UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

QUALITY OF WATER AND TIME OF TRAVEL IN GOODWATER AND OKATOMA CREEKS NEAR MAGEE, MISSISSIPPI

Open-File Report 81-1012

Prepared in cooperation with

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UNITED STATES DEPARTMENT OF THE INTERIOR
JAMES G. WATT, Secretary
GEOLOGICAL SURVEY
Dallas L. Peck, Director

For additional information write to:

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

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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)
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)

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

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

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.

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ABSTRACT

An intensive quality-of-water study was conducted during a period of generally low streamflow in Goodwater and Okatoma Creeks near Magee, Mississippi. During the August 12-14, 1980 study, the mean specific conductance of the water at all sites was less than 59 micromhos per centimeter; the dissolved-oxygen concentrations were greater than 5.0 milligrams per liter; pH values ranged from 6.0 to 6.8, and the mean water temperature ranged from 23.0° to 27.0° Celsius.

The biochemical oxygen demand and nutrient concentrations at the downstream sampling sites were higher in Goodwater Creek than in Okatoma Creek. The maximum 5-day biochemical oxygen demand was 2.7 milligrams per liter in Goodwater Creek and 1.5 milligrams per liter in Okatoma Creek. The mean concentration of total nitrogen was 1.0 and 0.71 milligrams per liter and the mean total phosphorus concentration was 0.26 and 0.10 milligrams per liter at the downstream sites on Goodwater and Okatoma Creeks, respectively. Fecal coliform densities generally were high at all sites, exceeding 4,000 colonies per 100 milliliters in both Goodwater and Okatoma Creek. Objectionable concentrations of total cadmium, mercury, iron, and phenol were present in a sample of water. Dieldrin, chlordane, DDD, DDE, and DDT were present in a sample of bottom material collected at the downstream site on Okatoma Creek.

The peak concentration of dye injected into Goodwater Creek traveled through a 1.7-mile reach at a rate of 0.3 mile per hour.

INTRODUCTION

Freshwater 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 management 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 data in this report are the results of a short-term intensive study on Okatoma and Goodwater Creeks near Magee from August 12 to August 14, 1980. Chemical, physical, bacteriological, and water discharge data are included in this report.

DESCRIPTION OF THE AREA

Location

The location of the study area is near the town of Magee. Magee is located in south-central Mississippi in Simpson County approximately 40 miles southeast of Jackson. A map showing the study area and the sampling sites is shown in figure 1.

Topography and Geology

The study area lies in the Piney Woods physiographic province, an area of generally moderate topographic relief. Ridges reaching altitudes of 400 to 450 feet above sea level separate the streams and are generally 100 feet higher than the stream bottomland. The slopes of the ridges are generally forested. Some ridge tops have been cleared and are used for agricultural purposes. Most of the stream bottoms are covered with a bottomland hardwood forest; however, some have been cleared and are used for agricultural purposes.

Geologic units of Miocene age and younger are exposed in the study area. Miocene deposits are exposed most noticeably bordering the lowlands of Okatoma Creek. These deposits are sedimentary in origin and consist of clay, sand, and gravel. The Citronelle Formation of Pliocene age blankets upland areas. The headwaters of Goodwater Creek contact the Citronelle Formation. Holocene alluvium underlies the lowlands of Okatoma Creek (Newcome and others, 1972, fig. 4).

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 Magee is 66°F (19°C) with an average August temperature of 80°F (26.5°C). The average minimum temperature is 42° (5.5°C) in January and the average maximum temperature is 91°F (32.5°C) in August. Rainfall is abundant and sometimes excessive averaging 55 inches per year. March is usually the wettest month and October the driest.

The study area is midway between NOAA (National Oceanic and Atmospheric Administration) weather stations at D'Lo and Collins, Mississippi. The air temperature was seasonally warm at both stations during the study. The average maximum temperature was 94°F (34.5°C) at both stations and the average minimum temperatures were 71° (21.5°C) and 73°F (22.5°C) at D'Lo and Collins, respectively. The following maximum and minimum air temperatures were reported:

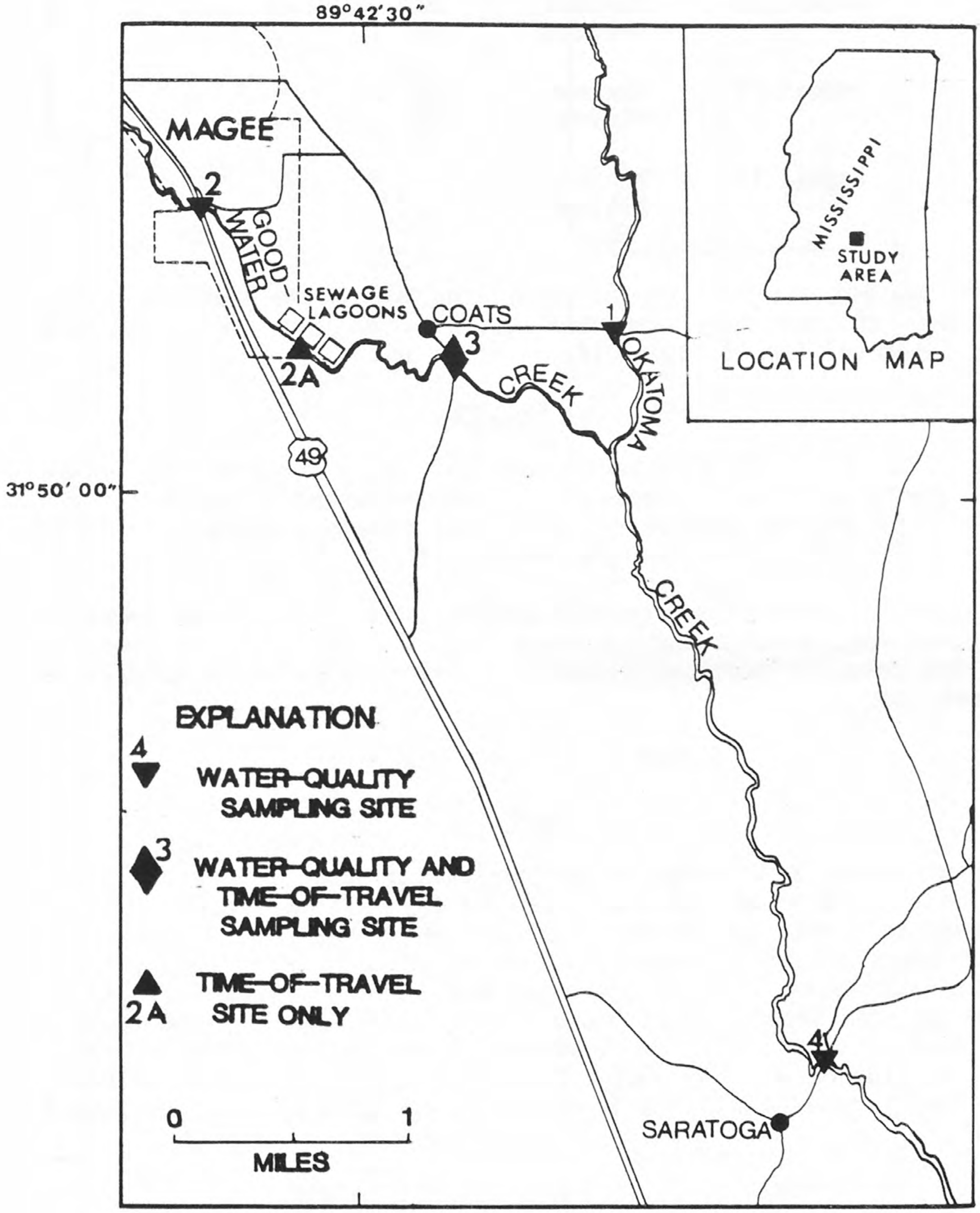

FIGURE 1.--STUDY AREA, WATER-QUALITY, AND TIME-OF-TRAVEL SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980.

Date	Temperature	D'Lo	Collins
August 12	Maximum	92	93
	Minimum	71	72
August 13	Maximum	94	95
	Minimum	72	74
August 14	Maximum	96	93
	Minimum	71	72

Rain was not observed in the study area during the study; however, 0.25 inches of rain was reported at D'Lo on the August 11 and 0.74 inches at Collins on August 14.

Cultural Features

Magee is a steadily growing regional trade center in Simpson County. The population of Magee has increased about 17 percent since 1970. The preliminary 1980 census was 3,488 people compared to a 1970 census of 2,989 (U.S. Bureau of the Census, 1971).

A number of industries provide employment for over 400 residents of Magee. Clothing, wood products, truck bodies, and livestock feed are some of the products produced. Various service businesses also provide employment.

