Section IV

WATER QUALITY DATA AND COLLECTION SUMMARY

Water Quality Monitoring Site Description

Station Number 1. Referred to in this report as the White River site, Station Number 1 is located downstream from the dam. The latitude and longitude are 36^{o}-25′-15" and 93^{o}-50′-50". The site is located in Carroll County, Arkansas.

Station Number 2. Station Number 2 is located upstream from the dam in the lake. The latitude and longitude are 36^{o}-25′-15" and 93^{o}-50′-50". The sampling site is referred to as the Norfork site in this report. The site is located in Carroll County, Arkansas.

Station Number 3. Referred to in this report as the Prairie Creek site, Station Number 3 is located in Beaver Lake on Prairie Creek. The latitude and longitude are 36^{o}-20′-48" and 94^{o}-04′-57". The site is located in Benton County, Arkansas.

Station Number 4. Station Number 4 is located in Beaver Lake near the Highway 12 bridge. The latitude and longitude are 36^{o}-19′-56" and 94^{o}01′-04". The site is located in Benton County, Arkansas. The site is referred to as the Highway 12 site in this report.

Station Number 5. Station Number 5 is located in Beaver Lake near Monte Ne. The latitude and longitude are 36^{o}-16′-56" and 94^{o}-04′-30". The site is located in Benton

County, Arkansas. It is referred to as the Monte Ne site in this report.

Station Number 6. Station Number 6 is located in Beaver Lake near War Eagle, Arkansas. The latitude and longitude are 36°-16′-03" and 93°-56′-35". The site is located in Benton County, Arkansas and is referred to as the War Eagle site in this report.

Station Number 7. Station Number 7 is located in Beaver Lake near Goshen, Arkansas. The latitude and longitude are 36°-06′-22" and 94°-00′-41". The site is located in Washington County, Arkansas. It is referred to as the Goshen site in this report.

Station Number 8. Station Number 8 is located in Beaver Lake near Avoca, Arkansas. The latitude and longitude are 36°-22′-18" and 94°-03′-54". The site is located in Benton County, Arkansas. It is referred to as the Avoca site in this report.

Station Number 9. Station Number 9 is located in Beaver Lake at the Rogers water intake near Lowell, Arkansas. The latitude and longitude are 36°-15′-33" and 94°-04′-08". The site is located in Benton County, Arkansas. It is referred to as the Rogers site in this report.

Station Number 10. Station Number 10 is located in Beaver Lake at the Highway 68 bridge. The latitude and longitude are 36°-06′-14" and 94°-00′-26". The site is located in Washington County, Arkansas. It is referred to as the Highway 68 site in this report.

Station Number 11. Station Number 11 is located in Beaver Lake on Richland Creek. The site is located in Washington County, Arkansas. It is referred to as the Richland Creek site in this report.

Water Quality Monitoring Data

Station Number 1 (White River Site). The overall period of record for the White River site extends from March 16, 1967 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, sulfate, temperature, turbidity, and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc. Only three seasonal concentrations were reported for carbon dioxide and six for bicarbonate alkalinity. Graphs were not prepared for these parameters.

Station Number 2 (Eureka Springs Site). The overall period of record for the Eureka Springs site extends from March 16, 1967 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, fecal coliform, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous and orthophosphate, sulfate, temperature, transparency, turbidity, and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc. The Eureka Springs site also includes the dissolved oxygen, temperature, conductivity and pH profile data.

Station Number 3 (Prairie Creek Site). The overall period of record for the Prairie Creek site extends from December 16, 1975 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, fecal coliform, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, temperature, transparency and turbidity. One concentration each was reported for nitrate nitrogen, un-ionized ammonia nitrogen and Total Kjeldahl Nitrogen. Consequently, graphs were not prepared for these parameters.

Station Number 4 (Highway 12 Site). The overall period of record for the Highway 12 site extends from March 16, 1950 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, sulfate, temperature, transparency, turbidity and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc.

Station Number 5 (Monte Ne Site). The overall period of record for the Monte Ne site extends from December 16, 1975 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, temperature, transparency and turbidity. One concentration was reported for un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen and total phosphorous. Consequently, these parameters were not graphed.

Station Number 6 (War Eagle Site). The overall period of record for the War Eagle site extends from December 15, 1975 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, temperature, transparency and turbidity. One concentration was reported for un-ionized ammonia nitrogen, ammonia nitrogen and Total Kjeldahl Nitrogen. Consequently, graphs were not prepared for these parameters.

Station Number 7 (Goshen Site). The overall period of record for the Goshen site extends from June 4, 1975 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, sulfate, temperature, transparency, turbidity, and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc.

Station Number 8 (Avoca Site). The overall period of record for the Avoca site extends from September 10, 1975 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, sulfate, temperature, transparency, turbidity, and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc.

Station Number 9 (Rogers Site). The overall period of record for the Rogers site extends from April 19, 1977 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, sulfate, temperature, transparency, turbidity, and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc.

Station Number 10 (Highway 68 Site). The overall period of record for the Highway 68 site extends from May 21, 1984 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, chloride, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, sulfate, temperature, transparency, turbidity, and metals. The metals analyses conducted include aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury, nickel, potassium and zinc.

Station Number 11 (Richland Creek Site). The overall period of record for the Richland Creek site extends from June 27, 1963 until the present. Analyses conducted include total alkalinity, biochemical oxygen demand, carbon dioxide, chlorophyll a, chlorophyll b, color, conductivity, dissolved oxygen, total hardness, calcium, dissolved calcium, dissolved magnesium, un-ionized ammonia nitrogen, ammonia nitrogen, Total Kjeldahl Nitrogen, nitrate nitrogen, pH, total phosphorous, orthophosphate, temperature, transparency, turbidity. Two concentrations were reported for un-ionized ammonia, four were reported for total and organic nitrogen, and five were reported for ammonia nitrogen. Consequently, graphs were not prepared for these parameters.

<u>Analysis of Data</u>

Two approaches were taken in analyzing the data contained in the record for each site. These were to prepare graphs of the seasonal data and to conduct statistical analyses of both the seasonal data and all of the data for each parameter. The term seasonal data refers to the samples collected three times per year. For consistency purposes, the three seasons were defined as extending from April 15 to June 15, July 15 through September 15 and from November 15 through January 15 of the succeeding year. Additionally, graphs containing very few points were excluded from the report.

<u>Station Number 1 (White River Site)</u>. The figures showing the data graphically for this site are included in Appendix A. Summaries of the statistical analyses are included in Tables IX, X and XI.

<u>Alkalinity</u>. Alkalinity is an important water quality parameter because it is usually the principal parameter which provides buffering capacity in water. As a buffer, it resists changes in pH, either increases or decreases. Consequently, the larger the alkalinity concentration, the

greater the resistance to change in pH. Thus, while large alkalinity concentrations are undesirable in most circumstances, the presence of moderate concentrations of alkalinity is ordinarily desirable.

Two parameters are frequently reported for alkalinity. These are total alkalinity and phenolphthalein alkalinity. Phenolphthalein alkalinity is present only when the pH of the water exceeds 8.3. Only total alkalinity is reported for the White River site.

The total alkalinity concentrations were relatively large in the river. However, because of the amount of limestone in the drainage basin, these relatively large concentrations are to be expected.

The minimum total alkalinity concentrations were all 48 mg/L in the May, August and December periods. The average concentrations for the three seasonal periods were 58, 61 and 60 mg/L. The maximum concentrations were 69, 106 and 73 mg/L. The overall minimum, average and maximum concentrations were 27, 58 and 106 mg/L. The term "overall" as used in this context refers to the minimum, average and maximum concentrations being determined for all of the data included in the record. The record sometimes includes parameter concentrations which are not in the three seasons as defined. For this reason, the overall minimum, average and maximum concentrations are also reported.

As indicated by these data and by Figures A1, A2 and A3, the total alkalinity concentrations varied somewhat as a function of time. The average seasonal concentrations indicated a remarkable consistency among the seasons, however. The range for the average concentrations was only 4 mg/L. The long-term trends in the May and December periods were for the concentrations to remain about the same. The general trend in the August period was for slightly increasing alkalinity concentrations as a function of time.

Five-Day Biochemical Oxygen Demand. Biochemical oxygen demand is a measure of the oxygen used by microorganisms in stabilizing biologically degradable organic material. The source of the organic material may be wastewater, naturally occurring materials in the watershed which are washed into the water during runoff periods, or may be naturally growing materials in the river (such as algae and other microorganisms).

