UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

QUALITY OF WATER IN JAMES CREEK, MONROE COUNTY, MISSISSIPPI

Open-File Report 81-1181

Prepared in cooperation with

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Jackson, Mississippi
1981

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 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)

Water temperatures are reported in degrees Celsius throughout this report. Temperatures may be converted to either the Farenheit or Celsius equivalent with the following formulas:

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

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 IN JAMES CREEK, MONROE COUNTY, MISSISSIPPI

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ABSTRACT

A short-term quality-of-water study of James Creek near Aberdeen, Mississippi was conducted on November 14-16, 1978, during a period of low streamflow. During the study, the water in the 2.6-mile stream reach was undesirable for many uses. Wastewater inflow immediately upstream of the study area contributed to the dissolved-solids load in James Creek. The specific conductance of the water ranged from 775 to 890 micromhos at the head of the study reach and from 650 to 750 micromhos at the end of the study reach.

A substantial biochemical oxygen-demand was evident in James Creek. Five-day biochemical oxygen demand values downstream of a sewage disposal pond outfall ranged from 8.3 to 11 milligrams per liter and dissolved-oxygen concentrations ranged from 0.4 to 4.5 milligrams per liter. Nitrogen and phosphorus compounds and fecal bacteria densities were highest downstream. Total ammonia nitrogen and phosphorus concentrations in the water leaving the study area ranged from 0.29 to 1.4 milligrams per liter and from 0.65 to 1.7 milligrams per liter, respectively. Fecal coliform densities exceeding 50,000 colonies per 100 milliliters of sample were observed in the study area. The median fecal coliform density of the water leaving the study area was 2,800 colonies per 100 milliliters.

INTRODUCTION

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

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

This report summarizes and documents the results of a short-term intensive study of James Creek conducted on November 14-16, 1978. Chemical, physical, bacteriological, and discharge data are included in the report.

DESCRIPTION OF THE AREA

Location

Monroe County is located in the northwest part of Mississippi and is bordered on the east by Alabama. The study area is situated west of Tombigbee River along a reach of James Creek immediately south of the city of Aberdeen. The study area and location of the water-quality sampling sites are shown in figure 1.

Cultural Features

Monroe County experienced a moderate decline in population between 1940 and 1960. The population increased from 33,953 to 34,043 between 1960 and 1970. The 1980 population was 36,420. The city of Aberdeen is the county seat of Monroe County. The population of the city between 1970 and 1980 increased from 6,507 to 7,179. The 1980 population is based on the Bureau of the Census 1980 preliminary report.

Chemicals, textiles, industrial and automotive products, and meat processing have added to the economy of the area in recent years. Bentonite and cottonseed oil processing, lumber, and cotton ginning have been important to the economy for several years.

Geology and Topography

Monroe County is near the eastern edge of the Mississippi embayment, a broad inland arm of the Gulf Coast Plain. The sedimentary beds of gravel, sand, clay, chalk, and silt dip to the southwest at 20 to 30 feet per mile (Wasson and others, 1965, p.15). The region can be divided into several distinct north-south trending belts characterized by different landforms that have resulted from erosion of the rock materials underlying the surface. Aberdeen lies just east of the Black Prairies and on the west edge of the Tombigbee Hills physiographic district. The Tombigbee Hills rise to 400 feet above sea level on some hills and ridges in the eastern part of the county. The Black Prairies are of more subdued topography. The surface of the area ranges from plains to low rolling hills. The Black Prairies district, developed on the outcrop of the chalky part of the Selma Group, does not readily absorb water (Lang and Boswell, 1960, p. 15).

The Pleistocene Series and possibly the Pliocene are represented in the county by Terrace loam, sand, and gravel. These materials, in an area 5 to 7 miles wide bordering Tombigbee River lie on the eroded surface of the Eutaw Formation on the east and are in contact with the Selma Group on the west.

The upper part of the James Creek Basin is on the outcrop of the Mooreville Chalk of the Selma Group of the Cretaceous Age. The middle reach is on the underlying Cretaceous Tombigbee Sand Member of the Eutaw Formation and Quaternary alluvium. The lower reach is in the alluvium or is incised into the lower part of the Eutaw Formation (Vestal, 1943, pl. 1).