STREAM CHARACTERISTICS

Drainage

Okatoma Creek originates in northwestern Simpson County and flows southeast draining 44 mi^2 upstream of site 1. Okatoma Creek is joined by Goodwater Creek approximately 0.5 mile below site 1 (fig. 1). Goodwater Creek originates approximately 2 miles west of Magee and flows southeast past Magee draining approximately 10 mi^2 upstream of site 2. The drainage area between sites 2 and 3 is 3.5 mi^2. Inflow from Magee's sewage treatment lagoons enters Goodwater Creek between sites 2 and 3. From its confluence with Goodwater Creek, Okatoma Creek flows southeast leaving the study area at site 4. The drainage area upstream of site 4 is 88 mi^2.

Channel Morphology and Stream Gradient

The physical characteristics of the channel of Okatoma Creek are similar at sampling sites 1 and 4. Channel cross sections at the sampling sites are shown in figure 2. The banks of the 30-foot wide channel are 3 to 5 feet high and steep. Mean depth of water was approximately 1 foot at site 1 compared to 2.3 feet at site 4. The physical characteristics of Goodwater Creek's channel are dissimilar at sites 2 and 3. At site 2 the banks are over 10 feet high at site 2 compared to 3 to 5 feet at site 3. The banks are steep and streambeds are irregular at both sites. Mean water depth was 0.9 ft at site 2 and 1.1 feet at site 3.

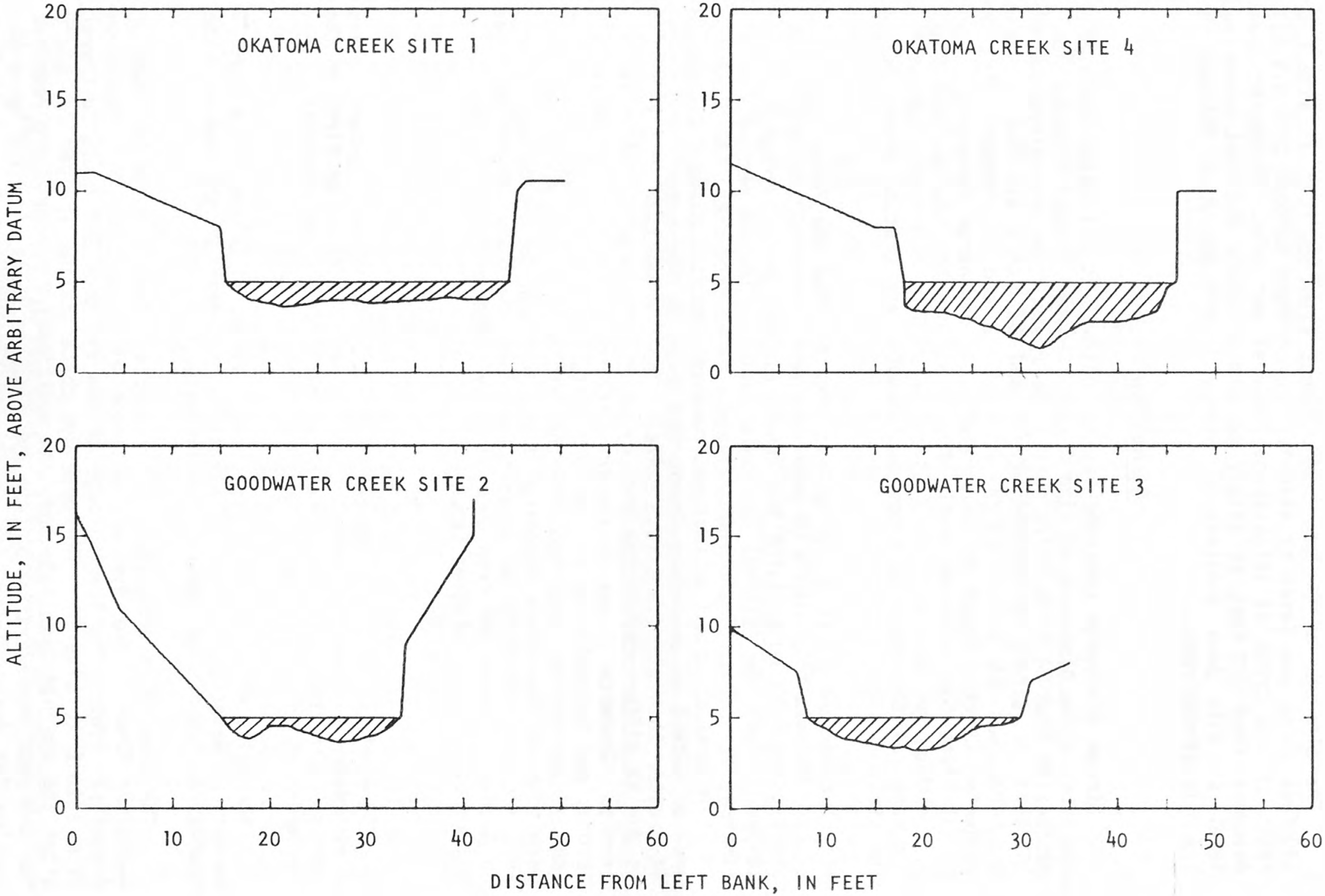

FIGURE 2.--CHANNEL CROSS SECTION AT SAMPLING SITES ON OKATOMA AND GOODWATER CREEKS, AUGUST 12-14, 1980.

The altitude of Okatoma Creek ranges from 350 feet at site 1 to 330 feet above sea level at site 4. The gradient through this 4.5 mile reach of the creek is slightly over 4 feet per mile. Goodwater Creek descends from 370 feet at site 2 to approximately 355 feet above sea level at site 3--a gradient of nearly 9 feet per mile through the 1.7 mile stream reach.

Streamflow

Stream discharge remained fairly constant at all sites throughout the study. The discharge at site 4 exhibited the largest change, slowly decreasing from 64 to 60 ft^3/s during the study. The mean discharge was 16 ft^3/s at site 1 on Okatoma Creek and 62 ft^3/s at site 4. Mean discharge was 14 and 21 ft^3/s at sites 2 and 3, respectively, on Goodwater Creek. Based on measurements of discharge through a 3-inch throat flume the estimated daily discharge from the sewage lagoons was 0.7 million gallons per day (1.1 ft^3/s). Figure 3 shows the stream discharge at the sampling sites on Goodwater and Okatoma Creeks during the study.

The streamflow at all sites was greater than the 7-day Q_{10} (7-day average minimum flow with a 10-year recurrence interval). The 7-day Q_{10} was estimated by multiplying the annual minimum 7-day average flow with 10-year recurrence interval in cubic feet per second per square mile (Tharpe, 1975, fig. 5) and the drainage area at each site. Although the drainage area at site 1 on Okatoma Creek is over four times the drainage area of site 2 on Goodwater Creek, the 7-day Q_{10} at site 2 (4.0 ft^3/s) is greater than at site 1 (3.3 ft^3/s). The greater 7-day Q_{10} at site 2 is due to differences in the geology of the drainage basins of the two creeks. Goodwater Creek drains the Citronelle Formation which readily absorbs and transmits water from precipitation. Okatoma Creek upstream from Magee drains outcrops of the Miocene series which are less permiable and therefore discharge a smaller flow to disecting streams. Thus the mean discharge was over three times the 7-day Q_{10} at the sites on Goodwater Creek and from approximately three to four times the 7-day Q_{10} at the sites on Okatoma Creek.

TIME OF TRAVEL

Time of travel refers to the rate that a dissolved substance moves downstream . 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 was used as the tracer dye as it behaves in a similar manner as water particles. The rate of movement of the dye will be similar to the rate of movement of the water.

The time of travel study was conducted along a 1.7-mile reach of Goodwater Creek. The dye was injected at site 2 at 1425 hours on August 12, 1980. The leading edge of the dye took 1.8 hours to travel from site 2 to site 2A. The peak dye concentration arrived 2.6 hours after the dye had been injected. An additional 2.5 hours were required for the peak concentration of the dye cloud to reach site 3 (figure 4). Samples for dye concentration at site 2A were collected about 15 feet upstream of the single outfall from the sewage lagoons.

