
| 17... | 0100 | -- | 305 | -- | 25.0 | -- |
| 17... | 0200 | -- | 305 | -- | 25.0 | -- |
| 17... | 0300 | -- | 304 | -- | 25.0 | -- |
| 17... | 0400 | -- | 304 | -- | 25.0 | -- |
| 17... | 0500 | -- | 303 | -- | 25.0 | -- |

TABLE 1.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 33°24'15"

| DATE | TIME | STREAM-FLOW, INSTAN-TANEOUS (CFS) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH FIELD (UNITS) | TEMPER-ATURE, WATER (DEG C) | OXYGEN, DIS-SOLVED (MG/L) |
|---|---|---|---|---|---|---|
| SEP | | | | | | |
| 17... | 0600 | -- | 302 | -- | 25.0 | -- |
| 17... | 0700 | -- | 302 | -- | 24.5 | -- |
| 17... | 0800 | -- | 299 | -- | 24.5 | -- |
| 17... | 0815 | 1.2 | 299 | 7.0 | 24.5 | -- |
| 17... | 0900 | 1.1 | 298 | -- | 24.5 | -- |
| 17... | 1000 | 1.0 | 298 | -- | 24.5 | -- |
| 17... | 1045 | 1.0 | 298 | 7.1 | 24.5 | -- |
| 17... | 1100 | 1.0 | 299 | -- | 24.5 | -- |
| 17... | 1200 | 1.0 | 299 | -- | 25.0 | 3.2 |
| 17... | 1300 | 1.0 | 298 | -- | 25.0 | 3.3 |
| 17... | 1400 | 1.0 | 298 | -- | 25.5 | 3.5 |
| 17... | 1500 | 1.0 | 298 | -- | 25.5 | 3.7 |
| 17... | 1520 | 1.0 | 299 | 7.2 | 25.5 | 3.8 |
| 17... | 1600 | 1.0 | 297 | -- | 25.5 | 4.0 |
| 17... | 1700 | 1.1 | 296 | -- | 25.5 | 4.0 |
| 17... | 1800 | 1.1 | 296 | -- | 25.5 | 3.9 |
| 17... | 1900 | 1.1 | 297 | -- | 25.0 | 3.7 |
| 17... | 1915 | 1.2 | 297 | 7.3 | 25.0 | 3.6 |
| 17... | 2000 | 1.1 | 296 | -- | 25.0 | 3.5 |
| 17... | 2100 | 1.1 | 296 | -- | 25.0 | 3.3 |
| 17... | 2200 | 1.0 | 297 | -- | 24.5 | 3.0 |
| 17... | 2300 | 1.0 | 297 | 7.2 | 24.5 | 2.8 |
| 17... | 2400 | 1.0 | 297 | -- | 24.5 | -- |
| 18... | 0100 | 1.0 | 297 | -- | 24.5 | -- |
| 18... | 0200 | 1.0 | 298 | -- | 24.0 | -- |
| 18... | 0300 | 1.0 | 298 | 7.3 | 24.0 | 2.2 |
| 18... | 0400 | 1.0 | 299 | -- | 24.0 | -- |
| 18... | 0500 | 1.0 | 298 | -- | 24.0 | -- |
| 18... | 0600 | 1.0 | 299 | -- | 23.5 | -- |
| 18... | 0700 | 1.0 | 299 | -- | 23.5 | 2.2 |
| 18... | 0740 | 1.0 | 311 | 7.2 | 23.5 | 2.2 |
| 18... | 0800 | 1.0 | 297 | -- | 23.5 | 2.5 |
| 18... | 0900 | 1.1 | 297 | -- | 23.5 | 2.6 |
| 18... | 1000 | 1.1 | 297 | -- | 23.5 | 2.8 |
| 18... | 1100 | 1.2 | 297 | 7.2 | 23.5 | 2.8 |

TABLE 2.--RESULTS OF LABORATORY ANALYSIS OF SAMPLES COLLECTED AT SAMPLING SITES ON BAKERS AND LINDSEY CREEKS, SEPTEMBER 15-18, 1980

07290060 - BAKERS CREEK AT SITE 1 - LAT 32°18'28", LONG 90°19'33"

| DATE | TIME | OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L) | OXYGEN DEMAND, BIOCHEM UNINHIB 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 | | | | | | | | |
| 16... | 1400 | 120 | 19 | 7200 | 1600 | .01 | .030 | .04 |
| 17... | 0640 | 110 | 19 | K3120 | K3600 | .00 | .010 | .01 |
| 17... | 1420 | -- | -- | -- | -- | .02 | .060 | .08 |
| 17... | 2200 | -- | -- | -- | -- | .00 | .030 | .03 |
| 18... | 0625 | -- | -- | -- | -- | .00 | .030 | .02 |

| 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, ORTHOPHOSPHATE TOTAL (MG/L AS P) |
|---|---|---|---|---|---|---|---|
| SEP | | | | | | | |
| 16... | 4.100 | 8.9 | 13 | 13 | 58 | 8.700 | 7.200 |
| 17... | 4.200 | 12 | 16 | 16 | 71 | 8.900 | 7.900 |
| 17... | 6.400 | 6.6 | 13 | 13 | 58 | 8.300 | 8.300 |
| 17... | 4.600 | .60 | 5.2 | 5.2 | 23 | 4.900 | 4.800 |
| 18... | 3.300 | .20 | 3.5 | 3.5 | 16 | 4.500 | 4.500 |