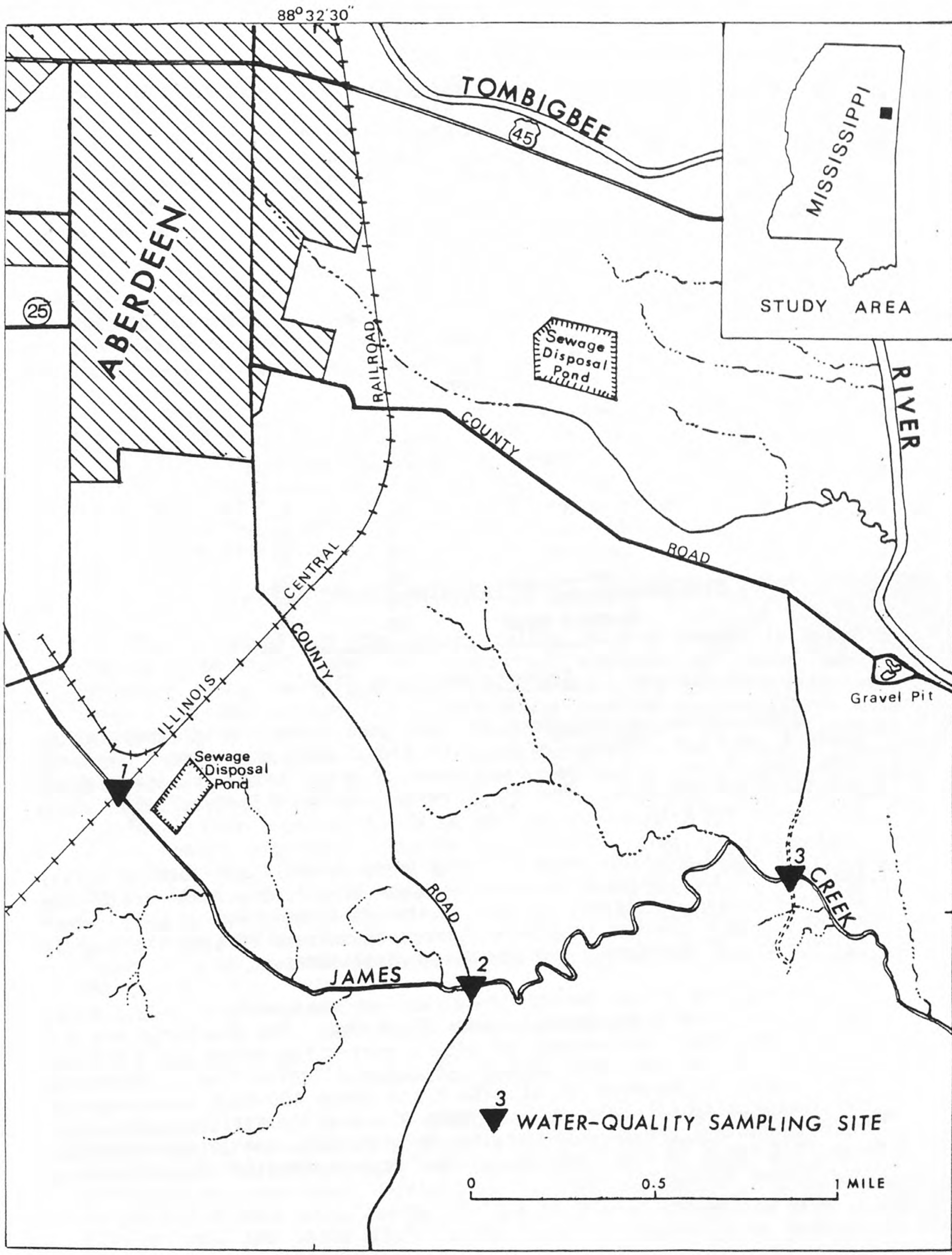

FIGURE 1.--LOCATION OF STUDY AREA AND WATER-QUALITY SAMPLING SITES ON JAMES CREEK.

Climate

The climate in the study area is typical of the subtropical southeast. Rainfall is usually high and summers are consistently hot. The rainfall generally is higher in the winter and early spring and lowest in the fall. The mean annual rainfall is about 53 inches. The monthly rainfall normally ranges from about 2.6 inches in October to 6.0 inches in March.

For the period of the study, the NOAA weather station at Aberdeen reported rainfall of 0.03 and 0.10 inches for November 14 and 16, respectively. The maximum and minimum air temperatures during and two days preceding the study and the maximum, minimum, and mean November 1978 air temperatures are as follows:

Date	Temperature (°F) Maximum	Temperature (°F) Minimum
November 12	75	44
November 13	74	51
November 14	75	59
November 15	76	59
November 16	79	65
Monthly mean	70	46

Drainage and Streamflow

James Creek, a tributary of Tombigbee River, originates in the western part of Monroe County. It flows southeast before entering Tombigbee River 2.3 miles downstream of site 3 and about 5 miles southeast of Aberdeen. The study reach extends 2.6 river miles along the creek from site 1 to site 3 (fig. 1).

The total drainage area of James Creek is 43.4 mi^2 (square miles) and most of the drainage upstream of site 1 is from a rural area. The drainage areas at sites 2 and 3 are 37.8 mi^2 and about 40 mi^2 respectively. The increase in discharge downstream of site 1 primarily is from one of Aberdeen's two sewage disposal ponds.

During the study period there was no measurable flow 1.5 miles upstream of site 1 at State Highway 25 bridge. The discharge was 2.4 ft^3/s (cubic feet per second) at site 1 during the study and 3.0 ft^3/s at site 2 during the period of sample collection. Discharge measurements on November 15 at site 1 and about 400 feet downstream of the sewage disposal pond outfall were 2.4 and 3.0 ft^3/s respectively. Assuming minimal ground-water seepage between measuring sites, there was about 0.6 ft^3/s (0.4 million gallons per day) of treated sewage entering James Creek during the study.

The discharge at site 3 ranged from 3.1 to 5.9 ft^3/s. However, the discharge was fairly constant and did not exceed 3.4 ft^3/s during most of the study. Discharge began to increase between 1400 and 1500 hours on November 16, the last day of the study (table 1). A marked change in the water quality occurred during the period of increased discharge. The reason for the sudden rise in the streamflow at site 3 or the source of the inflow could not be determined by personnel conducting the study.

The U.S. Geological Survey operated a continuous-record gaging station at State Highway 25 from 1964 to 1968. The station has been operated as a partial-record station since 1968. According to Tharpe (1975, p. 35) the 7-day Q_{10} at the gaging station is 0 ft^3/s.

A major chemical industry discharges its wastewater into James Creek downstream of the State Highway 25 gage and upstream of site 1 (Mississippi Air and Water Pollution Control Commission, written comm., undated). Because of low ground-water inflow upstream, it is probable that the quantity of streamflow in the study reach is primarily dependent on the quantity of treated sewage and industrial waste inflow in the drier seasons.

WATER-QUALITY DATA COLLECTION AND ANALYSES

The assessment of the water quality in this report is based on chemical, physical, and bacteriological analyses of water samples collected along the main stem of James Creek. The sampling sites were located on the stream reach that would provide representative data relevant to the study (fig. 1). Field measurements were performed at about 3-hour intervals. Water samples were collected at about 6-hour intervals at sites 1 and 3 during the study and during a 24-hour period at site 2. The 5-day biochemical oxygen demand (BOD_5), fecal coliform, and fecal streptococcal bacteria were analyzed at the U.S. Geological Survey Mobile Laboratory located in the study area. The samples for other water-quality parameters presented in this report were analyzed by the U.S. Geological Survey National Water Quality Laboratory in Atlanta, Georgia. Continuous dissolved oxygen, temperature, and specific conductance monitors were located at sites 1 and 3 during the study. The results of on-site measurements and laboratory analyses are given in tables 1 and 2.

WATER-QUALITY CHARACTERISTICS

General Composition

The quality of water in James Creek generally was undesirable for many uses during the study because of the wastewater inflow in and upstream of the study reach. Although the water in James Creek at low flow may be considered deleterious to some supplies, it probably is suitable for many uses during periods of higher streamflow when waste dilution and the waste assimilative capacity generally is greater in streams.

The results of a comprehensive chemical analyses of a water and bottom material sample collected at site 3 on November 16, 1978, are given in table 2. The dissolved-solids concentration of the water was 449 mg/L (milligrams per liter), and sodium, chloride, and bicarbonate comprised about three-fourths of the dissolved constituents. The color of the water was 100 units and the hardness as $CaCO_3$ was 81 mg/L. Iron and manganese concentrations were 440 and 100 ug/L (micrograms per liter), respectively. Concentrations of several minor elements were in the water and bottom material in less than 10 ug/L and 10 u/g respectively. The iron and manganese concentrations in the bottom material were 4,100 and 130 ug/L, respectively.

The water sample collected for herbicide analyses contained 2,4 D (0.37 ug/L). The other herbicides analyzed were below detectable limits. The water sample collected for insectide analyses was ruined in the laboratory during analyses. The insecticides and herbicides in the bottom material were below detectable limits.