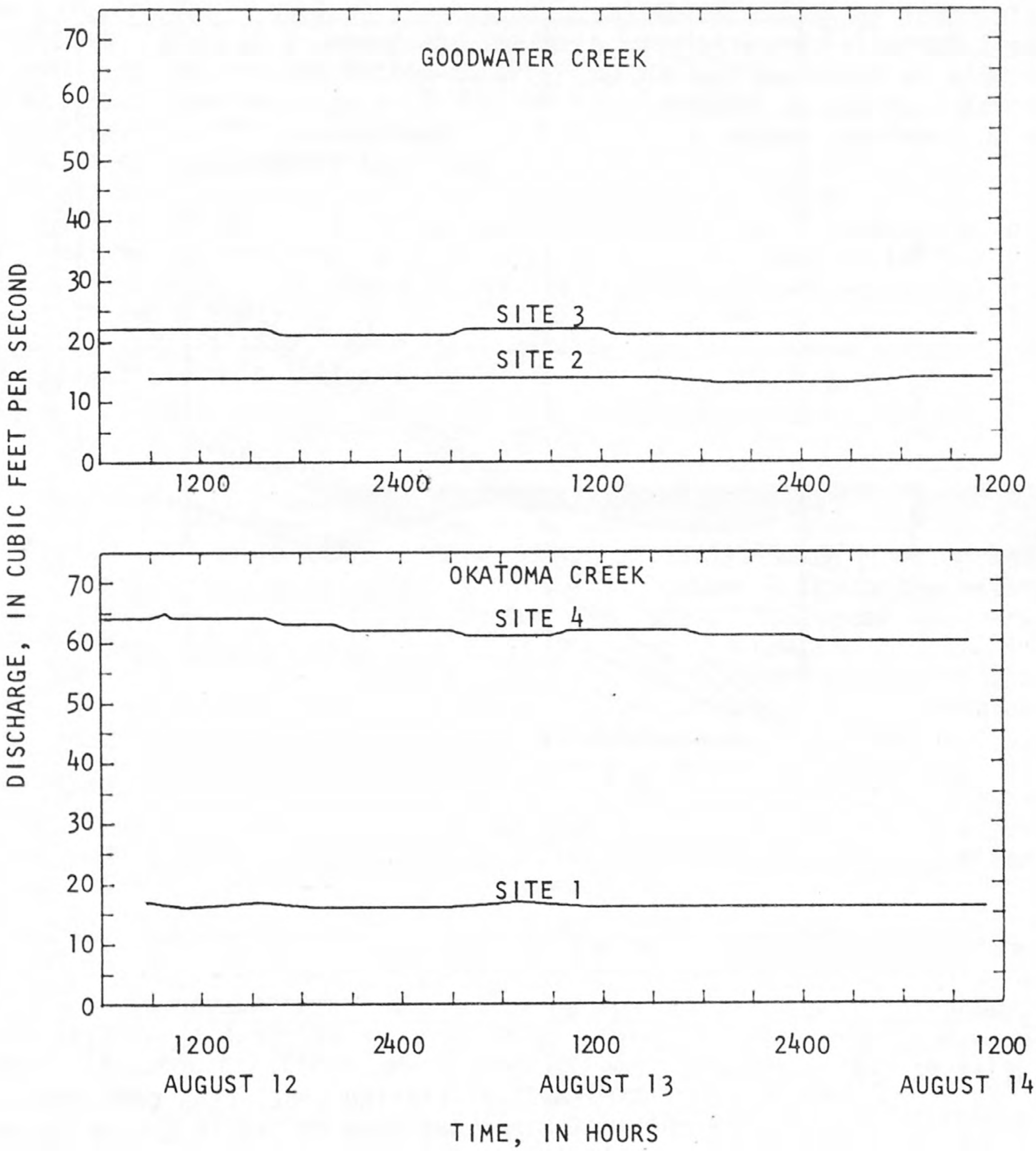

FIGURE 3.--STREAM DISCHARGE AT SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980.

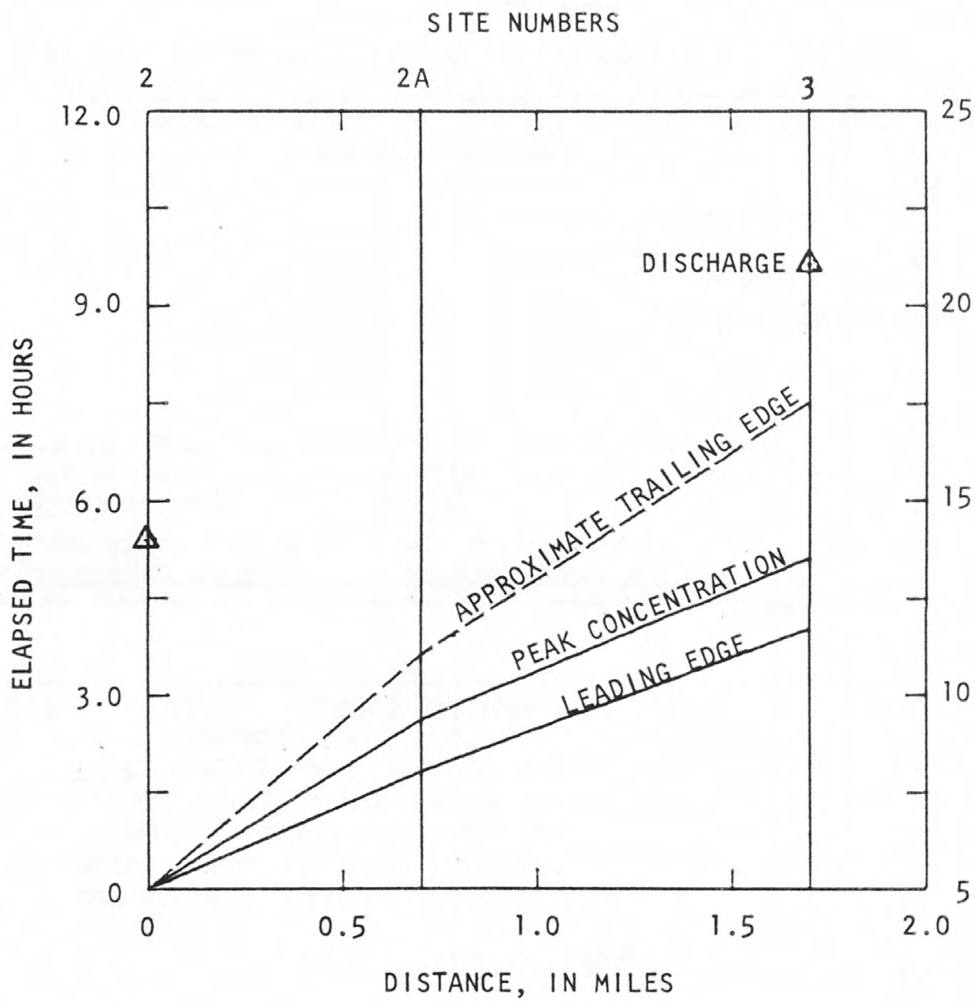

FIGURE 4.--TIME-OF-TRAVEL OF LEADING EDGE, PEAK CONCENTRATION, AND APPROXIMATE TRAILING EDGE OF DYE IN GOODWATER CREEK, AUGUST 12, 1980.

The average rate of dye travel increased downstream in Goodwater Creek. The average time of travel was 0.4 ft/s from site 2 to site 2A and 0.6 ft/s between sites 2A and 3. The average time of travel through the study reach was 0.5 ft/s or about 0.3 miles per hour.

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 at sites on Goodwater and Okatoma Creeks. Field measurements were made at 4-hour intervals. Nutrient samples were collected at 8-hour intervals and biochemical oxygen demand and bacteria samples were collected less frequently. A water and bottom-material sample was collected at site 4 on Okatoma Creek on August 13 for a comprehensive analysis. Water temperature, specific conductance, and dissolved oxygen monitors were operated continuously at sites 3 and 4.

The 5-day biochemical oxygen demand (BOD_5) and fecal bacteria count were determined in the U.S. Geological Survey Mobile Laboratory temporarily located in Magee. 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

The results of a comprehensive chemical analysis of a water and bottom material sample collected at site 4 on Okatoma indicate the water leaving the study area is suitable for many uses. The water was very soft (hardness of 7 mg/L), fairly low in color (21 units), and low in dissolved-solids (54 mg/L); however, there were constituents in the water that were at objectionable levels. The concentrations of cadmium (4 ug/L) and mercury (0.1 ug/L) were less than the limit recommended by EPA (Environmental Protection Agency) for a domestic water supply but were present in concentrations that are considered harmful for some aquatic life. The concentrations of phenol (1 ug/L) and iron (760 ug/L) were greater than the limits recommended by EPA for a domestic water supply (U.S. Environmental Protection Agency, 1976).

Several pesticides were present in the bottom material sample from site 4 on Okatoma Creek. The insecticides DDD, DDE, and DDT were present in concentrations of 8.8 ug/kg (micrograms per kilogram), 0.3 ug/kg, and 1.4 ug/kg, respectively. Dieldrin and chlordane were present in concentrations of 0.1 ug/kg and 10 ug/kg, respectively.

Specific Conductance

Specific conductance is the ability of water to conduct an electrical current. Distilled water has a very low conductance, less than one umhos/cm (micromho per centimeter at 25.0°C). Surface waters in Mississippi have a wide range of conductivity, from less than 50 umhos/cm in some inland freshwater streams to greater than 20,000 umhos/cm in saline estuaries along the Gulf Coast. Increased specific conductance is due to greater concentrations of dissolved solids.

The specific conductance of the water decreased from site 1 to site 4 on Okatoma Creek while the specific conductance at the sampling sites on Goodwater Creek were about the same above and below the inflow from the sewage lagoons (fig. 5). The mean specific conductance was 59 umhos/cm at site 1 and 37 umhos/cm at site 4 on Okatoma Creek. The mean specific conductance was 37 and 40 umhos/cm at sites 2 and 3, respectively, on Goodwater Creek. The range in specific conductance values at the sampling sites is shown in figure 6A.