The average five-day biochemical oxygen demand concentrations were 1.3, 1.4 and 0.84 mg/L in the May, August and December periods, respectively. These averages indicated significant seasonal variation. The maximum five-day biochemical oxygen demand concentrations were 2.3, 4.2 and 1.8 mg/L for the data collected for the three seasonal periods. The minimum concentrations were 0.4, 0.1 and 0.1 mg/L, respectively, in the May, August and December periods. The data are shown graphically in Figures A4, A5 and A6.

The five-day biochemical oxygen demand concentrations generally were variable as a function of time particularly in the August and December periods. The five-day biochemical oxygen demand concentrations generally decreased in the August period until 1976 and have been about uniform since.

When all of the data were combined, the minimum, average and maximum concentrations were 0.1, 1.15 and 4.2 mg/L. Substantial increases in these concentrations would be required for them to be troublesome.

Chloride. The minimum, average and maximum concentrations for all of the data were 1, 3.9 and 8 mg/L. All of the chloride concentrations were very small. These were low chloride levels compared with the recommended drinking water limit of 250 mg/L. The stream standard for the White River is 20 mg/L. Consequently, the chloride concentrations were well within the stream standard.

The average concentrations were 3.6, 4.2 and 4.0 mg/L in the May, August and December periods. These averages indicate only a nominal seasonal variation. The maximum concentrations were 5.0, 8.0 and 7.0 mg/L, respectively, in the May, August and December periods. The minimum concentrations were 3.0, 1.0 and 2.0 mg/L for the three seasonal periods.

Figures A7, A8 and A9 show the chloride concentrations as a function of time in the May, August and December sampling periods. As shown by Figure A7, the chloride concentrations have been relatively constant in the May period. Following a general decreasing trend, the chloride concentrations have been relatively uniform since 1973 in the August period. They have also been relatively uniform in the December period.

Color. Color is a physical water quality parameter that is commonly measured in surface water resources. Color may result from the presence of plankton, weeds, humus and peat materials, wastewaters and natural metallic ions (usually iron and/or manganese). The rule of thumb recommendation is that color not exceed 50 units for the protection of aquatic life.

Figures A10, A11 and A12 show the color data for the three seasonal sampling periods. As shown by the three figures, the color concentrations varied as a function of time particularly in the August period. However, the color concentrations were all relatively small. All were less than 50 units. In fact, the maximum color concentration in the record was 20 units which is forty percent of the rule of thumb value. The trends in the May and December seasons were for relatively consistent, and small, color concentrations. There was more variation during the August period than the May and December periods.

The average concentrations were 3.9, 7.8 and 3.9 units in the May, August and December periods. The maximum concentrations were 10, 20 and 10 units in the May, August and December periods, respectively. The minimum concentrations were all 0 for the three seasonal periods. When all of the color data were combined, the minimum, average and maximum color concentrations were 0, 4.9 and 20 units.

Conductivity. Conductivity is a measure of the ability of a water to carry an electrical current. This ability depends on the presence of ions, their valence, the relative concentrations of monovalent and multivalent ions, the temperature of the water and on the total concentration of the ions.

Over time, a reasonable relationship can usually be established between conductivity and total dissolved solids for a particular water, if dissolved solids data are available. This relationship is not necessarily constant often because of the presence of nonconducting materials, such as very fine clays which are measured in the dissolved solids test but which are poor conductors of electricity. However, given sufficient data a good approximate relationship can usually be established.

Figures A13, A14 and A15 show the data in the May, August and December seasonal periods. As shown by these figures, the conductivity values in the White River were moderate. Overall, the maximum value was 462 micromhos per centimeter which was unusually large. This conductivity value occurred in a sample collected in the December period of 1974. The minimum, average and maximum conductivity values were 61, 137 and 462 micromhos per centimeter for all data in the record.

The minimum, average and maximum conductivity values in the May period were 104, 134 and 168 micromhos per centimeter. The minimum, average and maximum values in the August period were 100, 131 and 165 micromhos per centimeter. In the December period, the minimum, average and maximum values were 92, 147 and 462 micromhos per centimeter. Thus, the average seasonal conductivity values were 134, 131 and 147 micromhos per centimeter. These averages indicated some seasonal variation.

As shown by Figures A13, A14 and A15, the conductivity values varied considerably as a function of time for all three seasonal periods. There were trends for increasing conductivity values as a function of time in the August and December periods. However, the rate of increase in conductivity values was not large.

Dissolved Oxygen. Dissolved oxygen is a measure of the oxygen concentration in the water. Since aerobic organisms, both micro and macro, require the presence of free molecular oxygen to thrive, dissolved oxygen is a very important water quality parameter in streams and lakes. The presence of low dissolved oxygen concentrations can result in fish kills and other deleterious effects on aquatic life. Dissolved oxygen concentrations exceeding six milligrams per liter are considered adequate for sport fish such as bass. Fish can tolerate smaller concentrations depending on the time of year. The primary standard for dissolved oxygen in the White River is 6 mg/L. Since the drainage area above the dam exceeds 100 square miles, the applicable critical standard is also 6 mg/L. The stretch of the White River below Beaver Dam is designated as trout water which also requires a minimum dissolved oxygen concentration of 6 mg/L.

The seasonal data are shown in Figures A16, A17 and A18. The water in the White River at this site was well aerated during the May period. The minimum dissolved oxygen concentration of 8.4 mg/L was considerably larger than the stream standard of 6 mg/L. The dissolved oxygen concentrations in the August period nearly always exceeded the stream standard. However, there was one sample which had a dissolved oxygen concentration of 5.6 mg/L. There were three occasions on which the dissolved oxygen concentrations were less than the stream standard during the December period. The average concentrations were 10.5, 8.5 and 8.6 mg/L in the May, August and December periods, respectively. The averages indicated a substantial seasonal variation in the dissolved oxygen concentrations. The largest average concentration was in the May period which was a departure from the norm for most lakes in Arkansas. Usually, the dissolved oxygen concentrations in the December period exceed those in the May and August periods.

The general trend has been for variable dissolved oxygen concentrations for all three seasonal periods. There does not to appear to be a trend for either increasing or decreasing dissolved oxygen concentrations as a function of time for either the May or August periods. There does appear to be a general trend for slightly increasing dissolved oxygen concentrations with the passage of time in the December period.

The minimum concentrations were 8.4, 5.6 and 3.9 mg/L in the May, August and December periods. The maximum concentrations were 14.8, 12.5 and 12.5 mg/L in the May, August and December periods, respectively. The dissolved oxygen concentrations, expressed as percent of saturation, are shown in Figures A19, A20 and A21 in the May, August and December sampling periods.

Fecal Coliform. The fecal coliform data for the White River sampling site are shown in Figures A22, A23 and A24 in the May, August and December periods, respectively. As shown by these figures, the fecal coliform counts were all well within the limit of 200 colonies per 100 mL for primary contact recreation. The trends were for small fecal coliform counts with occasional spikes in the May and August periods. Although variable, the counts were usually small in the December period.

The average fecal coliform counts were 25, 22 and 23 colonies per 100 mL in the May, August and December periods, respectively. The maximum counts were 150, 140 and 75 colonies per 100 mL. The minimum counts were 0 for all three seasons. Including all of the data in the record, the minimum, average and maximum counts were 0, 21 and 150 colonies per 100 mL.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures A25, A26 and A27 for the White River site. As shown by these figures, the total hardness concentrations in the samples collected were moderate. Although there is no absolute scale dividing hardness into different categories with respect to being soft or hard, water with a hardness concentration of less than 100 mg/L would usually be considered sufficiently soft for municipal and industrial water supply purposes.

The minimum, average and maximum total hardness concentrations for all of the data were 40, 66 and 82 mg/L. For the May period, the minimum, average and maximum concentrations were 40, 64 and 72 mg/L. The minimum, average and maximum concentrations in the August period were 49, 63 and 76 mg/L. In the December period, the minimum, average and maximum concentrations were 56, 67 and 82 mg/L. The general trend has been for somewhat variable total hardness concentrations as a function of time. However, this variation was not unusually large. No trends for either increasing or decreasing total hardness concentrations were evident for any of the three seasonal periods. One unusually small concentration of 40 mg/L was measured in a sample collected during the May period.