The water-quality criteria for intrastate, interstate, and coastal waters in Mississippi are given in Mississippi Department of Natural Resources, Bureau of Pollution Control, 1977, appendix page 75.

Specific Conductance and Dissolved Solids

The specific conductance of water is a measure of its ability to conduct an electric current and its degree of mineralization. The specific conductance values in this study are reported in micromhos per centimeter (umhos/cm) at 25°C. The dissolved-solids concentration in water is proportional to specific conductance in a ratio ranging from 0.55 to 0.75, depending on the composition of the water (Hem, 1970, p. 99). Approximate dissolved-solids concentrations for James Creek may be obtained by multiplying the specific conductance values given in table 1 by 0.57.

The specific conductance of the water in James Creek generally was higher at sites 1 and 2 than at site 3. The specific conductance ranged from 775 to 890 umhos/cm at site 1; 790 to 800 umhos/cm at site 2; and from 325 to 770 umhos/cm at site 3. The maximum and minimum specific conductance at site 3 was attained on the last day of the study during the period when the discharge was greater than 3.4 ft^3/s. The specific conductance at site 3 ranged from 650 to 760 umhos/cm prior to the rise in stage (table 1).

Previous data indicate that the dissolved-solids content of the water of James Creek at Highway 25 about 1.5 miles upstream of site 1 may be lower than that in the study area. On October 12, 1977, the specific conductance of the water of James Creek at Highway 25 was 314 umhos/cm; the discharge was 2.0 ft^3/s; and the dissolved-solids concentration was computed to be about 180 mg/L. The mean discharge and estimated dissolved-solids concentration at site 1 was about 2.4 ft^3/s and 490 mg/L during the study. Apparently, the waste material that enters James Creek along the 1.5-mile reach between site 1 and the bridge at State Highway 25 contributes to the dissolved-solids load in the study reach. Downstream at site 1 the mean estimated dissolved-solids concentration was about 455 mg/L during the period of sample collection. However, the mean dissolved-solids load between sites 1 and 2 increased from about 3.1 t/d (tons per day) to 3.7 t/d at that time.

Water Temperature

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

The water temperature of James Creek ranged from 17.0 to 22.5°C at site 1 and from 17.0 to 19.0°C at site 2. The evening and night-time temperatures were warmer at sites 1 and 2 than at site 3. The water temperatures at site 3 ranged from 15.5 to 23.5°C, and the morning and afternoon water temperatures were warmer than at the upstream sites. Maximum water temperatures were attained at site 3 on the last day of the study immediately prior to the rise in stage. Between 1400 and 1500 hours the water temperature at site 3 decreased from 23.5 to 18.0°C. The water temperature increased slightly after the rise and was 19.0°C during the last few hours of the study (fig. 2).

Dissolved Oxygen

Dissolved oxygen is an important index of water quality. It is derived from atmospheric reaeration and by photosynthesis from aquatic plants. Dissolved oxygen, normally present in all surface water, is essential to most chemical and biological processes, and is a key element for supporting aquatic life.

Water-quality criteria for the State of Mississippi requires that dissolved-oxygen concentrations be maintained at not less than 5 mg/L during flows exceeding the 7-day Q_{10} except under extreme conditions or authorized exceptions. The dissolved-oxygen level then may range between 4 and 5 mg/L for short periods of time, provided that the water quality is maintained in favorable condition in other aspects (Mississippi Department of Natural Resources, 1977, appendix, pages 5-10).

Dissolved-oxygen concentrations ranged from 2.9 to 7.8 mg/L at site 1 and from 4.8 to 10.5 mg/L at site 3. Dissolved oxygen concentrations were lower at site 2 than at sites 1 and 3. The dissolved-oxygen concentrations ranged from 0.4 to 4.5 mg/L at site 2 during the 24-hour period of sample collection.

The dissolved-oxygen content of James Creek at site 3 was at an acceptable level (5.0 mg/L) prior to the rise in discharge. During most of the study the dissolved-oxygen concentrations at site 3 ranged from 6.3 to 10.5 mg/L. During the first part of the rise in discharge on November 16, the dissolved-oxygen concentration decreased from 10.0 mg/L to 6.2 mg/L in a one hour period and continued to decrease to 4.8 mg/L in the evening hours. The dissolved-oxygen concentration was 5.0 mg/L at the conclusion of the study--about 10 hours after the initial rise in stage (fig. 3).

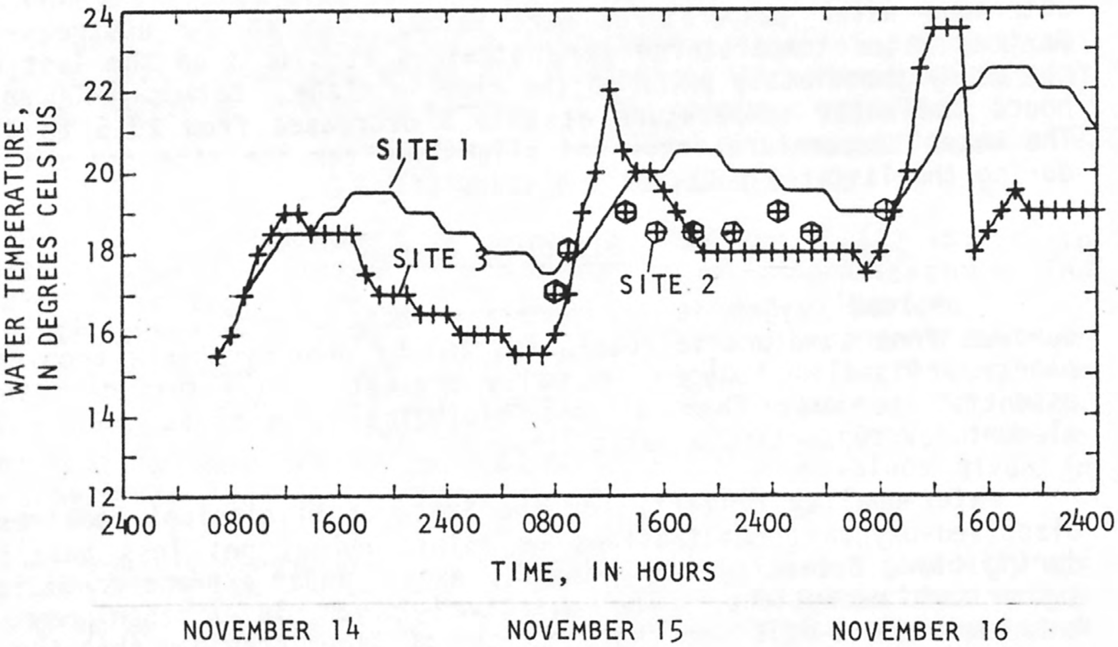

FIGURE 2.--WATER TEMPERATURE AT SAMPLING SITES ON JAMES CREEK, NOVEMBER 14-16, 1978.