Water Temperature

Water temperature is an important consideration when waste assimilation capacity of a stream is being determined. For example, the solubility of gases, rates of chemical reactions, and biological activity are affected by changing water temperatures. The solubility of oxygen decreases with increasing stream temperature. The rate in which dissolved oxygen is consumed during chemical reactions of aquatic organisms metabolism increases with increasing temperature, and the death rate of fecal bacteria is greater at higher stream temperatures.

The water temperature at all sites varied in a diurnal pattern during the study ranging from the minimum of 22.0°C at sites 2 and 3 to the maximum of 28.5°C at site 1 (fig. 7). The mean water temperature of Okatoma Creek decreased from 27.0°C at site 1 to 25.0°C at site 4. The mean water temperatures in Goodwater Creek increased slightly (23.0°C to 23.5°C) from site 2 to 3. The range in stream temperature was greatest at site 3 (fig. 6B) where temperature probably was affected by the discharge from the sewage lagoons. Inflow of ground water may have moderated water temperatures at site 2 (Newcome and others, 1972, p. 42).

pH - Hydrogen Ion Activity

The pH of water is a measure of the hydrogen ion activity in water. Theoretically, pure water at 25°C has a pH of 7.0. Water with pH values less than 7.0 is 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.

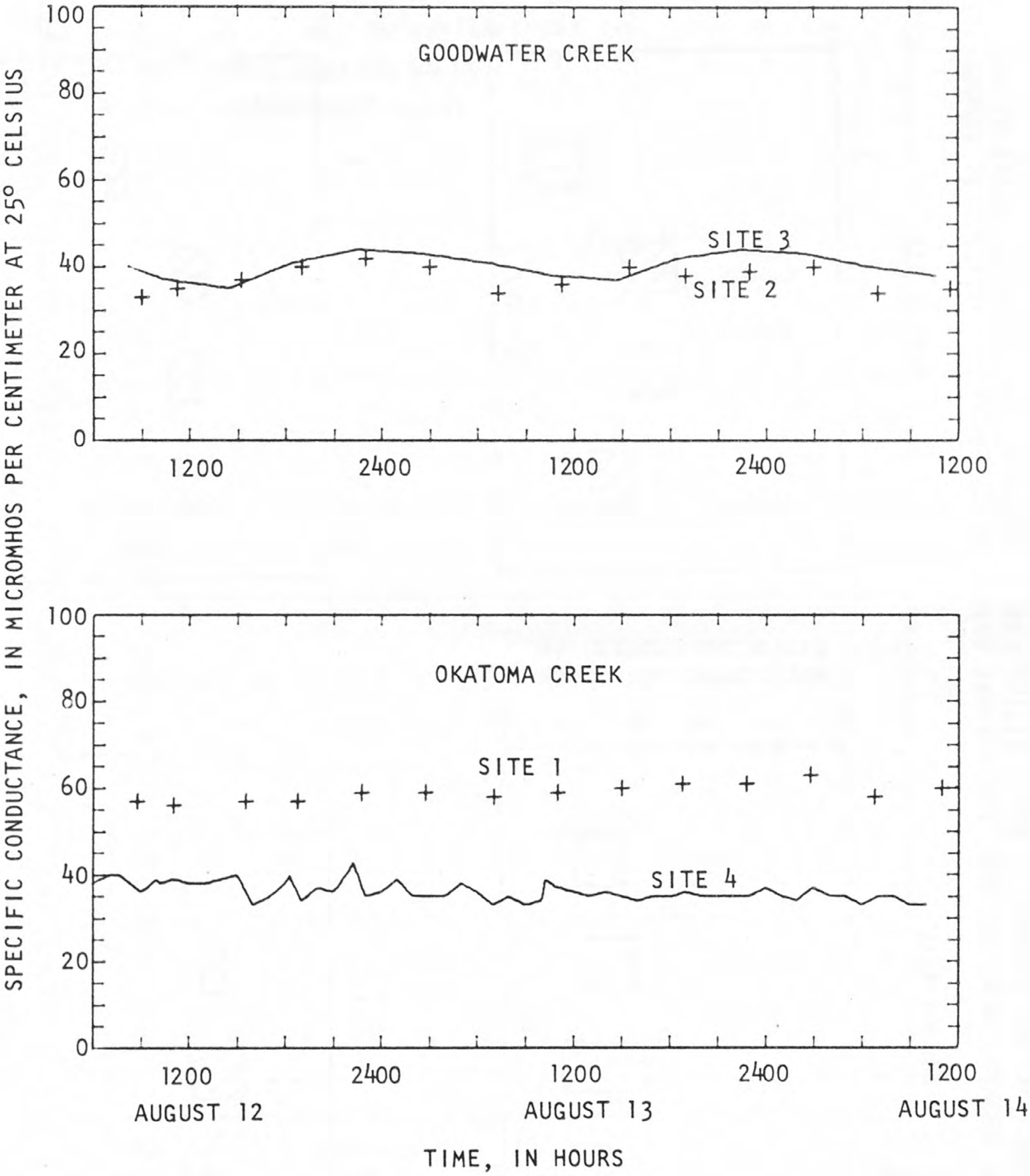

FIGURE 5.--SPECIFIC CONDUCTANCE AT THE SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980.

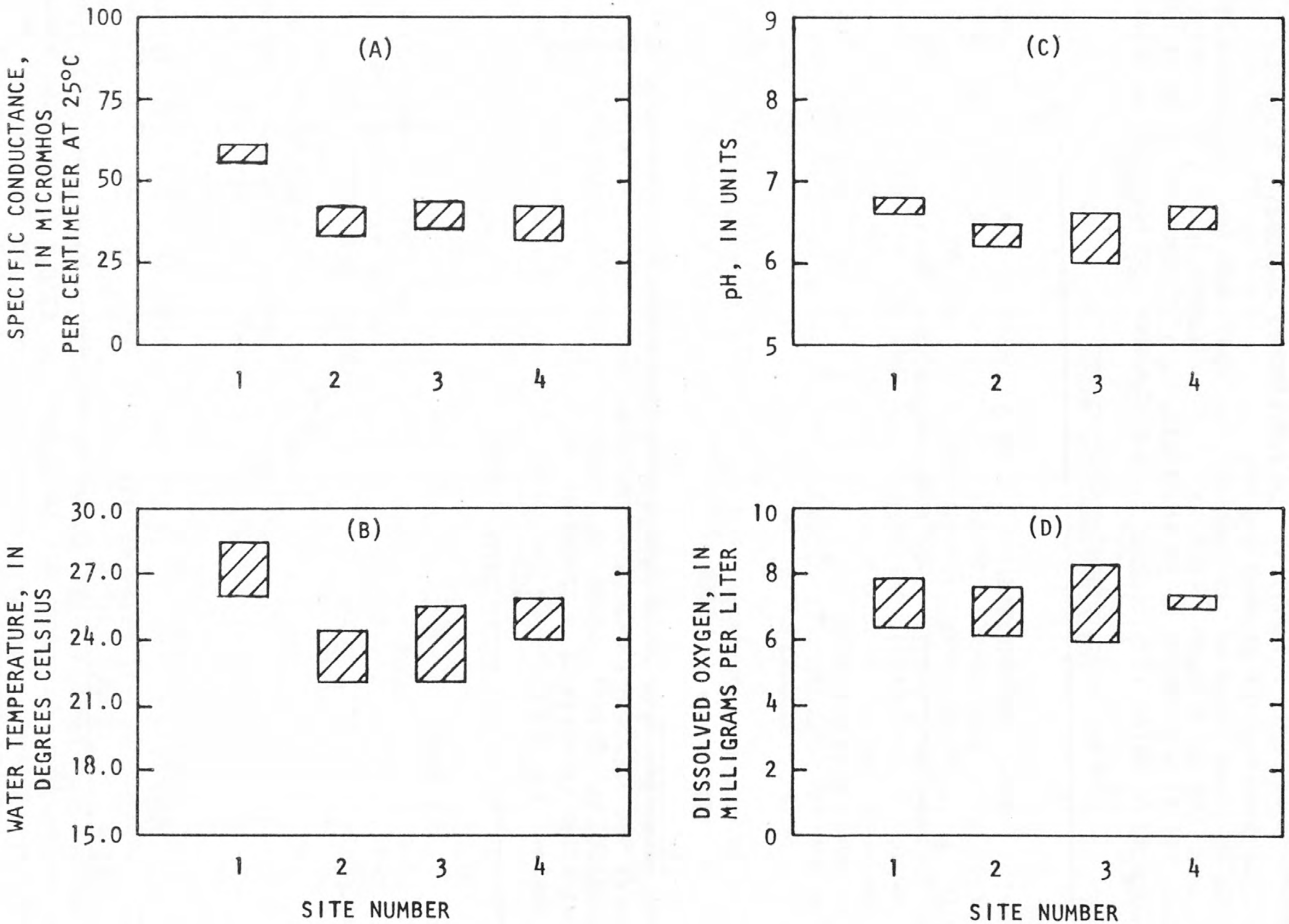

FIGURE 6.--RANGES OF SPECIFIC CONDUCTANCE, pH, WATER TEMPERATURE, AND DISSOLVED OXYGEN IN OKATOMA CREEK (SITES 1 AND 4) AND GOODWATER CREEK (SITES 2 AND 3), AUGUST 12-14, 1980.