The calcium data are shown in Figures A28, A29 and A30. As shown by Figure A28, the overall trend in the May period was for nearly uniform calcium concentrations except for the sample collected in 1981. This sample was the same one which had a small total hardness concentration. The overall trend in the August period was for slightly increasing calcium concentrations as a function of time. The overall trend in the December period was for the calcium concentrations to be nearly uniform. The most recent calcium data were collected in 1983. The average calcium concentrations were 52, 57 and 55 mg/L in the May, August and December seasonal periods, respectively. The maximum concentrations were 60, 68 and 62 mg/L for the three seasonal periods. The minimum concentrations were 25, 46 and 50 mg/L.

The dissolved calcium data are shown in Figures A31, A32 and A33. The minimum, average and maximum concentrations for dissolved calcium were 10, 21 and 24 mg/L in the May period. In the August period, the minimum, average and maximum concentrations were 18, 22 and 27 mg/L. In the December period, the minimum, average and maximum concentrations were 20, 22 and 25 mg/L. These data are expressed as calcium. Converted to expression as calcium carbonate, the data indicated that the total hardness was primarily calcium hardness. The overall trend in the May period was for relatively uniform dissolved calcium concentrations as a function of time except for the sample collected in 1981. The trend in the August period was for very slightly increasing dissolved calcium concentrations with the passage of time. The trend in the December period was for some variation in the data, but for the long-term trend to be for the concentrations to stay relatively constant.

The dissolved magnesium data are shown in Figures A34, A35 and A36. As indicated by these figures, the overall trend for the dissolved magnesium data was for considerable variation in the data for all three seasonal periods. The trend in the August period was for slightly increasing dissolved magnesium concentrations as a function of time. Conversely, the trend in the December period was for slightly decreasing concentrations with the passage of time. No long-term trend of either increasing or decreasing concentrations was evident in the May period. As indicated by the figures, the dissolved magnesium concentrations were small in the river at this site. The average dissolved magnesium concentrations were 2.3, 2.2 and 2.7 mg/L in the May, August and December periods, respectively. Thus, the seasonal averages were relatively uniform which indicated little seasonal variation.

The noncarbonate hardness data are shown in Figures A37, A38 and A39. The term "noncarbonate" hardness refers to calcium and/or magnesium which is associated with anions other than alkalinity. The anions are usually sulfate and/or chloride. The maximum noncarbonate hardness was 22 mg/L which was relatively small and not particularly significant. The average noncarbonate hardness concentrations were 10, 9 and 8 mg/L, respectively, in the May, August and December periods. The maximum noncarbonate hardness concentrations were 15, 22 and 15 mg/L for the three seasonal periods. As shown by the figures, there was considerable variation in the concentrations as a function of time.

Metals. Figures A40, A41 and A42 show the seasonal data for aluminum. The maximum concentrations in the May, August and December periods were 500, 320 and 250 micrograms per liter. There is no maximum contaminant level for aluminum in drinking water. Similarly, there is no stream standard for aluminum. As shown in Figure A40 in the May period, the aluminum concentrations were usually small with one peak concentration of 500 micrograms per liter. The average concentrations were 90, 130 and 80 micrograms per liter which indicated a significant seasonal variation. However, all of the aluminum concentrations were small. The minimum concentrations were all 10 micrograms per liter. The data in the August and December periods were variable.

The maximum arsenic concentration was 10 micrograms per liter. For reference purposes, the maximum contaminant level for arsenic in drinking water is 50 micrograms per liter. Consequently, the arsenic concentrations in the river at this site would be considered small. The maximum concentration was only twenty percent of the maximum contaminant level for drinking water. The arsenic data are shown in Figures A43, A44 and A45. The overall trends for the arsenic data were for nearly constant concentrations as a function of time for all three seasonal periods. The exception was the unusually large concentration of 10 micrograms per liter in the sample collected during the August period in 1973. The maximum arsenic concentrations were 1, 10 and 3 micrograms per liter, respectively, in the May, August and December seasonal periods.

The maximum chromium concentration for all of the data was 100 micrograms per liter. For protection of aquatic life, chromium concentrations should not exceed the 10 to 15 micrograms per liter range. The maximum contaminant level for chromium in drinking water is 50 micrograms per liter. Consequently, the maximum contaminant level for drinking water was exceeded once in the entire record. However, the chromium concentrations were excessive on several occasions for the protection of aquatic life. The maximum concentrations were 20, 20 and 100 micrograms per liter, respectively, in the May, August and December periods. The chromium data are shown in Figures A46, A47 and A48.

The copper data are shown graphically in Figures A49, A50 and A51 in the May, August and December periods. In larger concentrations, copper imparts an undesirable taste to water. Consequently, the recommended limit is 1 mg/L for drinking water. The minimum, average and maximum copper concentrations were 1, 2.8 and 8 micrograms per liter in the May period. In the August period, the minimum, average and maximum concentrations were 1, 7 and 41 micrograms per liter. The minimum, average and maximum in the December period were 1, 13.3 and 110 micrograms per liter. For all of the data, the minimum, average and maximum concentrations were 1, 13 and 240 micrograms per liter. Thus, the copper concentrations were excessive on several occasions in the river at this site. With respect to the protection of aquatic life, the copper concentrations should not exceed the 20 to 30 micrograms per liter range in a water with the hardness concentrations typical of Beaver Lake. A general trend for decreasing copper concentrations as a function of time existed in the May and December periods.

For water which is to be used as a public water supply, iron in significant concentrations is undesirable because of the aesthetic quality problems and because of staining of clothing and plumbing fixtures. Consequently, the recommended limit for drinking water is 0.3 mg/L. The minimum, average and maximum iron concentrations for all of the data were 10, 119 and 700 micrograms per liter. The average concentrations were 109, 161 and 138 micrograms per liter in the May, August and December periods, respectively. These averages indicated considerable seasonal variation. The maximum concentrations were 700, 460 and 350 micrograms per liter in the May, August and December periods. The minimum concentrations were 20, 10 and 40 micrograms per liter in the May, August and December periods. The general trend in the May period was for usually small iron concentrations as a function of time with the exception of the peak concentration of 700 micrograms per liter in 1985. The data in the August period were more variable ranging from 10 to 460 micrograms per liter. A general trend for increasing iron concentrations in the December period was evident until 1987. Since 1987, however, the concentrations have been smaller, but were increasing again. The iron data are shown in Figures A52, A53 and A54. As shown by these figures, the iron concentrations exceeded the recommended limit of 300 micrograms per liter for iron in drinking water on several occasions.

Lead is an element which is becoming increasingly regulated in the United States. Lead accumulates in the human body with the passage of time. Consequently, there is a cumulative exposure. The maximum concentrations for the seasonal data were 14, 7 and 20 micrograms per liter in the May, August and December periods. The seasonal lead data are shown graphically in Figures A55, A56 and A57, in the May, August and December periods, respectively. As shown by these figures, there was some variation in the lead concentrations as a function of time, particularly in the May and December periods. The maximum seasonal lead concentration of 20 micrograms per liter was relatively large. However, all of the lead concentrations since 1979 have been quite small. The minimum, average and maximum lead concentrations for all of the data in the record were 0, 9 and 200 micrograms per liter. The maximum concentration was very large.

Manganese is also a parameter of concern for water to be used for municipal water supply purposes. Like iron, manganese causes an undesirable taste in the water as well as staining laundry and plumbing fixtures. The recommended maximum contaminant level for manganese in drinking water is 0.05 mg/L. Figures A58, A59 and A60 show the seasonal data for manganese. The minimum, average and maximum concentrations for all of the data were 0, 60 and 440 micrograms per liter. In the May period, the minimum, average and maximum concentrations were 10, 28 and 140 micrograms per liter. In the August period, the minimum, average and maximum concentrations were 0, 56 and 160 micrograms per liter. The minimum, average and maximum concentrations were 0, 108 and 440 micrograms per liter in the December period. Thus, the average seasonal concentrations were 28, 56 and 108 micrograms per liter. These averages indicated a strong seasonal dependency. The overall trend in the May period was for relatively uniform and small manganese concentrations except for one peak concentration. The data were variable in the August and December periods.

The mercury data are shown in Figures A61, A62 and A63 in the May, August and December periods, respectively. The maximum concentration was 0.5 microgram per liter which occurred on four occasions. The maximum mercury concentrations were 0.5 microgram per liter for all three seasonal periods. All of the mercury concentrations were considerably less than the 20 micrograms per liter maximum contaminant level for drinking water. None exceeded the level necessary for the protection of aquatic life. The trends for all three seasonal periods were for nearly uniform mercury concentrations since 1982.