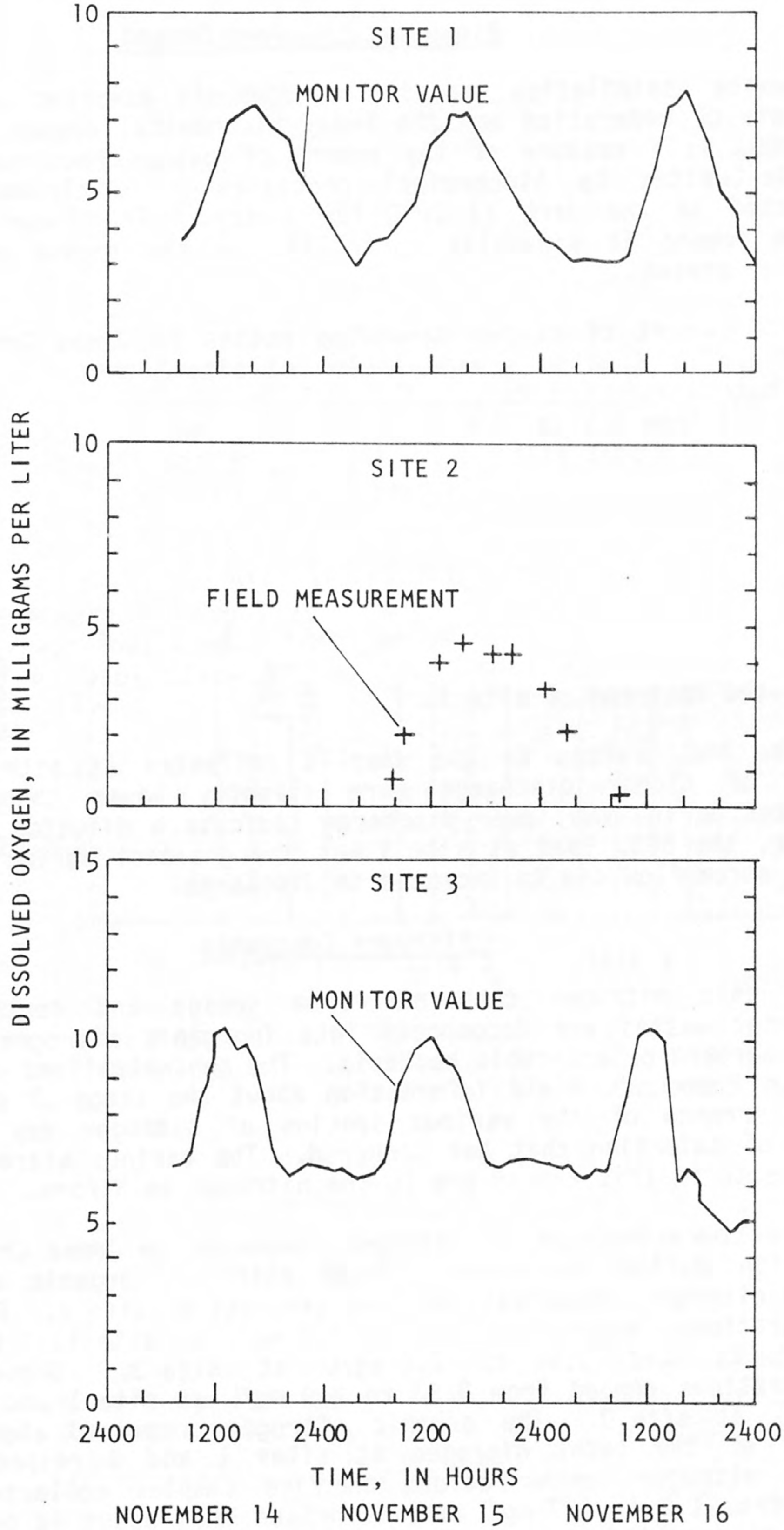

FIGURE 3.--DISSOLVED-OXYGEN CONCENTRATIONS AT SAMPLING SITES ON JAMES CREEK, NOVEMBER 14-16, 1978.

Biochemical Oxygen Demand

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

The amount of oxygen demanding wastes in James Creek was higher downstream of treated sewage inflow at site 2 than the water entering the study area at site 1. The BOD_5 ranged from 4.7 to 7.6 mg/L at site 1 and from 5.5 to 10 mg/L at site 3. The mean BOD_5 was 5.6 mg/L at site 1 and 7.4 mg/L at site 3. The BOD_5 of the 5 samples collected over a 24 hour period at site 2 ranged from 8.3 to 11 mg/L and the mean value was 9.9 mg/L (fig. 4).

The increase in the BOD_5 from site 1 to site 2 indicates that carbonaceous wastes are entering James Creek downstream of site 1. The generally high BOD_5 and the low night time dissolved-oxygen levels at site 1 also indicates that part of the waste load in the study area originated upstream of site 1.

The BOD_5 values in the samples collected at site 3 during the period of higher discharge were slightly lower than the samples collected during the lower discharge indicate a dilution of the waste. However, the BOD_5 load at site 3 was the greatest during the period of higher streamflow due to increase in discharge.

Nitrogen Compounds

Organic nitrogen compounds from sewage and certain kinds of industrial wastes are decomposed into inorganic nitrogen compounds by either aerobic or anaerobic bacteria. The concentrations of the various nitrogen compounds yield information about the stage of decomposition. The occurrence of the various species of nitrogen may indicate the amount of oxidation that has occurred. The various nitrogen compounds referred to in this report are in the nitrogen as N form.

The concentrations of nitrogen compounds in James Creek generally were high during the study. Total nitrogen, organic nitrogen, and ammonia nitrogen concentrations were greatest at site 2. Total nitrogen concentrations ranged from 0.93 to 3.4 mg/L at site 1; 4.0 to 4.5 mg/L at site 2; and 1.5 to 2.6 mg/L at site 3. Organic nitrogen concentrations ranged from 0.53 to 2.9 mg/L at site 1 and from 0.60 to 1.8 mg/L at site 3. The organic nitrogen comprised about 71 and 67 percent of the total nitrogen at sites 1 and 3 respectively. The organic nitrogen concentrations of five samples collected at site 2 ranged from 1.3 to 2.7 mg/L and comprised only about 42 percent of the total nitrogen because of an increase in inorganic nitrogen concentrations, primarily ammonia nitrogen. The total ammonia nitrogen concentrations ranged from 0.12 to 0.27 mg/L at site 1 and from 0.29 to 1.4 mg/L at site 3. At site 2 the total ammonia nitrogen concentrations ranged from 1.7 to 2.9 mg/L and was about 56 percent of the total nitrogen.