K - NONIDEAL COLONY COUNT

TABLE 2.--CONTINUED

07290070 - BAKERS CREEK AT SITE 3 - LAT 32°18'06", LONG 90°23'27"

| DATE | TIME | OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) | OXYGEN DEMAND, BIOCHEM UNINHIB 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 | | | | | | | | |
| 16... | 1450 | 43 | 3.2 | 1100 | K912 | .58 | .070 | .65 |
| 17... | 0745 | 44 | 4.0 | 9600 | 1650 | .47 | .060 | .53 |
| 17... | 1500 | -- | -- | -- | -- | .09 | .010 | .10 |

| 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, ORTHOPH OSPHATE TOTAL (MG/L AS P) |
|---|---|---|---|---|---|---|---|
| SEP | | | | | | | |
| 16... | .310 | 1.1 | 1.4 | 2.1 | 9.1 | 2.800 | 2.700 |
| 17... | .300 | 1.0 | 1.3 | 1.8 | 8.1 | 2.700 | 2.600 |
| 17... | .050 | .74 | .79 | .89 | 3.9 | .880 | .760 |

K - NONIDEAL COLONY COUNT

TABLE 2.--CONTINUED

07290080 - LINDSEY CREEK AT SITE 4 - LAT 32°18'49", LONG 90°23'01"

| DATE | TIME | OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) | OXYGEN DEMAND, BIOCHEM UNINHIB 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 | | | | | | | | |
| 16... | 1430 | 18 | 4.0 | 1800 | 490 | .05 | .010 | .06 |
| 17... | 0725 | 17 | 4.0 | 9600 | 1650 | .05 | .010 | .06 |
| 17... | 1445 | -- | -- | -- | -- | .12 | .010 | .13 |

| 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, ORTHOPH OSPHATE TOTAL (MG/L AS P) |
|---|---|---|---|---|---|---|---|
| SEP | | | | | | | |
| 16... | .320 | .48 | .80 | .86 | 3.8 | .780 | .530 |
| 17... | .330 | .32 | .65 | .71 | 3.1 | .740 | .520 |
| 17... | .210 | .53 | .74 | .87 | 3.9 | .700 | .460 |

TABLE 2.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 90°26'53"

| DATE | TIME | OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) | OXYGEN DEMAND, BIOCHEM UNINHIB 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 | | | | | | | | |
| 16... | 1515 | -- | 4.2 | 370 | 350 | .08 | .020 | .10 |
| 17... | 0815 | 21 | 1.4 | K400 | 790 | .08 | .020 | .10 |
| 17... | 1520 | -- | -- | -- | -- | .55 | .060 | .61 |
| 17... | 2300 | -- | -- | -- | -- | .08 | .010 | .09 |
| 18... | 0740 | -- | -- | -- | -- | .06 | .020 | .08 |



| 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, ORTHOPH OSPHATE TOTAL (MG/L AS P) |
|---|---|---|---|---|---|---|---|
| SEP | | | | | | | |
| 16... | .160 | .94 | 1.1 | 1.2 | 5.3 | .980 | .790 |
| 17... | .130 | .69 | .82 | .92 | 4.1 | .940 | .690 |
| 17... | .150 | .59 | .74 | 1.4 | 6.0 | .740 | .620 |
| 17... | .050 | .56 | .61 | .70 | 3.1 | .780 | .660 |
| 18... | .090 | .73 | .82 | .90 | 4.0 | .890 | .620 |

K - NONIDEAL COLONY COUNT

TABLE 2.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 90°26'53"

| DATE | TIME | COLOR (PLAT-INUM COBALT UNITS) | TUR-BID-ITY (NTU) | 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) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | 1520 | 50 | 28 | 44 | 0 | 12 | 3.4 | 46 |

| DATE | SODIUM AD-SORP-TION RATIO | ALKA-LINITY (MG/L AS CACO3) | SULFATE DIS-SOLVED (MG/L AS SO4) | CHLO-RIDE, DIS-SOLVED (MG/L AS CL) | FLUO-RIDE, DIS-SOLVED (MG/L AS F) | SILICA, DIS-SOLVED (MG/L AS SIO2) | SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) | SOLIDS, DIS-SOLVED (TONS PER AC-FT) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | 3.0 | 120 | 3.9 | 15 | .4 | 15 | 201 | .27 |

| DATE | SOLIDS, DIS-SOLVED (TONS PER DAY) | ARSENIC TOTAL (UG/L AS AS) | ARSENIC TOTAL IN BOT-TOM MA-TERIAL (UG/G AS AS) | CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) | CADMIUM RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CD) | CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) | CHRO-MIUM, RECOV. FM BOT-TOM MA-TERIAL (UG/G) | COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | .54 | 14 | 1 | 1 | <10 | 9 | 10 | 3 |