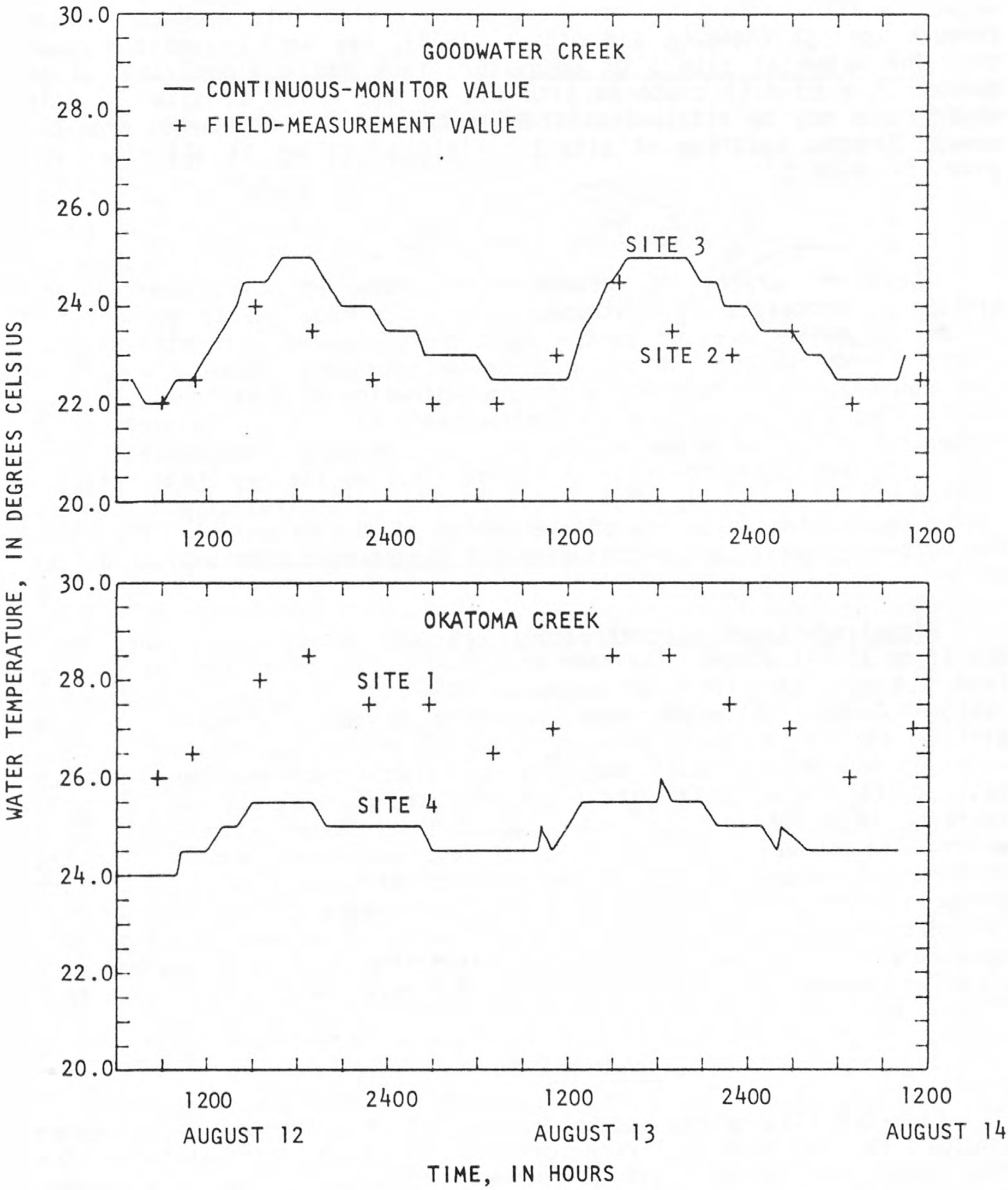

FIGURE 7.--WATER TEMPERATURE AT THE SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980.

Generally the pH was lower in Goodwater Creek than in Okatoma Creek. The pH ranged between 6.0 and 6.6 units at the sites on Goodwater Creek whereas the pH ranged from 6.4 to 6.8 units at sites on Okatoma Creek (fig. 6C). The lower pH (5.0 to 6.0 units) of ground water in the Citronelle Formation, which drains into Goodwater Creek through springs (Newcome and others, 1972), may have caused the lower pH. The water at site 3 on Goodwater Creek had a wider range of pH values (6.0 to 6.6) compared with 6.2 to 6.5 units at site 2. This wider range may be attributed to the nature of the discharges from the sewage lagoons upstream of site 3. Field pH values at all sites are given in table 1.

Dissolved Oxygen

Dissolved oxygen is essential to many of the chemical and biological processes in a stream. Oxygen is required to support the aerobic organisms present in the aquatic environment. In streams that contain large organic loads, organic or inorganic chemical reactions that consure oxygen may reduce the concentration of dissolved oxygen to levels that are unfavorable for some aquatic organisms. Respiration of large populations of algae may cause dissolved-oxygen concentrations to show a diurnal variation with an increase during the daylight hours and a decrease during the night hours. The dissolved-oxygen content therefore, is an indication of the status of the water with respect to the balance between oxygen-consuming and oxygen-producing process at the moment of sampling (Hem, 1970).

Dissolved-oxygen concentrations remained above 5 mg/L throughout the study at all sites. The mean dissolved-oxygen concentrations ranged from 6.8 mg/L at site 3 on Goodwater Creek to 7.1 mg/L at site 4 on Okatoma Creek. Although mean dissolved oxygen concentrations were similar at all sites, a greater range of values occurred at the two sites on Goodwater Creek. The range of dissolved-oxygen concentrations was 6.2 to 7.6 mg/L at site 2 and 6.0 to 8.2 mg/L at site 3. The increase in range in dissolved-oxygen concentrations from site 2 to 3 which also showed a deurnal fluctuation, may have been due to the presence of algae (noted as green coloration of the water) which produced more oxygen during the day and consumed more oxygen for respiration at night. A diurnal fluctuation of dissolved oxygen was less apparent at site 4 than at other sites (fig. 8). A narrow range of dissolved-oxygen concentrations (6.9 to 7.3 mg/L) was observed at site 4 (figure 6D).

Biochemical Oxygen Demand

Five-day biochemical oxygen demand (BOD_5) is the amount of oxygen consumed by biological activity for a period of five days at 20°C. The BOD_5 method is commonly used to estimate the organic load of a stream. Normally, unpolluted streams carry a residual organic load creating a BOD_5 of 0.5 to 1.0 mg/L. During high runoff this load may increase BOD_5's to 1.0 to 2.0 mg/L or higher (Velz, 1970). Industrial and municipal effluents usually cause a significant increase in the BOD_5 load.