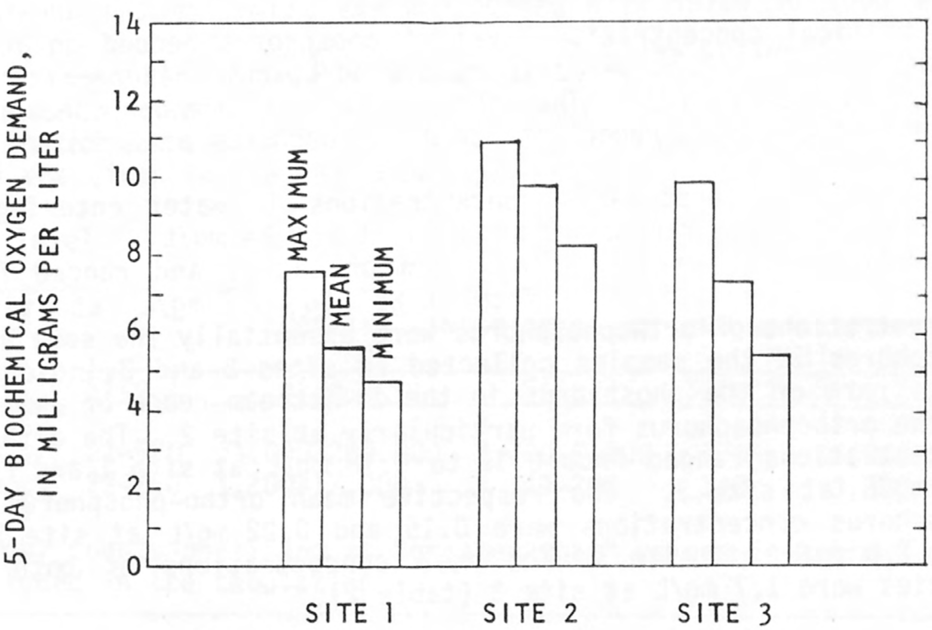

FIGURE 4.--MAXIMUM, MEAN, AND MINIMUM 5-DAY BIOCHEMICAL DEMAND AT SAMPLING SITES ON JAMES CREEK, NOVEMBER 14-16, 1978.

The nitrite plus nitrate nitrogen concentrations at site 1 ranged from 0.06 to 0.26 mg/L and the mean concentration was 0.16 mg/L. Lower concentrations generally were present at sites 2 and 3. The mean concentrations at sites 2 and 3 were 0.06 and 0.03 mg/L, respectively. The general decrease in nitrite plus nitrate concentrations indicate that a denitrification process was occurring in James Creek downstream of site 1 (table 2).

Phosphorus

Phosphorus generally is not considered toxic to man. It is one of the primary nutrients essential to aquatic plant growth, and enrichment of a body of water with phosphorus may stimulate the growth of algae. The critical concentration level of phosphorus needed to inhibit algal growth has been considered to be 0.1 mg/L, but this remains in question (Velz, 1970, p. 19). The phosphorus and orthophosphorus compounds referred to in this report are in the phosphorus as P form.

The total phosphorus concentrations in water entering the study area at site 1 ranged from 0.21 to 0.24 mg/L. Total phosphorus concentrations increased downstream of site 1 and ranged from 1.5 to 1.8 mg/L at site 2 and from 0.65 to 1.7 mg/L at site 3. The concentrations of orthophosphorus were essentially the same as the total phosphorus in the samples collected at sites 2 and 3 indicating that a large part of the phosphorus in the downstream reach of James Creek was in the orthophosphorus form particularly at site 2. The orthophosphorus concentrations ranged from 0.12 to 0.18 mg/L at site 1 and from 0.41 to 1.7 mg/L at site 3. The respective mean ortho-phosphorus and total phosphorus concentrations were 0.15 and 0.22 mg/L at site 1; and 0.89 and 1.0 mg/L at site 3. The mean concentrations of both phosphorus species were 1.7 mg/L at site 2 (table 2).

pH - Hydrogen Ion Activity

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

The pH of the water entering the study area at site 1 was generally higher than at sites 2 and 3. The pH of James Creek ranged from 8.1 to 8.8 units at site 1 and from 7.7 to 8.0 units at site 2. At site 3, the pH of the water ranged from 7.7 to 8.2 units during most of the study. During the rise in stage at site 3, the pH decreased from 8.2 to 6.8 units during the first part of the rise in discharge, and then increased to 7.9 units after the initial rise in stage (table 2).

Bacteria

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

The fecal bacteria densities of water samples collected during the study were variable and were much greater at site 2 than at sites 1 and 3. The density of fecal coliforms was greater than fecal streptococci bacteria in the downstream reach (table 2). A summary of fecal bacteria densities are given in the following table.

Fecal Bacteria	Density, in colonies per 100 milliliters: Range, Site 1	Range, Site 2	Range, Site 3	Median Count, Site 1	Median Count, Site 2	Median Count, Site 3
Coliforms	31-520	34,000-200,000	2,000-6,800	170	56,000	2,800
Streptococci	23-760	1,200-17,000	49-700	140	3,200	280

Note: Colony counts qualified as "greater than" values in table 2 are not included in the tabulation.

The fecal coliform to fecal streptococcal bacteria ratios of all of the samples collected at sites 2 and 3 were greater than 2.0. The ratios of all samples collected at site 2 and all but two samples collected at site 3 were greater than 4.0. This may be considered strong evidence of human enteric wastes entering James Creek downstream of site 1. At site 1, the ratios of 4 of 12 samples exceeded 4.0 and 6 of 12 samples exceeded 2.0. This suggests that part of the waste material in James Creek originated from sources upstream of site 1.

SUMMARY

The short-term water-quality study of the 2.6-mile reach of James Creek near Aberdeen was conducted during a period of low discharge. The flow in the study reach was maintained by wastewater inflow and by inflow of treated sewage downstream of site 1. An average of about 0.6 ft^3/s of treated sewage entered James Creek during the study. The discharge of James Creek ranged from 2.4 ft^3/s at site 1 to about 3.4 ft^3/s at site 3 during most of the study. The discharge at the respective sampling sites was fairly constant in the study reach although a rise in stage occurred at site 3 near the end of the study. The discharge at site 3 increased from 3.4 to 5.9 ft^3/s and gradually receded during the last 10 hours of the study.