The maximum nickel concentrations were 9, 6, and 50 micrograms per liter in the May, August and December periods. These were small concentrations and were well within the range acceptable for the protection of aquatic life. The trends for the May and August periods have been for small, but variable, nickel concentrations. The trend in the December period has been for much smaller and more uniform nickel concentrations since 1980. The nickel data are shown in Figures A64, A65 and A66.

The average seasonal potassium concentrations were 1.3, 1.4 and 1.4 mg/L in the May, August and December periods, respectively. The maximum seasonal concentrations were 1.8, 1.6 and 1.6 mg/L. Potassium is usually not a particularly significant water quality parameter. Potassium at concentrations this small would not be considered a significant parameter by almost any ground or surface water quality scale. The data are shown graphically in Figures A67, A68 and A69. The overall trend in the May period was for variable potassium concentrations as a function of time. The trend in the August period was for slightly increasing concentrations with the passage of time. However, the actual increases were small. The trend in the December period was for nearly constant concentrations.

The recommended maximum contaminant level for zinc in public water supplies is 5 mg/L. The recommended limit is included because zinc imparts an undesirable taste to water at large concentrations and causes a milky appearance concentrations. For the seasonal data, the maximum concentrations were 40, 610 and 100 micrograms per liter. These concentrations were well within acceptable levels. The data are shown graphically in Figures A70, A71 and A72. The trends for all three seasonal periods were for usually small zinc concentrations with occasional spikes in the data. The maximum concentration of 610 micrograms per liter in the August period was unusually large for surface water in this area and was excessive with respect to the protection of aquatic life.

Nitrogen. Figures A73, A74 and A75 show the data for un-ionized ammonia nitrogen data for the White River site in the May, August and December periods. As shown by Figure A73, the un-ionized ammonia concentrations were variable in the May period with the concentrations ranging from 0.0001 to 0.0010 mg/L. The trends in the August and December periods were for more uniform, and small, un-ionized ammonia concentrations. The average concentrations were 0.0004, 0.0002 and 0.0001 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.0010, 0.0004 and 0.0002 mg/L in the May, August and December periods.

The ammonia nitrogen concentrations are shown graphically in Figures A76, A77 and A78. The average concentrations were 0.04, 0.04 and 0.03 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.08, 0.06 and 0.07 mg/L for the three seasonal periods. The ammonia concentrations were variable in the May period. A trend for increasing concentrations as a function of time was apparent in the August and December periods.

The organic nitrogen concentrations for the White River are shown in Figures A79, A80 and A81. The general trend in the May period was for slightly increasing organic nitrogen concentrations with the passage of time. The data were variable in both the August and December periods. The average organic nitrogen concentrations were 0.20, 0.63 and 0.72 mg/L in the May, August and December periods, respectively, which indicated a strong seasonal dependency. The minimum concentrations were 0.00, 0.10 and 0.14 in the May, August and December periods, respectively. The maximum concentrations were 0.32, 1.10 and 1.20 mg/L.

The nitrate nitrogen concentrations have been variable for all three seasonal periods as shown in Figures A82, A83 and A84. The nitrate concentrations were small, and relatively constant for all three seasonal periods. The exception was a peak concentration of 1.5 mg/L for the sample collected in the May period of 1984. This was an unusually large nitrate concentration. The trend in the August period has been for slightly increasing nitrate concentrations as a function of time. No evidence of either increasing or decreasing concentrations over the long term were apparent in the May and December periods. For the seasonal data, the minimum, average and maximum concentrations were 0.16, 0.36 and 1.50 mg/L in the May period. In the August period, the nitrate ranged from 0.03 to 0.70 mg/L with an average concentration of 0.32 mg/L. The average concentration in the December period was 0.34 mg/L with the concentrations ranging from 0.20 to 0.42 mg/l. Thus, the average seasonal concentrations were 0.26, 0.36 and 0.15 mg/L which indicated substantial seasonal variations.

The Total Kjeldahl Nitrogen data are shown graphically in Figures A85, A86 and A87. As shown by Figure A85, the overall trend in the May period was for slightly increasing Total Kjeldahl Nitrogen concentrations. The trends in the August and December periods were for variable concentrations. The peak Total Kjeldahl Nitrogen concentration of 3.2 mg/L in the December period was very large. However, analyses for Total Kjeldahl Nitrogen were discontinued in 1984. Consequently, the significance of the peak concentration over the long-term was not known. The average seasonal concentrations were 0.26, 0.58 and 1.10 mg/L in the May, August and December periods, respectively. These averages indicated a strong seasonal dependency. The data ranged from 0.10 to 0.37 mg/L in the May period. The minimum and maximum concentrations were 0.10 and 1.10 mg/L in the August period. The range in the December period was from 0.10 to 3.20 mg/L. These were relatively large ranges for Total Kjeldahl Nitrogen concentrations.

The total nitrogen data are shown in Figures A88, A89 and A90. As indicated by Figures A88 and A89, the overall trend in the May and August periods were for increasing total nitrogen concentrations as a function of time. The overall trend in the December period was for variable total nitrogen concentrations as a function of time. The average seasonal concentrations were 0.45, 0.89 and 1.11 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.61, 1.40 and 1.60 mg/L for the three seasonal periods. The averages indicated a significant seasonal variation in the total nitrogen concentrations with the total nitrogen concentrations during the August and December periods usually larger than in the May period.

pH. The pH parameter is a measure of the hydrogen ion concentration in a water. Consequently, it is related to the acidity or alkalinity of a water. In general, organisms thrive when the pH is about neutral (7). However, a pH within 5 to 9 is usually considered to be acceptable for aquatic growth. Regulation No. 2 establishes limits for pH between 6 and 9.

Figures A91, A92 and A93 show the pH values in the May, August and December periods. As shown by these figures, the pH values were well within the limits established by the Arkansas Department of Pollution and Control in Regulation

No. 2. Although there was some variation from year to year for each of the seasonal periods, the overall trends were for the pH values to stay relatively constant over the long term for all three seasonal periods. The minimum, average and maximum pH values were 6.2, 7.6 and 8.8 units for all of the data. For the May period, the average pH value was 7.8 units with the range from 7.0 and 8.8 units. The minimum and maximum pH values in the August period were 6.3 and 8.7 units with the average pH being 7.6 units. 'The minimum, average and maximum pH values were 6.2, 7.4 and 8.2 units in the December period. The average seasonal pH values were 7.8, 7.6 and 7.4 units which indicated some variation in the average values with respect to the season of the year.

Phosphorous. Figures A94, A95 and A96 show the total phosphorous data in the May, August and December periods, respectively. The average concentrations were 0.02, 0.05 and 0.01 mg/L for the three seasonal periods. The data in the May period were variable. The trend in the August period has been for nearly constant, and small, concentrations since 1981. There was considerable variation in the data prior to 1981. The total phosphorous concentrations were small, and relatively, uniform, in the December period. The maximum total phosphorous concentrations were 0.04, 0.44 and 0.03 mg/L in the May, August and December periods. The minimum concentrations were 0.01 mg/L in the May and August periods and 0.0 mg/L in the December period. Total phosphorous concentrations in large unpolluted lakes are usually within the range from 0.01 to 0.05 mg/L. Consequently, the peak concentration in the August period was very large.

Figures A97, A98 and A99 show the orthophosphate data in the May, August and December periods, respectively. The data for all three seasonal periods can be characterized as usually being relatively uniform, but with periodic peaks in concentration. By far the most common concentration was 0.01 mg/L in all three seasons. The average orthophosphate concentrations were 0.01 mg/L for all three seasonal periods. The maximum concentrations were 0.03, 0.02 and 0.02 mg/L in the May, August and December periods, respectively.

Sulfate. Figures A100, A101 and A102 show the sulfate data at the White River sampling site. All of the sulfate concentrations were relatively small with the maximum concentration being 11 mg/L.

The stream standard for sulfate in the White River is 20 mg/L. Consequently, all of the sulfate concentrations were less than the applicable standard for the White River.

The minimum, average and maximum sulfate concentrations for all of the data were 1, 6.8 and 11.0 mg/L. In the May period, the minimum, average and maximum concentrations were 5, 7.4 and 9.0 mg/L. The average concentration was 6.4 with the data ranging from 1.0 to 11.0 mg/L in the August period. The minimum and maximum concentrations were 5.0 and 9.0 mg/L with and average concentration of 6.6 mg/L in the December period. The average seasonal concentrations were 7.4, 6.4 and 6.6 mg/L which indicated only nominal variation in the average seasonal concentrations.