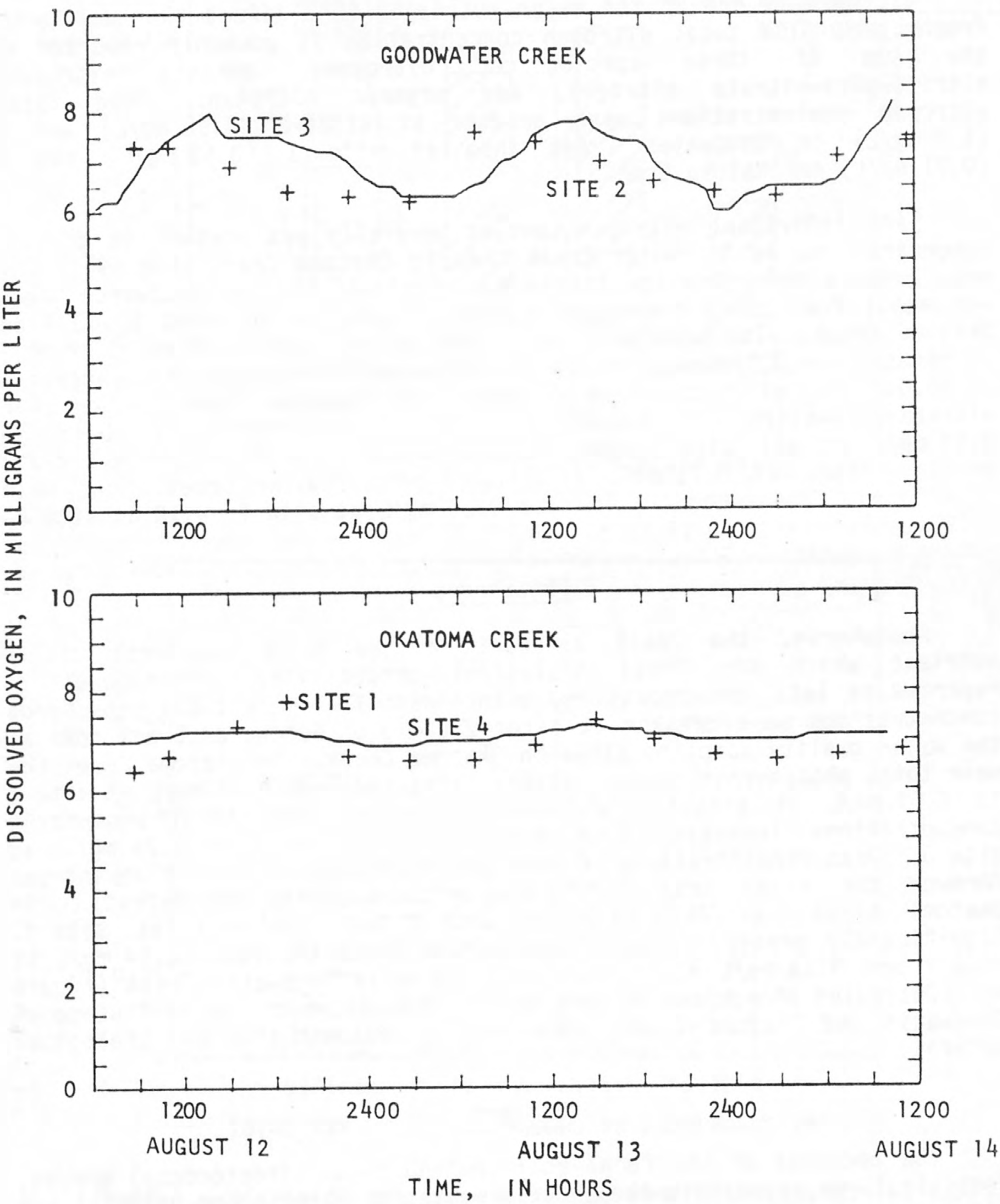

FIGURE 8.--DISSOLVED OXYGEN CONCENTRATIONS AT THE SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980.

The mean BOD_5 (determined from two samples) was greater at the sites on Goodwater Creek than on Okatoma Creek. The mean BOD_5 was 1.3 and 1.5 mg/L at sites 1 and 4, respectively on Okatoma Creek and 2.4 mg/L for sites 2 and 3 on Goodwater Creek.

Nitrogen Compounds

Nitrogen is one of the major nutrients that affect the quality of freshwater. The total nitrogen concentration is commonly reported as the sum of three species of nitrogen: ammonia nitrogen, nitrite-plus-nitrate nitrogen, and organic nitrogen. Mean total nitrogen concentrations were greater at sites 2 (0.98 mg/L) and 3 (1.0 mg/L) on Goodwater Creek than at sites 1 (0.62 mg/L) and 4 (0.71 mg/L) on Okatoma Creek.

Each individual nitrogen species generally was present in greater concentrations in Goodwater Creek than in Okatoma Creek (fig. 9). The mean ammonia concentration at the two sampling sites on Goodwater Creek was about four times the concentration of ammonia at sites 1 and 4 on Okatoma Creek. The mean ammonia concentrations were 0.19 and 0.17 mg/L at sites 2 and 3, respectively. This compares to the mean concentration of 0.04 mg/L at both sites 1 and 4 on Okatoma Creek. The mean nitrite-plus-nitrate nitrogen concentrations ranged from 0.41 to 0.58 mg/L at all sites except site 2. The mean nitrite-plus-nitrate concentration was 0.71 mg/L at site 2 on Goodwater Creek. The mean organic nitrogen concentration was 0.17 mg/L at site 1, 0.10 at site 2, 0.29 at site 3, and 0.19 at site 4.

Phosphorus

Phosphorus, the least abundant of the major nutrients, is a nutrient which may limit biological productivity. Phosphorus is reported as total phosphorus and orthophosphate. Mean total phosphorus concentrations were greater at sites 2 and 3 on Goodwater Creek than at the water quality sampling sites on Okatoma Creek. In Okatoma Creek the mean total phosphorous concentrations increased from 0.05 mg/L at site 1 to 0.09 mg/L at site 4. In Goodwater Creek mean total phosphorus concentrations increased from 0.19 mg/L at site 2 to 0.26 mg/L at site 3. Mean concentrations of orthophosphate also increased downstream through the study area. The mean orthophosphate concentration in Okatoma Creek was 0.01 mg/L at site 1 and 0.07 mg/L at site 4. Significantly greater mean orthophosphate concentrations (0.14 mg/L at site 2 and 0.18 mg/L at site 3) were found in Goodwater Creek (figure 9). Decreased phosphorus concentrations downstream of the confluence of Goodwater and Okatoma Creeks were due to sedimentation and biological uptake.

Bacteria

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

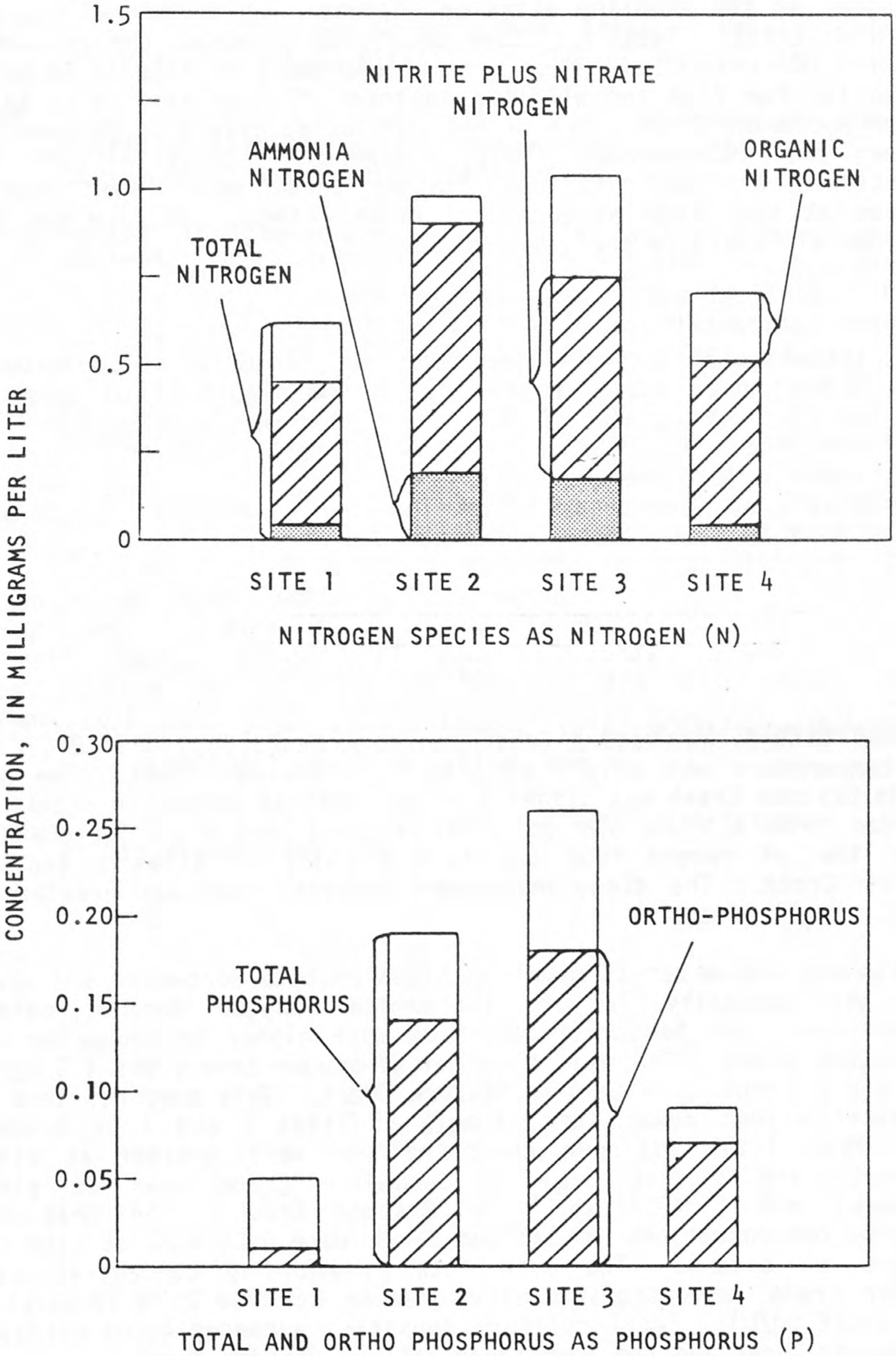

FIGURE 9.--MEAN NITROGEN AND PHOSPHORUS CONCENTRATIONS AT THE SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980.