The quality of water in James Creek generally was poor during the study and there also was a marked change in the quality of water at site 3 associated with the increase in discharge. During the first hour of the increase in discharge at site 3, the dissolved-oxygen concentrations, water temperature, pH, and specific conductance decreased. The specific conductance ranged from 775 to 890 umhos/cm at site 1 and decreased downstream to site 3. The specific conductance at site 3 ranged from 650 to 760 umhos/cm before the rise and from 325 to 770 umhos/cm after the rise, when the discharge was greater than 3.4 ft^3/s.

The biochemical oxygen demand generally was high in the study reach and was highest at sites 2 and 3. The maximum BOD_5 values observed were 7.6 mg/L at site 1, 11 mg/L at site 2, and 10 mg/L at site 3. The dissolved-oxygen concentrations at site 1 ranged from 2.9 to 7.8 mg/L and were lower than the minimum state criterion of 5 mg/L at site 2, ranging from 0.4 to 4.5 mg/L. Dissolved-oxygen concentrations at site 3 ranged from 6.3 to 10.5 mg/L during most of the study and from 4.8 to 6.5 after the rise in stage.

Total ammonia and phosphorus concentrations were much higher at sites 2 and 3 than at site 1. The highest ammonia concentrations observed were; 0.27 mg/L at site 1; 2.9 mg/L at site 2; and 1.4 mg/L at site 3. Evidence suggests that denitrification was occurring downstream of site 1. Total phosphorus concentrations ranged from 0.21 to 0.24 mg/L at site 1; 1.5 to 1.8 mg/L at site 2; and 0.65 to 1.7 mg/L at site 3. Much of the total phosphorus in James Creek was orthophosphorus particularly at sites 2 and 3.

The fecal bacteria densities of samples collected downstream of treated sewage inflow were high and fecal coliform densities usually exceeded fecal streptococcal densities. The fecal bacteria densities were considerably higher at site 2 than at sites 1 and 3. At site 2 the fecal coliform densities ranged from 34,000 to 200,000 col/100 mL and fecal streptococcal densities ranged from 1,200 to 17,000 col/100 mL. The median fecal coliform colony counts were 170 col/100 mL at site 1; 56,000 col/100 mL at site 2; and 2,800 col/100 mL at site 3. Evidence based on fecal coliform and streptococcal ratios indicates that many of the fecal bacteria observed at site 2 and 3 originated from the treated sewage inflow downstream of site 1 and that a part of the fecal bacteria originated from human enteric wastes discharged upstream of site 1.

SELECTED REFERENCES

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

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

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

Lang, J. W., and Boswell, E. H., 1960, Public and Industrial Water Supplies in a Part of Northern Mississippi: Mississippi Geological Survey, Bulletin 90, 104 p.

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

Mississippi Department of Natural Resources, Bureau of Pollution Control, 1977, State of Mississippi water quality criteria for intrastate, interstate, and coastal waters, in Mississippi Department of Natural Resources, Bureau of Pollution Control, 1980, State of Mississippi 305(b) Water Quality Report 1978-79, 75 p.

Skougstad, M. W., and others, 1979, Methods for determiniation of inorganics in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, Book 5, Chapter A1, 626 p.

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

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

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, John Wiley, 619 p.

Vestal, F. E., 1943, Monroe County Mineral Resources, Mississippi State Geological Survey, Bulletin 57, 218 p.

Wasson, B. E., and others, 1965, Available Water for Industry, Clay, Lowndes, Monroe, and Oktibbeha Counties, Mississippi: Mississippi Research and Development Center, 39 p.

HYDROLOGIC DATA

TABLE 1.--RESULTS OF FIELD DETERMINATIONS, HOURLY DISCHARGE, AND CONTINUOUS MONITOR VALUES

02437603 - JAMES CREEK AT SITE 1 - LAT 33°47'48", LONG 88°33'01'

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
NOV						
14...	0800	2.4	775	8.1	17.0	3.6
14...	0900	2.4	775	--	17.0	3.9
14...	1000	2.4	775	--	17.5	4.4
14...	1030	2.4	775	8.1	18.0	4.5
14...	1100	2.4	775	--	18.0	4.8
14...	1200	2.4	775	--	18.5	5.8
14...	1230	2.4	775	8.1	18.5	6.4
14...	1300	2.4	780	--	18.5	6.5
14...	1400	2.4	780	--	18.5	7.0
14...	1500	2.4	790	8.1	19.0	7.2
14...	1600	2.4	790	--	19.0	7.4
14...	1700	2.4	790	--	19.5	7.3
14...	1800	2.4	790	8.6	19.5	6.9
14...	1900	2.4	790	--	19.5	6.7
14...	2000	2.4	785	--	19.5	6.4
14...	2100	2.4	785	8.8	19.0	5.5
14...	2200	2.4	785	--	19.0	5.2
14...	2300	2.4	790	--	19.0	4.8
14...	2400	2.4	790	--	18.5	4.4
15...	0010	2.4	800	8.8	18.5	4.3
15...	0100	2.4	800	--	18.5	4.0
15...	0200	2.4	800	--	18.5	3.4
15...	0300	2.4	800	8.7	18.0	3.0
15...	0400	2.4	800	--	18.0	3.4
15...	0500	2.4	800	--	18.0	3.7
15...	0600	2.4	800	--	18.0	3.8
15...	0700	2.4	800	--	17.5	3.8
15...	0730	2.4	810	8.5	17.5	4.0
15...	0800	2.4	810	--	17.5	4.2
15...	0900	2.4	810	--	18.0	4.4
15...	0930	2.4	810	8.5	18.0	4.5
15...	1000	2.4	820	--	18.0	4.8
15...	1100	2.4	830	--	18.5	5.6
15...	1200	2.4	840	8.5	19.0	6.5
15...	1300	2.4	840	--	19.5	6.7
15...	1400	2.4	840	--	20.0	7.2
15...	1500	2.4	840	8.5	20.0	7.0
15...	1600	2.4	840	--	20.0	7.2
15...	1700	2.4	840	--	20.5	6.9

TABLE 1 --CONTINUED

02437603 - JAMES CREEK AT SITE 1 - LAT 33°47'48", LONG 88°33'01"