The long-term trends for all three seasonal periods were for variable sulfate concentrations. However, no trends of either increasing or decreasing concentrations over the long term were evident.

Temperature. The temperature of the water in the river at the White River sampling site clearly indicates the effect of discharging from the lower reaches of the lake. The average temperatures were 10.3, 13.2 and 8.6 degrees Celsius in the May, August and December periods, respectively. The maximum temperatures were 20.0, 30.0 and 12.0 degrees Celsius. Since the temperature standard for trout waters is 20 degrees Celsius, the standard was exceeded on five occasions in the early years of the August period record. However, the temperatures have all been less than 20 degrees Celsius since 1974. The minimum temperatures were 6.0, 8.0 and 3.5, respectively, in the May, August and December periods.

The temperature data are shown graphically in Figures A103, A104 and A105. As shown by these figures, the temperatures have generally been uniform since 1974 for all three seasonal periods. A tendency for increasing temperatures since 1980 in the August period was evident.

Turbidity. Figures A106, A107 and A108 show the turbidity data for the White River site. The minimum, average and maximum turbidity values were 0.4, 1.7 and 14 FTU for all of the data. The specific stream standard for turbidity in the Ozark Highlands Ecoregion is 10 NTU. The turbidity values for the seasonal data were much less than the stream standard except for one sample collected in the May period in 1985. The turbidity value for this sample was 14 FTU.

The turbidity data were variable for all three seasonal periods. However, the turbidity values were nearly always relatively small. The maximum turbidity values were 14.0, 4.5 and 4.0 FTU in the May, August and December periods. The minimum turbidity values were 0.4, 0.4 and 0.5 FTU in the three seasonal periods. The average turbidity values were 2.0, 1.6 and 1.6 FTU. Clearly, the overall trend for turbidity at the White River site was for very small turbidity values. The quality of the water was excellent in this regard at this site.

Station Number 2 (Eureka Springs Site). The figures showing the data graphically for this site are included in Appendix B. Summaries of the statistical analyses are included in Tables XII, XIII and XIV. The dissolved oxygen profiles are shown in Figures BD1 through BD190. Figures BT1 through BT190 show the temperature profiles from December, 1973 until July, 1990. Figures BC1 through BC190 show the conductivity profiles for the same period. The pH profiles are shown in Figures BP1 through BP190.

For the dissolved oxygen, temperature and pH figures, constant horizontal scales were used in preparing the graphs. In this manner, not only the shape of the curves can be examined, but also the relative placement of the curve on the figures was easily discernable. On occasion, the horizontal scale for the conductivity profiles was changed to accommodate larger conductivity concentrations.

As shown by Figures BD1 through BD190, Beaver Lake stratifies during the summer months. The depth of the dissolved oxygen chemocline varies, but was usually in the range from 30 to 50 feet during the summer months. Figures BD103, BD127, BD151, BD175 show the dissolved oxygen profiles for August of 1982, 1984, 1986 and 1988, respectively. A comparison of these figures indicates the shape of the dissolved oxygen profile varies considerably from year to year. The lake is remixed in late fall-early winter as it destratifies.

The temperature profiles shown in Figures BT1 through BT190 also indicate the stratification. For example, Figures BT103, BT127, BT151 and BT175 show the temperature profiles corresponding with the dissolved oxygen profiles for August of 1982, 1984, 1986 and 1988. As shown by these temperature profiles, Beaver Lake strongly stratifies in the summer months.

The conductivity profiles corresponding with the dissolved oxygen and temperature profiles are shown in Figures BC103, BC127, BC151 and BC175. As shown by Figure BC6, the conductivity values were often significantly depth related during the period of stratification. A comparison of Figures BC6 through BC12 indicates the shape of the conductivity profiles also varies. Activity in the water below the dissolved oxygen chemocline contributes to the increased conductivity values in the lower levels of the lake.

The pH values are also clearly depth related. Additionally, the shape of the pH profile varies considerably. Figures BP103, BP127, BP151 and BP175 show the pH profiles corresponding with the dissolved oxygen, temperature and conductivity profiles.

Except for the dissolved oxygen, temperature, conductivity and pH data collected for the profiles, most of the remaining data represent samples collected about 0.2 and 0.8 depths.

Alkalinity. The total alkalinity concentrations in the samples collected upstream from the dam were moderate. The minimum and maximum alkalinity concentrations were 27 and 79 mg/L. The overall average concentration was 56 mg/L. The average seasonal total alkalinity concentrations were 56, 56 and 55 mg/L which indicated very little seasonal variation. The minimum and maximum concentrations were 47 and 66 mg/L in the May season. The total alkalinity concentrations ranged from 46 and 79 mg/L in the August season. The minimum and maximum concentrations in the December season were 44 and 66 mg/L.

The trend was for the total alkalinity concentrations to be nearly constant as a function of the season of the year. There were variations in the total alkalinity concentrations as a function of time, but the variations were not unusually large.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.0, 1.0 and 4.2 mg/L for all of the data. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.1, 1.2 and 2.9 mg/L for the data collected in the May period. In the August period, the minimum and maximum concentrations were 0.0 and 4.2 with an average concentration of 1.0 mg/L. The average concentration in the December period was 0.7 mg/l with the data ranging from 0.0 to 2.9 mg/L.

The five-day biochemical oxygen demand concentrations were towards the low end of the range usually encountered in large lakes in Arkansas. The average seasonal concentrations were 1.2, 1.0 and 0.7 mg/L, respectively, in the May, August and December periods. These averages indicated a significant seasonal dependency. They were indicative of a water of very good to excellent quality with respect to this parameter.

Chloride. The minimum, average and maximum concentrations for all of the data were 2, 3.7 and 8.0 mg/L. These chloride concentrations were very small compared with the recommended drinking water limit of 250 mg/L and were less than the applicable standard of 20 mg/L for the White River. The average concentrations were 3.4, 4.2 and 3.8 mg/L in the May, August and December periods, respectively. The maximum concentrations were 5.0, 8.0 and 6.0 mg/L, respectively, in the May, August and December periods. The minimum concentrations were 2.0, 3.0 and 2.0 mg/L.

The trend was for nearly uniform chloride concentrations as a function of the season of the year. The trend was also for the range of concentrations to be small for each of the three seasons.

Clearly, the quality of the water in Beaver Lake was excellent with respect to the amount of chloride in the water. Substantial increases in the chloride concentrations would have to occur for this parameter to be of concern.

Chlorophyll a. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.1, 1.2 and 4.4 micrograms per liter. The chlorophyll a samples were collected at the three foot depth. In the May season, the minimum, average and maximum chlorophyll a concentrations were 0.1, 0.8 and 1.8 micrograms per liter. The average concentration in the August period was 1.9 micrograms per liter with the data ranging from 0.5 to 4.4 micrograms per liter. The minimum and maximum concentrations in the December period were 0.4 and 2.2 micrograms per liter with the average chlorophyll a concentration being 1.2 micrograms per liter. The average seasonal concentrations were 0.8, 1.9 and 1.2 micrograms per liter which indicated some seasonal variation. The trend was for the chlorophyll a concentrations in the August period to be larger than either the May or December period. This was often the case. There was also a trend for the maximum chlorophyll a concentrations to be relatively small indicating a water of very good to excellent quality at this site. The concentrations indicated the lake is in the mesotrophic stage at this site.

Chlorophyll b. The average chlorophyll b concentrations were all 0.1 microgram per liter, respectively, in the May, August and December periods. The maximum concentrations were 0.1, 0.2 and 0.2 microgram per liter. The minimum concentrations were all 0.1 microgram per liter for the three seasonal periods. The trend was for small chlorophyll b concentrations for each of the three seasonal periods which indicated the water at this site was of excellent quality.

Color. The average color concentrations were 4.6, 4.5 and 4.6 color units, respectively, in the May, August and December periods. The maximum color concentrations were 10, 14 and 30 units for the three seasonal periods. The minimum color concentrations were all zero. For all of the data, the minimum, average and maximum concentrations were 0, 4.2 and 30 units.

The trends were for small color concentrations for all three seasons. The data were more variable in the December period than in the May and August periods. The maximum color concentration in the entire record was sixty percent of the rule of thumb maximum of 50 units. Consequently, the quality of the water at this site was excellent concerning this parameter.