The densities of fecal coliform and fecal streptococcus generally were higher at the sampling sites on Goodwater Creek than at the sites on Okatoma Creek. Fecal coliform densities exceeded the recommended limit of 4,000 col/100 mL (Mississippi Department of Natural Resources, 1977, p. 10) for fish and wildlife in three of four samples at sites 2 and 3 on Goodwater Creek. One of two samples at site 4 on Okatoma Creek exceeded the recommended limit. Generally densities of fecal streptococcus at the sites on Okatoma Creek were lower than the densities at the sites on Goodwater Creek. Fecal coliform and fecal streptococcus densities are given in table 2.

SUMMARY

An intensive quality-of-water study was conducted on Goodwater and Okatoma Creeks near Magee, Mississippi, from August 12 to August 14, 1980. The study was conducted during a period when streamflow was 3 to 4 times the 7-day Q_{10}. The mean discharge was 16 ft³/s and 62 ft³/s at sites 1 and 4 on Okatoma Creek and 13 ft³/s and 21 ft³/s at sites 2 and 3 respectively on Goodwater Creek. The average time of travel in the 1.7-mile reach between sites 2 and 3 was 0.5 ft³/s.

The mean specific conductance of Okatoma Creek decreased from 59 umhos/cm at site 1 to 37 umhos/cm at site 4. The specific conductance remained about the same in Goodwater Creek. The mean specific conductance was 37 and 40 umhos/cm at site 2 and 3, respectively. The mean water temperature at sites 2 and 3 on Goodwater Creek and site 4 on Okatoma Creek ranged from 23.0°C to 25.0°C. Mean water temperature was 27.0°C at site 1 on Okatoma Creek. The pH of water in Okatoma Creek was slightly higher than in Goodwater Creek. The pH ranged from 6.4 to 6.8 units at sites 1 and 4 on Okatoma Creek whereas the pH ranged from 6.0 to 6.6 units at sites 2 and 3 on Goodwater Creek. The dissolved-oxygen concentration was greater than 5.0 mg/L at all sites.

Although the water at sampling sites on both Goodwater and Okatoma Creeks was generally low in biochemical oxygen demand, nutrient concentrations, and bacterial densities were higher in Goodwater Creek than Okatoma Creek. The mean biochemical oxygen demand was 1.3 mg/L at site 1 and 1.5 mg/L at site 4 on Okatoma Creek. This compares to a mean biochemical oxygen demand of 2.4 mg/L at sites 2 and 3 on Goodwater Creek. Mean total nitrogen concentrations were greater at sites 2 (0.98 mg/L) and 3 (1.0 mg/L) on Goodwater Creek than at sites 1 (0.62 mg/L) and 4 (0.71 mg/L) on Okatoma Creek. The mean total phosphorus concentrations in Okatoma Creek were 0.05 mg/L at site 1 and 0.09 mg/L at site 4. The mean total phosphorus concentrations in Goodwater Creek were significantly greater at site 2 (0.19 mg/L) and site 3 (0.26 mg/L). Fecal coliform densities exceeded 4,000 col/100 mL at Goodwater Creek and the downstream site of Okatoma Creek.

Generally the water in Goodwater and Okatoma Creeks is suitable for many uses. However, cadmium (4.0 ug/L), mercury (0.1 ug/L), phenol (1 ug/L), and iron (760 ug/L) concentrations were at or above the recommended limits for aquatic life at site 4 on Okatoma Creek. Dieldrin (0.1 ug/kg), chlordane (10 ug/kg), DDD (8.8 ug/kg), DDE (0.3 ug/kg) and DDT (1.4 ug/kg) were also detected in a bottom materials sample.

SELECTED REFERENCES

Cross, R. D., and Wales, R. W., 1974, Atlas of Mississippi: Jackson, University Press of Mississippi, 187 p.

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

Mississippi Department of Natural Resources, Bureau of Pollution Control, 1977, State of Mississippi water quality criteria for intrastate, interstate, and coastal waters in State of Mississippi 305(b) Water Quality Report 1978-79: Mississippi Department of Natural Resources, Bureau of Pollution Control, 74 p.

Newcome, Roy, Jr., Tharpe, E. J., and Oakley, W. T., 1972, Water for industrial development in Copiah and Simpson Counties, Mississippi: Mississippi Research and Development Center Bulletin, 60 p.

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

U.S. Bureau of the Census, 1971, Census of population, 1970, general population characteristics: Final Report PC(1) B26 Mississippi, Washington, D. C., U.S. Government Printing Office.

U.S. Environmental Protection Agency, 1976, Quality Criteria for Water: U.S. Government Printing Office, 256 p.

Velz, C. J., 1970, Applied Stream Sanitation: New York, Wiley-Interscience, 629 p.

HYDROLOGIC DATA

TABLE 1.--RESULTS OF FIELD DETERMINATIONS, HOURLY DISCHARGE, AND CONTINUOUS MONITOR VALUES AT THE WATER-QUALITY SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980

02472551 - OKATOMA CREEK AT SITE 1, LAT 31°50'44", LONG 89°41'24"

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)
AUG						
12...	0845	17	57	6.6	26.0	6.4
12...	1100	16	56	6.6	26.5	6.7
12...	1530	17	57	6.7	28.0	7.3
12...	1845	16	57	6.7	28.5	7.8
12...	2245	16	59	6.7	27.5	6.7
13...	0245	16	59	6.7	27.5	6.6
13...	0700	17	58	6.7	26.5	6.6
13...	1100	16	59	6.7	27.0	6.9
13...	1500	16	60	6.7	28.5	7.4
13...	1845	16	61	6.8	28.5	7.0
13...	2245	16	61	6.7	27.5	6.7
14...	0245	16	63	6.8	27.0	6.6
14...	0645	16	58	6.7	26.0	6.7
14...	1105	16	62	6.7	27.0	6.8

TABLE 1.--CONTINUED

02472560 - GOODWATER CREEK AT SITE 2, LAT 31°51'12", LONG 89°43'13"

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)
AUG						
12...	0900	14	33	6.2	22.0	7.3
12...	1115	14	35	6.3	22.5	7.3
12...	1515	14	37	6.4	24.0	6.9
12...	1900	14	40	6.3	23.5	6.4
12...	2300	14	42	6.3	22.5	6.3
13...	0300	14	40	6.3	22.0	6.2
13...	0715	14	34	6.3	22.0	7.6
13...	1115	14	36	6.4	23.0	7.4
13...	1530	14	40	6.5	24.5	7.0
13...	1900	13	38	6.4	23.5	6.6
13...	2300	13	39	6.3	23.0	6.4
14...	0300	13	40	6.3	23.5	6.3
14...	0700	14	34	6.4	22.0	7.1
14...	1120	14	35	6.5	22.5	7.4

TABLE 1.--CONTINUED

02472567 - GOODWATER CREEK AT SITE 3, LAT 31°50'36", LONG 89°42'04"

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)
AUG						
12...	0700	22	--	--	22.5	6.0
12...	0800	22	--	--	22.0	6.2
12...	0815	22	40	6.4	22.5	6.4
12...	0900	22	--	--	22.0	6.7
12...	1000	22	--	--	22.5	7.2
12...	1030	22	37	6.4	22.5	7.2
12...	1100	22	--	--	22.5	7.4
12...	1200	22	--	--	23.0	7.6
12...	1300	22	--	--	23.5	7.8
12...	1400	22	--	--	24.0	8.0
12...	1430	22	35	6.6	25.0	7.7
12...	1500	22	--	--	24.5	7.5
12...	1600	22	--	--	24.5	7.5
12...	1700	21	--	--	25.0	7.5
12...	1800	21	--	--	25.0	7.5
12...	1830	21	41	6.6	25.0	7.5
12...	1900	21	--	--	25.0	7.4
12...	2000	21	--	--	24.5	7.3
12...	2100	21	--	--	24.0	7.2
12...	2200	21	--	--	24.0	7.2
12...	2230	21	44	6.4	24.0	7.1
12...	2300	21	--	--	24.0	7.0
12...	2400	21	--	--	23.5	6.7
13...	0100	21	--	--	23.5	6.5
13...	0200	21	--	--	23.5	6.5
13...	0230	21	43	6.3	23.0	6.3
13...	0300	21	--	--	23.0	6.3
13...	0400	22	--	--	23.0	6.3
13...	0500	22	--	--	23.0	6.3
13...	0600	22	--	--	23.0	6.3
13...	0630	22	41	6.4	23.0	6.4
13...	0700	22	--	--	22.5	6.5
13...	0800	22	--	--	22.5	6.6
13...	0900	22	--	--	22.5	7.0
13...	1000	22	--	--	22.5	7.1
13...	1045	22	38	6.4	22.5	7.3
13...	1100	22	--	--	22.5	7.5
13...	1200	22	--	--	22.5	7.7
13...	1300	21	--	--	23.5	7.8

TABLE 1.--CONTINUED

02472567 - GOODWATER CREEK AT SITE 3, LAT 31°50'36", LONG 89°42'04"