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)
NOV						
15...	1800	2.4	850	8.8	20.5	6.3
15...	1900	2.4	850	--	20.5	5.8
15...	2000	2.4	850	--	20.5	5.3
15...	2100	2.4	850	8.8	20.0	4.8
15...	2200	2.4	850	--	20.0	4.4
15...	2300	2.4	850	--	20.0	4.1
15...	2400	2.4	850	--	20.0	3.7
16...	0010	2.4	850	8.5	20.0	3.6
16...	0100	2.4	850	--	19.5	3.6
16...	0200	2.4	850	--	19.5	3.3
16...	0245	2.4	850	8.5	19.5	3.1
16...	0300	2.4	850	--	19.5	3.3
16...	0400	2.4	850	--	19.5	3.2
16...	0500	2.4	850	--	19.0	3.2
16...	0600	2.4	860	--	19.0	3.1
16...	0630	2.4	860	8.3	19.0	3.2
16...	0700	2.4	860	--	19.0	3.2
16...	0800	2.4	860	--	19.0	3.2
16...	0900	2.4	860	8.3	19.0	3.2
16...	1000	2.4	860	--	19.5	3.8
16...	1100	2.4	870	--	20.0	4.7
16...	1200	2.4	870	8.4	20.5	5.2
16...	1300	2.4	870	--	21.5	6.3
16...	1400	2.4	870	--	22.0	7.3
16...	1500	2.4	870	8.4	22.0	7.6
16...	1600	2.4	870	8.4	22.5	7.8
16...	1700	2.4	870	--	22.5	7.3
16...	1800	2.4	870	8.8	22.5	6.7
16...	1900	2.4	870	--	22.5	5.6
16...	2000	2.4	870	--	22.0	4.8
16...	2100	2.4	870	8.8	22.0	4.4
16...	2200	2.4	880	--	22.0	3.6
16...	2300	2.4	890	--	21.5	3.2
16...	2330	2.4	880	8.5	21.0	2.9

TABLE 1.--CONTINUED

02437604 - JAMES CREEK AT SITE 2 - LAT 33°47'20", LONG 88°32'02"

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)
NOV						
15...	0800	3.0	790	7.7	17.0	.8
15...	0900	3.0	790	7.7	18.0	2.0
15...	1315	3.0	800	7.8	19.0	4.0
15...	1530	3.0	800	7.8	18.5	4.5
15...	1820	3.0	800	8.0	18.5	4.1
15...	2115	3.0	800	8.0	18.5	4.1
16...	0040	3.0	800	8.0	19.0	3.2
16...	0305	3.0	800	8.0	18.5	2.1
16...	0830	3.0	800	7.9	19.0	.4

TABLE 1.--CONTINUED

02437606 - JAMES CREEK AT SITE 3 - LAT 33°47'35", LONG 88°31'07"

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)
NOV						
14...	0700	3.1	700	7.8	15.5	6.6
14...	0800	3.1	680	--	16.0	6.6
14...	0900	3.1	650	7.8	17.0	6.9
14...	1000	3.1	670	--	18.0	8.4
14...	1100	3.1	680	--	18.5	9.1
14...	1200	3.1	700	7.7	19.0	10.3
14...	1300	3.1	700	--	19.0	10.5
14...	1400	3.1	720	--	18.5	9.9
14...	1500	3.1	730	--	18.5	10.0
14...	1600	3.1	750	7.9	18.5	9.7
14...	1700	3.1	750	--	18.5	8.6
14...	1800	3.4	750	--	17.5	7.2
14...	1830	3.4	750	7.9	17.0	6.5
14...	1900	3.4	750	--	17.0	6.3
14...	2000	3.4	750	--	17.0	6.4
14...	2100	3.4	750	--	17.0	6.5
14...	2145	3.4	750	8.0	16.5	6.7
14...	2200	3.4	750	--	16.5	6.6
14...	2300	3.4	750	--	16.5	6.6
14...	2400	3.4	750	--	16.5	6.6
15...	0045	3.4	750	7.8	16.0	6.6
15...	0100	3.4	750	--	16.0	6.5
15...	0200	3.4	750	--	16.0	6.5
15...	0300	3.4	750	--	16.0	6.4
15...	0345	3.4	750	7.9	16.0	6.4
15...	0400	3.4	750	--	16.0	6.4
15...	0500	3.4	750	--	15.5	6.4
15...	0600	3.4	750	--	15.5	6.6
15...	0630	3.4	750	7.8	15.5	7.1
15...	0700	3.4	750	--	15.5	7.0
15...	0800	3.4	750	--	16.0	8.3
15...	0900	3.4	750	--	17.0	9.2
15...	1000	3.4	745	--	19.0	9.9
15...	1100	3.4	745	--	20.0	10.0
15...	1200	3.4	740	--	22.0	10.2
15...	1245	3.4	740	8.0	21.0	9.4
15...	1300	3.4	740	--	20.5	9.6
15...	1400	3.4	740	--	20.0	9.5
15...	1500	3.4	740	--	20.0	9.1

TABLE 1.--CONTINUED

02437606 - JAMES CREEK AT SITE 3 - LAT 33°47'35", LONG 88°31'07"

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)
NOV						
15...	1545	3.4	740	8.0	19.5	8.3
15...	1600	3.4	745	--	19.5	8.2
15...	1700	3.4	745	--	19.0	7.3
15...	1800	3.4	745	--	18.5	6.7
15...	1845	3.4	750	7.9	18.0	6.6
15...	1900	3.4	750	--	18.0	6.7
15...	2000	3.4	750	--	18.0	6.6
15...	2100	3.4	750	--	18.0	6.7
15...	2140	3.4	750	7.9	18.0	6.8
15...	2200	3.4	750	--	18.0	6.7
15...	2300	3.4	750	--	18.0	6.8
15...	2400	3.4	750	--	18.0	6.7
16...	0100	3.4	750	7.9	18.0	6.7
16...	0200	3.4	750	--	18.0	6.6
16...	0300	3.4	750	--	18.0	6.6
16...	0330	3.4	750	8.0	18.0	6.5
16...	0400	3.4	750	--	18.0	6.5
16...	0500	3.4	750	--	18.0	6.4
16...	0600	3.4	750	--	18.0	6.5
16...	0700	3.4	760	--	17.5	6.5
16...	0730	3.4	760	7.8	17.5	6.9
16...	0800	3.4	760	--	18.0	7.3
16...	0900	3.4	760	--	19.0	8.2
16...	0930	3.4	760	7.8	19.5	8.9
16...	1000	3.4	760	--	20.0	9.4
16...	1100	3.4	760	--	22.5	10.3
16...	1200	3.4	760	--	23.5	10.4
16...	1230	3.4	760	8.2	23.5	10.4
16...	1300	3.4	760	--	23.5	10.3
16...	1400	3.4	760	--	23.5	10.0
16...	1500	4.6	500	--	18.0	6.2
16...	1530	5.4	345	6.8	18.5	6.4
16...	1600	5.9	325	--	18.5	6.5
16...	1700	5.1	550	--	19.0	6.3
16...	1800	4.6	640	--	19.5	5.7
16...	1830	4.1	710	7.9	19.5	5.4
16...	1900	4.0	720	--	19.0	5.4
16...	2000	4.0	725	--	19.0	5.1
16...	2100	3.9	725	--	19.0	4.9
16...	2120	3.9	725	7.9	19.0	4.8
16...	2200	3.7	740	--	19.0	5.1
16...	2300	3.7	750	--	19.0	5.0
16...	2350	3.6	770	7.9	19.0	4.9
16...	2400	3.5	765	--	19.0	5.0