Conductivity. The minimum, average and maximum conductivity values were 59, 135 and 270 micromhos per centimeter for all of the data in the record. The average conductivity values were 135, 137 and 136 micromhos per centimeter. The average values indicated very little difference among the seasons of the year. The range in the May period was from 108 to 270 micromhos per centimeter which indicated substantial variation in the data for this period. The range in the August period was smaller extending from 101 to 170 micromhos per centimeter. In the December period, the minimum and maximum values were 89 and 219 micromhos per centimeter. Thus, the magnitudes of the ranges were 162, 69 and 130 micromhos per centimeter, respectively, in the May, August and December periods.

Fecal Coliform. The average fecal coliform counts were 1.0, 35.1 and 3.3 colonies per 100 mL in the May, August and December periods. The maximum counts were 9, 350 and 29 colonies per 100 mL. The minimum counts were all zero for the three seasonal periods. Including all of the data in the record, the minimum, average and maximum concentrations were 0, 10 and 350 colonies per 100 mL. The maximum coliform count of 350 colonies per 100 mL occurred in the August period which was during the primary contact recreation period.

Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month.

Except for the count of 350 colonies per 100 mL, the fecal coliform counts were well within acceptable levels at this site. In fact, the counts were small for surface water. The samples analyzed for fecal coliform were all collected at the surface.

The trends for fecal coliform organisms at this site were for very small counts at this site in the May and

December periods. The quality of the water was excellent in this regard.

Hardness. The total hardness concentrations in the samples collected were relatively large. The minimum, average and maximum total hardness concentrations for all of the data were 19, 63 and 110 mg/L (expressed as calcium carbonate). The average total hardness concentrations were 61, 63 and 60 mg/L in the May, August and December periods, respectively, which indicated little seasonal variation. The maximum total hardness concentrations were 110, 75 and 68 mg/L for the three seasonal periods. The minimum concentrations were 19, 49 and 47 mg/L for the three seasonal periods. The total hardness concentrations were variable as a function of time, particularly in the May period. The magnitudes of the ranges were 91, 26 and 21 mg/L, respectively, in the May, August and December periods.

The average seasonal calcium concentrations were 53, 55 and 50 mg/L for the three seasonal periods. The calcium concentrations ranged from 10 to 98 mg/L in the May period. In the August period, the range was from 46 to 65 mg/L. The minimum and maximum concentrations in the December period were 38 and 55 mg/L. The trend for the calcium was for little variation as a function of the season of the year. Like the total hardness data, the data for calcium were more variable in the May period than in the August and December periods.

The dissolved calcium concentrations averaged 21, 22 and 20 mg/L in the May, August and December periods, respectively. The ranges were from 4 to 39, 18 to 26 and 15 to 22 mg/L in the May, August and December periods. The trend for the dissolved calcium concentrations was for little variation as a function of the season of the year. However, the data were variable as a function of time, particularly in the May period.

The average dissolved magnesium concentrations were 2.0, 1.9 and 2.2 mg/L in the May, August and December periods, respectively. The maximum concentrations were 2.4, 2.4 and 4.0 mg/L for the three seasonal periods. Consequently, the trend was for nearly uniform, and small, dissolved magnesium concentrations among the seasons. A trend for relatively little variation in the data as a function of time was also evident.

Overall, the noncarbonate hardness averaged 13 mg/L with the range being from 0 to 54 mg/L. Noncarbonate hardness refers to calcium and magnesium which is present in excess of the alkalinity and, thus, is associated with chloride and/or sulfate in an ionic balance. It is not desirable to have noncarbonate hardness concentrations which are too large. In the May period, the noncarbonate hardness ranged from 6 to 54 mg/L with an average concentration of 16.5 mg/L. The minimum, average and maximum concentrations in the August period were 5, 12 and 19 mg/L, respectively. The average concentration was 7.2 mg/L in the December period. In the December period, the range was from 0 to 13 mg/L. Although there were differences in the average concentrations which were 16.5, 12.2 and 7.2 mg/L in the May, August and December periods, little emphasis should be placed on this difference.

Metals. The maximum aluminum concentrations in the May, August and December periods were 160, 240 and 400 micrograms per liter. There is no maximum contaminant level for aluminum in drinking water. However, these would be considered relatively small aluminum concentrations. The average aluminum concentrations were 59, 50 and 67 micrograms per liter. The trend was for little variation in the average concentrations as a function of the season of the year.

The maximum arsenic concentration was 10 micrograms per liter. For reference purposes, the maximum contaminant level for arsenic in drinking water is 50 micrograms per liter. Consequently, the arsenic concentrations in the lake at this site would be considered very small. The maximum arsenic concentrations were 1, 10 and 3 micrograms per liter in the May, August and December periods. Thus, the maximum arsenic concentration was only twenty percent of the maximum contaminant level for treated drinking water. The average arsenic concentrations were 0.9, 1.3 and 1.0 micrograms per liter. The trends were for small and relatively consistent arsenic concentrations for all three seasonal periods at this site.

The maximum chromium concentration for all of the data was 100 micrograms per liter. The maximum contaminant level for chromium in drinking water is 50 micrograms per liter. Thus, the chromium concentration exceeded the maximum contaminant level on one occasion. The maximum concentrations were 20, 20 and 100 micrograms per liter in the May, August and December periods. These concentrations were excessive with respect to the protection of aquatic life. The average concentrations were 9, 9 and 10 micrograms per liter for the three seasonal periods. The trend was for relatively uniform chromium concentrations among the three seasonal periods, except for the peak concentration in the December period.

The minimum, average and maximum copper concentrations were 1, 3.8 and 21 micrograms per liter in the May period. In the August period, the minimum, average and maximum concentrations were 1, 4.9 and 41 micrograms per liter. The minimum, average and maximum in the December period were 0, 10 and 110 micrograms per liter. For all of the data, the minimum, average and maximum concentrations were 0, 9.2 and 240 micrograms per liter. Thus, the copper concentrations were large on several occasions in the lake at this site. The copper concentrations should not exceed the 20 to 30 micrograms per liter range for the protection of aquatic life in Beaver Lake. The average concentrations were 3.8, 4.9 and 10 micrograms per liter, respectively, in the May, August and December periods. Consequently, the trend was for some variation in the copper concentrations as a function of the season of the year. However, the average value in the December period was influenced significantly by the peak concentration of 110 micrograms per liter.

The minimum, average and maximum iron concentrations for all of the data were 10, 74 and 340 micrograms per liter.

The average concentrations were 62, 66 and 93 micrograms per liter in the May, August and December periods, respectively. These averages indicated some seasonal variation with the average concentration in the December period exceeding those in the May and August periods. The maximum concentrations were 180, 270 and 340 micrograms per liter in the May, August and December periods. The minimum concentrations were all 10 micrograms per liter in the May, August and December periods. The trend was for relatively small iron concentrations for all three seasonal periods.

The maximum lead concentration found in the record was 200 micrograms per liter. The maximum concentrations for the seasonal data were 15, 9 and 20 micrograms per liter for the May, August and December periods. The average concentrations for lead were 4.0, 3.4 and 3.8 micrograms per liter. Although it did not occur during one of the seasonal periods, the maximum lead concentration of 200 micrograms per liter was very large. The concentration was the same as the maximum concentration at the White River site. The lead concentrations were usually less than the action level for lead in public water supplies and were usually with acceptable levels for the protection of aquatic life.

The minimum, average and maximum manganese concentrations for all of the data were 0, 31 and 250 micrograms per liter. In the May period, the minimum, average and maximum concentrations were 0, 13 and 40 micrograms per liter. For the August period, the minimum and maximum concentrations were 10 and 60 micrograms per liter. The average concentration in the August period was 17 micrograms per liter. The average concentration in the December period was 50 micrograms per liter with the range being from 10 to 250 micrograms per liter. Thus, the average seasonal concentrations were 13, 17 and 50 micrograms per liter. The trend was for a strong seasonal influence on the manganese concentrations in the water. The manganese concentrations were usually larger, and more variable, in the December period than in the May and August periods, which parallels the tendency for iron at this site.

The maximum mercury concentration was 3.8 micrograms per liter for all of the data. The maximum mercury concentrations for the three seasonal periods were 0.5, 0.5 and 3.8 micrograms per liter. The maximum contaminant level for mercury in drinking water is 2 micrograms per liter. Consequently, the mercury concentration was larger than the maximum contaminant level for drinking water on one occasion. Additionally, the maximum concentration of 3.8 micrograms per liter exceeded the level necessary for the protection of aquatic life. The average mercury concentrations were 0.12, 0.15 and 0.29 microgram per liter. The trend was for small mercury concentrations in the water at this site except for one sample in the December period.