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)
AUG						
13...	1400	21	--	--	24.0	7.8
13...	1445	21	37	6.6	25.5	7.9
13...	1500	21	--	--	24.5	7.7
13...	1600	21	--	--	25.0	7.5
13...	1700	21	--	--	25.0	7.4
13...	1800	21	--	--	25.0	7.4
13...	1830	21	42	6.6	25.5	7.3
13...	1900	21	--	--	25.0	7.0
13...	2000	21	--	--	25.0	6.7
13...	2100	21	--	--	24.5	6.6
13...	2200	21	--	--	24.5	6.5
13...	2230	21	44	6.0	24.0	6.4
13...	2300	21	--	--	24.0	6.0
13...	2400	21	--	--	24.0	6.0
14...	0100	21	--	--	23.5	6.3
14...	0200	21	--	--	23.5	6.4
14...	0230	21	39	6.5	23.5	6.5
14...	0300	21	--	--	23.5	6.5
14...	0400	21	--	--	23.0	6.5
14...	0500	21	--	--	23.0	6.5
14...	0600	21	--	--	22.5	6.5
14...	0630	21	40	6.5	23.0	6.6
14...	0700	21	--	--	22.5	6.6
14...	0800	21	--	--	22.5	7.0
14...	0900	21	--	--	22.5	7.5
14...	1000	21	--	--	22.5	7.8
14...	1040	21	38	6.6	23.0	8.2

TABLE 1.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4, LAT 31°48'03", LONG 89°40'26"

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)
AUG						
12...	0745	64	40	6.5	24.0	7.0
12...	0800	64	39	--	24.0	7.0
12...	0900	65	36	--	24.0	7.0
12...	1000	65	39	--	24.0	7.1
12...	1015	64	38	6.4	24.5	7.1
12...	1100	64	39	--	24.5	7.1
12...	1200	64	38	--	24.5	7.2
12...	1300	64	37	--	25.0	7.2
12...	1400	64	39	6.6	25.0	7.2
12...	1500	64	40	--	25.5	7.2
12...	1600	64	33	--	25.5	7.2
12...	1700	63	35	--	25.5	7.2
12...	1800	63	38	--	25.5	7.2
12...	1815	63	40	6.6	25.5	7.2
12...	1900	63	34	--	25.5	7.2
12...	2000	63	37	--	25.0	7.1
12...	2100	62	36	--	25.0	7.1
12...	2200	62	41	--	25.0	7.0
12...	2215	62	43	6.7	25.0	7.0
12...	2300	62	35	--	25.0	7.0
12...	2400	62	36	--	25.0	6.9
13...	0100	62	39	--	25.0	6.9
13...	0200	62	35	--	25.0	6.9
13...	0215	62	35	6.6	25.0	6.9
13...	0300	62	35	--	24.5	6.9
13...	0400	61	35	--	24.5	7.0
13...	0500	61	38	--	24.5	7.0
13...	0600	61	36	6.6	25.0	7.0
13...	0700	61	33	--	24.5	7.0
13...	0800	61	35	--	24.5	7.0
13...	0900	61	33	--	24.5	7.1
13...	1000	62	34	--	24.5	7.1
13...	1015	62	39	6.6	25.0	7.1
13...	1100	62	37	--	24.5	7.1
13...	1200	62	36	--	25.0	7.2
13...	1300	62	35	--	25.5	7.2
13...	1400	62	36	6.7	26.0	7.3
13...	1500	62	35	--	25.5	7.3
13...	1600	62	34	--	25.5	7.2

TABLE 1.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4. LAT 31°48'03", LONG 89°40'26"

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)
AUG						
13...	1700	62	35	--	25.5	7.2
13...	1800	61	35	--	25.5	7.2
13...	1815	61	35	6.7	26.0	7.2
13...	1900	61	36	--	25.5	7.1
13...	2000	61	35	--	25.5	7.1
13...	2100	61	35	--	25.5	7.0
13...	2200	61	35	--	25.0	7.0
13...	2215	61	35	6.7	25.0	7.0
13...	2300	61	35	--	25.0	7.0
13...	2400	61	37	--	25.0	7.0
14...	0100	61	35	--	25.0	7.0
14...	0200	60	34	--	24.5	7.0
14...	0215	60	35	6.7	25.0	7.0
14...	0300	60	37	--	25.0	7.0
14...	0400	60	35	--	24.5	7.0
14...	0500	60	35	--	24.5	7.1
14...	0600	60	33	6.7	24.5	7.1
14...	0700	60	35	--	24.5	7.1
14...	0800	60	35	--	24.5	7.1
14...	0900	60	33	--	24.5	7.1
14...	1000	60	33	6.7	25.0	7.1

TABLE 2.--RESULTS OF LABORATORY ANALYSIS OF SAMPLES COLLECTED AT THE WATER-QUALITY SAMPLING SITES ON GOODWATER AND OKATOMA CREEKS, AUGUST 12-14, 1980

02472551 - OKATOMA CREEK AT SITE 1, LAT 31°50'44", LONG 89°41'24"

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)
AUG								
12...	1530	18	1.1	560	370	.40	.010	.41
12...	2245	--	--	--	--	.41	.000	.41
13...	0700	20	1.5	430	760	.40	.000	.40
13...	1500	--	--	--	--	.40	.010	.41

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)
AUG							
12...	.050	.11	.16	.57	2.5	.060	.020
12...	.030	.18	.21	.62	2.7	.040	.010
13...	.040	.17	.21	.61	2.7	.040	.010
13...	.050	.21	.26	.67	3.0	.050	.010

TABLE 2.--CONTINUED

02472560 - GOODWATER CREEK AT SITE 2, LAT 31°51'12", LONG 89°43'13"

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)
AUG								
12...	1515	14	3.0	>6000	1800	.70	.010	.71
12...	2300	--	--	--	--	.72	.010	.73
13...	0715	15	1.7	K15000	<1000	.69	.010	.70
13...	1530	--	--	--	--	.70	.010	.71

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)
AUG							
12...	.210	.11	.32	1.0	4.6	.250	.180
12...	.190	.09	.28	1.0	4.5	.220	.150
13...	.100	.13	.23	.93	4.1	.090	.080
13...	.260	.07	.33	1.0	4.6	.210	.160

TABLE 2.--CONTINUED

02472567 - GOODWATER CREEK AT SITE 3, LAT 31°50'36", LONG 89°42'04"

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)
AUG								
12...	1430	19	2.2	K2400	550	.57	.000	.57
12...	2230	--	--	--	--	.59	.010	.60
13...	0630	23	2.7	K6600	1000	.58	.020	.60
13...	1445	--	--	--	--	.59	.010	.60
13...	2230	--	--	--	--	.60	.020	.62
14...	0630	--	--	--	--	.48	.000	.48

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)
AUG							
12...	.160	.23	.39	.96	4.3	.200	.180
12...	.180	.18	.36	.96	4.3	.270	.190
13...	.150	.38	.53	1.1	5.0	.280	.190
13...	.180	.30	.48	1.1	4.8	.210	.160
13...	.200	.29	.49	1.1	4.9	.320	.210
14...	.170	.35	.52	1.0	4.4	.270	.160

TABLE 2.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4, LAT 31°48'03", LONG 89°40'26"

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)
AUG								
12...	1400	15	1.5	K130	370	.47	.000	.47
12...	2215	--	--	--	--	.46	.000	.46
13...	0600	18	1.5	K6200	280	.51	.000	.51
13...	1400	--	--	--	--	.45	.010	.46
14...	0600	--	--	--	--	.44	.010	.45

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)
AUG							
12...	.040	.16	.20	.67	3.0	.090	.070
12...	.040	.19	.23	.69	3.1	.090	.070
13...	.030	.15	.18	.69	3.0	.080	.070
13...	.050	.27	.32	.78	3.5	.090	.060
14...	.050	.20	.25	.70	3.1	.090	.070

TABLE 2.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4, LAT 31°48'03", LONG 89°40'26"

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)
AUG								
13...	1400	21	5.2	7	0	1.5	.9	3.8

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)
AUG								
13...	.6	11	1.3	6.5	.1	10	54	.07

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)
AUG								
13...	9.05	1	0	4	<10	11	<10	0

TABLE 2.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4, LAT 31°48'03", LONG 89°40'26"

DATE	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)
AUG								
13...	<0	2	<10	760	5300	2	20	140

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/G 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)
AUG								
13...	1200	.1	.00	0	<10	0	0	10

DATE	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN)	CARBON, ORGANIC TOTAL (MG/L AS C)	PHENOLS (UG/L)	PCB TOTAL (UG/L)	PCB, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	PCN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)
AUG								
13...	10	2.7	1	.00	0	.0	.0	.00

TABLE 2.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4, LAT 31°48'03", LONG 89°40'26"

DATE	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)
AUG								
13...	.0	.0	10	.00	8.8	.00	.3	.00

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)
AUG								
13...	1.4	.00	.00	.1	.00	.0	.00	.0

DATE	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)
AUG								
13...	.00	.00	.0	.00	.0	.00	.0	.00

TABLE 2.--CONTINUED

02472580 - OKATOMA CREEK AT SITE 4, LAT 31°48'03", LONG 89°40'26"

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)
AUG								
13...	.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)
AUG								
13...	.00	0	0	.00	.00	.00	.00	.00