TABLE 2.--RESULTS OF LABORATORY ANALYSES

02437603 - JAMES CREEK AT SITE 1 - LAT 33°47'48", LONG 88°33'01"

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)
NOV								
14...	0800	21	5.6	K50	300	.09	.02	.11
14...	1230	25	5.4	K100	760	.10	.02	.12
14...	1800	21	6.8	K31	700	.10	.03	.13
15...	0010	25	6.3	320	250	.13	.03	.16
15...	0730	28	5.4	420	150	.18	.04	.22
15...	1200	31	4.8	520	140	.13	.05	.18
15...	1800	24	5.0	440	K81	.19	.07	.26
16...	0010	21	4.8	220	K46	.11	.09	.20
16...	0630	20	5.2	200	120	.06	.12	.18
16...	1200	26	5.4	140	K23	.05	.13	.18
16...	1800	19	4.7	140	K35	.02	.09	.11
16...	2330	29	7.6	100	>500	.02	.04	.06

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)
NOV							
14...	.12	.73	.85	.96	4.3	.230	.13
14...	.15	.75	.90	1.0	4.5	.240	.15
14...	.15	.73	.88	1.0	4.5	.230	.14
15...	.16	.77	.93	1.1	4.8	.220	.14
15...	.25	2.1	2.3	2.5	11	.230	.18
15...	.26	.70	.96	1.1	5.0	.230	.18
15...	.24	.65	.89	1.2	5.1	.210	.16
16...	.23	.53	.76	.96	4.3	.230	.15
16...	.27	2.9	3.2	3.4	15	.220	.14
16...	.23	.74	.97	1.2	5.1	.240	.16
16...	.16	.67	.83	.94	4.2	.210	.13
16...	.19	.68	.87	.93	4.1	.210	.12

TABLE 2.--CONTINUED

02437604 - JAMES CREEK AT SITE 2 - LAT 33°47'20", LONG 88°32'02"

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)
NOV								
15...	0800	40	9.9	K160000	17000	.04	.03	.07
15...	1315	42	11	200000	K5400	.03	.03	.06
15...	1820	39	11	56000	K3200	.04	.03	.07
16...	0040	30	8.3	34000	K1700	.05	.04	.09
16...	0830	36	9.2	37000	K1200	.00	.04	.04

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)
NOV							
15...	2.5	1.9	4.4	4.5	20	1.800	1.8
15...	2.9	1.3	4.2	4.3	19	1.800	1.8
15...	2.5	1.7	4.2	4.3	19	1.800	1.8
16...	1.7	2.7	4.4	4.5	20	1.500	1.5
16...	2.2	1.8	4.0	4.0	18	1.800	1.7

TABLE 2.--CONTINUED

02437606 - JAMES CREEK AT SITE 3 - LAT 33°47'35", LONG 88°31'07"

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)
NOV								
14...	0700	55	7.0	2300	700	.01	.01	.02
14...	1200	29	8.3	2000	540	.00	.02	.02
14...	1830	32	10	2700	420	.01	.01	.02
15...	0045	26	9.1	2500	K230	.00	.01	.01
15...	0630	31	8.0	2100	K280	.00	.02	.02
15...	1245	35	7.7	4600	K150	.00	.02	.02
15...	1845	28	8.1	3000	K300	.02	.02	.04
16...	0100	26	5.5	2500	K130	.02	.06	.08
16...	0730	7	5.8	K6800	500	.02	.02	.04
16...	1230	27	5.7	5900	K49	.01	.03	.04
16...	1830	38	6.2	5100	K200	.01	.03	.04
16...	2350	28	8.1	5100	>1000	.01	.03	.04

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)
NOV							
14...	.43	1.1	1.5	1.5	6.7	.850	.70
14...	.29	1.2	1.5	1.5	6.7	1.700	1.7
14...	.40	1.8	1.8	1.8	8.1	1.000	.75
15...	.44	1.3	1.7	1.7	7.6	.970	.80
15...	.45	1.2	1.6	1.6	7.2	1.100	.99
15...	.39	1.3	1.7	1.7	7.6	.930	.79
15...	.51	1.4	1.9	1.9	8.6	.950	.81
16...	.60	.90	1.5	1.6	7.0	.970	.87
16...	.93	.87	1.8	1.8	8.1	1.200	1.1
16...	.89	1.2	2.1	2.1	9.5	1.200	.97
16...	1.2	.60	1.8	1.8	8.1	.650	.41
16...	1.4	1.2	2.6	2.6	12	.900	.77

TABLE 2.--CONTINUED

0243706 - JAMES CREEK AT SITE 3 - LAT 33°47'35", LONG 88°31'07"

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)
NOV								
16...	1230	100	6.0	81	0	25	4.5	130

DATE	SODIUM AD-SORP-TION RATIO	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV								
16...	6.3	240	0	200	2.4	58	85	.3

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	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)
NOV								
16...	11	449	432	.61	4.12	4	0	0

TABLE 2.--CONTINUED

02437606 - JAMES CREEK AT SITE 3 - LAT 33°47'35", LONG 88°31'07"

DATE	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	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)
NOV								
16...	<10	10	<10	0	<10	1	<10	440

DATE	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)	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)
NOV								
16...	4100	10	<10	100	130	<.5	.00	8

DATE	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)	ZINC, RECOV. FM BOTTOM MATERIAL (UG/G AS ZN)	CARBON, ORGANIC TOTAL (MG/L AS C)	PHENOLS (UG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)
NOV								
16...	<10	0	0	10	<10	11	0	0

TABLE 2.--CONTINUED

02437606 - JAMES CREEK AT SITE 3 - LAT 33°47'35", LONG 88°31'07"

DATE	TIME	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)
NOV									
16...	1230	0	.0	0	.0	.0	.0	.0	.0

DATE	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG)
NOV									
16...	.0	.0	.0	.0	.0	.0	.0	.0	.0

DATE	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4-D, TOTAL (UG/L)	2,4-D, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4,5-T TOTAL (UG/L)	2,4,5-T TOTAL IN BOTTOM MATERIAL (UG/KG)	SILVEX, TOTAL (UG/L)	SILVEX, TOTAL IN BOTTOM MATERIAL (UG/KG)
NOV									
16...	.0	0	.0	.37	0	.00	0	.00	.0

K - NONIDEAL COLONY COUNT