Overall, the maximum nickel concentration was 290 micrograms per liter. The maximum nickel concentrations were 10, 7 and 50 micrograms per liter in the May, August and December periods. The average nickel concentrations were 3, 2.2 and 4.5 micrograms per liter for the three seasonal periods.

The seasonal concentrations were small and were well within the level necessary for the protection of aquatic life. However, an unusually large concentration of 290 micrograms per liter was measured in one non-seasonal sample. This concentration was excessive.

The potassium concentrations averaged 1.4, 1.4 and 1.5 mg/L in the May, August and December periods, respectively. The maximum concentrations were 1.8, 1.7 and 2.3 mg/L. Potassium at concentrations this small would not be considered a significant parameter by almost any ground or surface water quality scale. The trend was for small and nearly uniform potassium concentrations. The ranges of potassium concentrations were very small. They were 0.9 to 1.8, 1.1 to 1.7 and 1.2 to 2.3 mg/L, respectively, in the May, August and December periods.

The recommended maximum contaminant level for zinc in public water supplies is 5 mg/L. The maximum zinc concentration for all of the data was 400 micrograms per liter. For the seasonal data, the maximum concentrations were 70, 400 and 70 micrograms per liter. The average concentrations were 18, 39 and 22 micrograms per liter in the May, August and December periods, respectively. Thus, the trend was for a relatively strong seasonal influence on the zinc concentrations. However, except for the maximum concentration of 400 micrograms per liter, the zinc concentrations were relatively small. The maximum concentration was unusually large and was excessive with respect to the protection of aquatic life.

Nitrogen. The average un-ionized ammonia nitrogen was 0.0016 mg/L with the range from 0 to 0.0100 mg/L for all of the data at this site. In the May period, the range was from 0.0001 to 0.0100 mg/L with an average concentration of 0.0024 mg/L. The minimum, average and maximum concentrations were 0, 0.0027 and 0.0100 mg/L in the August period. The concentrations ranged from 0 to 0.0010 mg/L with an average concentration of 0.0003 mg/L in the December period. Thus, the average concentrations were 0.0024, 0.0027 and 0.0003 mg/L. The trend was for much larger un-ionized ammonia concentrations in the May and August periods than the December period.

The average ammonia nitrogen concentrations were 0.05, 0.05 and 0.03 mg/L, respectively, in the May, August and December periods. Ammonia nitrogen concentrations ranged from 0.01 to 0.14 mg/L in the May period and from 0 to 0.18 mg/L in the August period. The range was from 0 to 0.07 mg/L in the December period. The trends were for relatively small, and variable, ammonia concentrations for all three seasonal periods.

Overall, the minimum, average and maximum Total Kjeldahl Nitrogen concentrations were 0.07, 0.41 and 2.5 mg/L. The average concentrations were 0.40, 0.66 and 0.31 mg/L in the May, August and December seasonal periods, respectively. The maximum concentrations were 1.70, 2.50 and 0.66 mg/L for the three seasonal periods. The trend was for the Total Kjeldahl Nitrogen concentrations to be seasonally dependent with the August period having the largest concentrations.

The maximum concentrations in the May and August periods were relatively large.

The nitrate nitrogen concentrations averaged 0.25, 0.18 and 0.22 mg/L in the May, August and December periods. The maximum concentrations were 0.60, 0.60 and 0.37 mg/L in the May, August and December periods. The minimum concentrations were 0.07, 0 and 0.08 mg/L in the spring, summer and winter seasons. As indicated by the seasonal average concentrations there was some seasonal variation in the nitrate concentrations. The nitrate concentrations in the May and August periods were usually larger than in the December period. The trend was also for considerable variation in the data as a function of time.

pH. The minimum, average and maximum pH values were 5.7, 7.6 and 9.8 units for all of the data. The average pH values were 7.8, 7.8 and 7.3 units, respectively, in the May, August and December periods. The minimum pH values were 7.0, 6.8 and 5.7 units for the three seasonal periods. The maximum pH values were 9.8, 9.4 and 8.1 units. The average pH values indicated some variation in the average values with respect to the season of the year. The pH values varied as a function of time, but most values were within the range of from 6 to 9 established by the Arkansas Department of Pollution Control and Ecology.

Phosphorous. The minimum, average and maximum concentrations, were 0.01, 0.02 and 0.08 mg/L for all of the data. The average total phosphorous concentrations were 0.02 mg/L for all three seasonal periods. The maximum concentrations were 0.08, 0.07 and 0.07 mg/L in the May, August and December seasonal periods, respectively. The minimum concentrations were all 0.01 mg/L. The trend was for essentially no variation in total phosphorous as a function of the season of the year. A trend for relatively uniform total phosphorous concentrations was also apparent. The total phosphorous concentrations were usually within the range encountered in large unpolluted lakes. The maximum concentrations were slightly larger than the range of 0.01 to 0.05 mg/L usually encountered in large lakes.

The maximum orthophosphate concentration for all of the data was 0.05 mg/L which was relatively large. For the seasonal data, the maximum concentrations were 0.05, 0.02 and 0.04 mg/L in the May, August and December periods. The average orthophosphate concentrations were all 0.01 mg/L for the three seasonal periods. Thus, the trend was for the orthophosphate concentrations not to be seasonally dependent. A second trend was for the orthophosphate concentrations to usually be small and relatively uniform.

Sulfate. Regulation No. 2 issued by the Arkansas Department of Pollution Control and Ecology lists a stream standard of 20 mg/L for the White River. The maximum sulfate concentration in the record was 10 mg/L. Overall, the minimum and average sulfate concentrations were 1.0, 6.8 and 10.0 mg/L. In the May period, the minimum, average and maximum concentrations were 5.0, 7.4 and 10.0 mg/L. The average sulfate concentration was 6.5 mg/L with a range from 1.0 to 10.0 mg/L in the August period. In the December period, the minimum, average and maximum concentrations were 5.0, 6.7 and 10 mg/L. Consequently, all of the sulfate concentrations were well within the applicable standard. With respect to sulfate, the water in Beaver Lake at this site would be considered to be of excellent quality. The trend was for some seasonal variation in sulfate concentrations.

Transparency. The minimum, average and maximum transparency values were 8, 186 and 462 inches for all of the data. The average values were 227, 187 and 164 inches, respectively, in the May, August and December periods. The minimum values were 8, 108 and 84 inches in the August data. The maximum values were 462, 294 and 228 inches. Although there is no specific standard for transparency, it is ordinarily desirable to have a transparency of forty-eight inches based on the Secchi disk measurement for waters used in primary contact recreation. Consequently, based on this criterion, the water in Beaver Lake at the Norfork site would be considered of excellent quality. The water was very clear. Although the minimum transparency value in the May period was 8 inches which was small, the average transparency value was 227 inches. Consequently, the usual situation was for the water to be very clear at this site. The trend was for large transparency values for all three seasons. The transparency values were variable as a function of time for all three seasons.

Turbidity. The minimum, average and maximum turbidity values were 0.2, 1.0 and 5.5 FTU for all of the data. The maximum turbidity values for the seasonal data were 5.2, 1.5

and 5.5 FTU, respectively, in the May, August and December periods. The minimum turbidity values were 0.2, 0.2 and 0.4 FTU for the three seasonal periods. The average turbidity values were 1.0, 0.7 and 1.1 FTU in the May, August and December periods which indicated some variation in the average seasonal values. These were very small turbidity values which are well within the standard of 25 NTU for Beaver Lake. The trend was for small and nearly uniform turbidity values for the Eureka Springs site.

Station Number 3 (Prairie Creek Site). The figures showing the data graphically for this site are included in Appendix C. Summaries of the statistical analyses are included in Tables XV, XVI and XVII.

Alkalinity. The minimum, average and maximum total alkalinity concentrations were 31, 68 and 240 mg/L for all of the data. The average seasonal total alkalinity concentrations were 48, 55 and 113 mg/L in the May, August and December periods. The general trend for the total alkalinity in the May period was for relatively constant concentrations. The trend was for the alkalinity concentrations to stay about the same with no indication of either long-term increasing or decreasing concentrations in the August period. The alkalinity concentrations were relatively uniform in the August period. The alkalinity concentrations were much more variable in the December period than in either the May or August period. A general trend for increasing total alkalinity concentrations as a function of time in the December period appeared to be developing. The long-term trend in the May period data was for no indication of either increasing or decreasing concentrations. The minimum concentrations were 31, 42 and 44 mg/L in the May, August and December periods. The maximum concentrations were 62, 91 and 240 mg/L for the three seasonal periods. The trend was for much larger total alkalinity concentrations in the December period than in either the May or August period. The data are shown in Figures C1, C2 and C3.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.4, 1.6 and 2.8 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 2.0, 1.6 and 1.2 mg/L in the May, August and December periods, respectively. The maximum concentrations were 2.6, 2.8 and 2.3 mg/L for the three seasonal periods. The minimum concentrations were 0.9, 1.0 and 0.4 mg/L. The data are shown graphically in Figures C4, C5 and C6.