TABLE 2.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 90°26'53"

| DATE | COBALT, RECOV. FM BOTTOM MATERIAL (UG/G AS CO) | COPPER, TOTAL RECOVERABLE (UG/L AS CU) | COPPER, RECOV. FM BOTTOM MATERIAL (UG/G AS CU) | IRON, TOTAL RECOVERABLE (UG/L AS FE) | IRON, RECOV. FM BOTTOM MATERIAL (UG/G AS FE) | LEAD, TOTAL RECOVERABLE (UG/L AS PB) | LEAD, RECOV. FM BOTTOM MATERIAL (UG/G AS PB) | MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | <10 | 3 | 10 | 3400 | 5600 | 6 | 10 | 1100 |

| DATE | MANGANESE, RECOV. FM BOTTOM MATERIAL (UG/G) | MERCURY TOTAL RECOVERABLE (UG/L AS HG) | MERCURY RECOV. FM BOTTOM MATERIAL (UG/G AS HG) | NICKEL, TOTAL RECOVERABLE (UG/L AS NI) | NICKEL, RECOV. FM BOTTOM MATERIAL (UG/G AS NI) | SELENIUM, TOTAL (UG/L AS SE) | SELENIUM, TOTAL IN BOTTOM MATERIAL (UG/G) | ZINC, TOTAL RECOVERABLE (UG/L AS ZN) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | 1000 | .4 | .00 | 6 | <10 | 0 | 0 | 30 |

| DATE | ZINC, RECOV. FM BOTTOM MATERIAL (UG/G AS ZN) | CARBON, ORGANIC TOTAL (MG/L AS C) | PHENOLS (UG/L) | PCB TOTAL (UG/L) | PCB, TOTAL IN BOTTOM MATERIAL (UG/KG) | NAPHTHALENES, POLYCHLOR. TOTAL (UG/L) | PCN, TOTAL IN BOTTOM MATERIAL (UG/KG) | ALDRIN, TOTAL (UG/L) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | 20 | 8.8 | 0 | .00 | 0 | .0 | .0 | .00 |

TABLE 2.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 90°26'53"

| DATE | 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) | DDE, TOTAL (UG/L) | DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) | DDT, TOTAL (UG/L) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | .0 | .0 | 0 | .00 | 2.5 | .00 | 2.7 | .00 |

| DATE | DDT, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) | DI- AZINON, TOTAL (UG/L) | DI- ELDRIN TOTAL (UG/L) | DI- ELDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) | ENDO- SULFAN, TOTAL (UG/L) | ENDO- SULFAN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) | ENDRIN, TOTAL (UG/L) | ENDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | .3 | .01 | .00 | .0 | .00 | .0 | .00 | .0 |

| DATE | ETHION, TOTAL (UG/L) | 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) | LINDANE TOTAL IN BOT- TOM MA- TERIAL (UG/KG) | MALA- THION, TOTAL (UG/L) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | .00 | .00 | .0 | .00 | .0 | .00 | .0 | .00 |

TABLE 2.--CONTINUED

07290090 - BAKERS CREEK AT SITE 5 - LAT 32°20'05", LONG 90°26'53"

| DATE | METH-OXY-CHLOR, TOTAL (UG/L) | METH-OXY-CHLOR, TOT. IN BOTTOM MATL. (UG/KG) | METHYL PARA-THION, TOTAL (UG/L) | METHYL TRI-THION, TOTAL (UG/L) | MIREX, TOTAL (UG/L) | MIREX, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) | PARA-THION, TOTAL (UG/L) | PER-THANE TOTAL (UG/L) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | .00 | .0 | .00 | .00 | .00 | .0 | .00 | .00 |

| DATE | PER-THANE IN BOTTOM MATERIL (UG/KG) | TOX-APHENE, TOTAL (UG/L) | TOXA-PHENE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) | TOTAL TRI-THION (UG/L) | 2,4-D, TOTAL (UG/L) | 2, 4-DP TOTAL (UG/L) | 2,4,5-T TOTAL (UG/L) | SILVEX, TOTAL (UG/L) |
|---|---|---|---|---|---|---|---|---|
| SEP | | | | | | | | |
| 17... | .00 | 0 | 0 | .00 | .02 | .00 | .00 | .00 |