The five-day biochemical oxygen demand concentrations were about average to slightly less than average for most lakes in Arkansas. The trend was for relatively uniform five-day biochemical oxygen demand concentrations during the May period. The trends were for more variable and smaller five-day biochemical oxygen demand concentrations in the samples collected in the August and December periods. There does not appear to be a trend for either increasing or decreasing five-day biochemical oxygen demand concentrations over the long term for any of the three seasonal periods.

Chloride. Only four chloride concentrations were reported for the Prairie Creek site. Consequently, graphs were not prepared. The minimum, average and maximum concentrations for all of the data were 4, 6.5 and 14 mg/L. There is not sufficient data in the record to draw any conclusions.

Chlorophyll a. The minimum, average and maximum chlorophyll a for all of the data were 0.1, 4.1 and 14.0 micrograms per liter, respectively. The average chlorophyll a concentrations were 4.6, 5.0 and 3.0 micrograms per liter, respectively, in the May, August and December periods. The maximum concentrations were 7.3, 14.0 and 6.7 micrograms per liter for the three seasonal periods. The minimum concentrations were 0.1, 2.2 and 0.7 micrograms per liter. The seasonal averages indicated a significant seasonal variation with the average concentration largest during the August period. The data are shown graphically in Figures C7, C8 and C9. As shown by Figure C7, the chlorophyll a concentrations varied somewhat as a function of time. Except for the peak concentration in 1988, the data in the August period were relatively uniform. The peak concentration in 1988 was relatively large. The data were variable in the December period. A long term trend of slightly increasing chlorophyll a concentrations in the May period may have been developing. There were no trends for either increasing or decreasing concentrations as a function of time in the August and December periods. The chlorophyll a concentrations indicated the lake is in the mesotrophic stage at this site.

Chlorophyll b. The minimum, average and maximum chlorophyll b concentrations in the May period were 0.1, 0.2 and 0.9 micrograms per liter. In the August period, the minimum, average and maximum concentrations were 0.1, 0.4 and 1.7 micrograms per liter. The minimum, average and maximum in the December period were 0.1, 0.4 and 1.3 micrograms per liter. The minimum, average and maximum chlorophyll b concentrations for all data were 0.1, 0.3 and 1.7 micrograms per liter.

The seasonal data are shown graphically in Figures C10, C11 and C12. As shown by these figures, the chlorophyll b concentrations were variable for all three periods. The peak concentration in the August period corresponded with the peak chlorophyll a concentration for this period. The trend in the December period has been for constant chlorophyll b concentrations since the December period of 1986 sample was collected. The data in the May period would be characterized as usually being small with occasional peak concentrations.

Color. Figures C13, C14 and C15 show the color data for the three seasonal sampling periods. As shown by the three figures, the color concentrations varied considerably as a function of time in the May period. The trends were for small and nearly uniform color concentrations in the August and December periods.

The maximum concentration for all of the data was 80 units. On two occasions during the May period, the color concentrations exceeded the rule of thumb value of a maximum concentration of 50 units. The concern is that color in excess of 50 units may limit photosynthesis and may have a deleterious effect upon certain aquatic life such as phytoplankton and the benthos. There were no trends with respect to either increasing or decreasing color concentration as a function of time for any of the three seasonal periods.

Including all of the data, the minimum, average and maximum color concentrations were 0, 9.8 and 80 units. The average color concentrations were 19.6, 5.1, and 4.3 units in the May, August and December periods, respectively. The maximum color concentrations were 80, 10 and 10 units. The minimum color concentrations were 1.0, 2.0, and 0 for the three seasonal periods.

<u>Conductivity</u>. Figures C16, C17 and C18 show the data in the May, August and December seasonal periods. As shown by these figures, the conductivity values in Beaver Lake were moderate. The average conductivity values were 138, 128 and 215 micromhos per centimeter in the May, August and December periods, respectively. The maximum conductivity values were 235, 143 and 307 micromhos per centimeter. The minimum values were 101, 109 and 134 micromhos per centimeter. The seasonal averages indicated essentially a strong seasonal influence with the conductivity values usually being larger in the December period than in either the May or August period. The trends in the May and August periods were for

relatively uniform conductivity values as a function of time. The long-term trend in the December period was for increasing conductivity values with the passage of time.

Reservoir Depth. Figures C19, C20 and C21 show the depth of water at the time of sampling for each season. The depths were generally shallow during the August and December periods.

Dissolved Oxygen. The seasonal data for dissolved oxygen are shown in Figures C22, C23 and C24. The minimum, average and maximum concentrations for all of the data were 6.2, 9.6 and 13.4 mg/L. The minimum, average and maximum dissolved oxygen concentrations in the May period were 6.2, 9.7 and 11.0 mg/L. In the August period, the minimum, average and maximum concentrations were 7.0, 8.0 and 9.1 mg/L. The minimum, average and maximum concentrations in the December period were 9.6, 10.8 and 13.4 mg/L.

The overall trends in the May, August and December periods were for the dissolved oxygen concentrations to remain relatively constant as a function of time, but with some variation from year to year. That is, there was no trend for either increasing or decreasing dissolved oxygen concentrations over the full period of the record. All of the dissolved oxygen concentrations exceeded 6 mg/L. Consequently, the water in the lake at this site was well aerated. The dissolved oxygen concentrations expressed as a percentage of the saturation value are plotted in Figures C25, C26 and C27.

Fecal Coliform. Figures C28, C29 and C30 show the seasonal fecal coliform data plotted as a function of time in the May, August and December periods. The maximum fecal coliform counts were 23, 83 and 95 colonies per 100 mL. The average fecal coliform counts were 4.7, 12 and 16 colonies per 100 mL. Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. For the period of the year from October 1 until March 31, the applicable standard is a geometric mean of 1,000 colonies per 100 mL and a maximum of 2,000 colonies per 100 mL in more than 10 percent of the samples taken in any 30-day period.

All of the fecal coliform counts for the three seasonal periods were much less than the limit for primary contact recreation. The trend was for variable, but usually small, fecal coliform counts in the August and December periods. The trend in the May period was for small and more uniform coliform counts. The quality of the water at the Prairie Creek site was excellent with respect to the fecal coliform count.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures C31, C32 and C33 for the Prairie Creek site. As shown by these figures, the total hardness concentrations in the samples collected were variable in the May and December periods. The general trend in the August period was for more uniform total hardness concentrations. There were no long-term trends of either increasing or decreasing hardness concentrations apparent for any of the three seasonal periods. The minimum, average and maximum total hardness concentrations for all of the data were 19, 70 and 128 mg/L (expressed as calcium carbonate). The average concentrations were 57, 60 and 92 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 83, 75 and 128 mg/L for the three seasonal periods. The minimum concentrations were 19, 50 and 64 mg/L. As shown by the figures, the total hardness concentrations were clearly seasonally dependent. The water was much harder during the December period than in the May and August periods. The calcium data are shown in Figures C34, C35 and C36.

The maximum calcium concentrations were 78, 68 and 114 mg/L (expressed as calcium carbonate) in the May, August and December periods. The average calcium concentrations were 52, 54 and 70 mg/L in the May, August and December periods, respectively. The minimum concentrations were 11, 45 and 55 mg/L. Like the total hardness data, the calcium data were clearly seasonally dependent with the calcium concentrations in the December period larger than in the May and August periods. Both the total hardness and calcium hardness concentrations were very small in the sample collected in the May period of 1981. The trend in the August period was for nearly uniform calcium concentrations. After the peak concentration in 1975, the calcium concentrations in the December period were nearly uniform. The data were variable in the May period.

The dissolved calcium concentrations are shown in Figures C37, C38 and C39 in the May, August and December periods. As shown by Figure C37 in the May period, the dissolved calcium concentrations have generally decreased slightly as a function of time. The trend in the August period was for nearly uniform dissolved calcium concentrations with a possible tendency for very slightly declining concentrations as a function of time. The data in the December period were relatively uniform except for two larger concentrations in 1987 and 1989. The minimum, average and maximum concentrations were 4.5, 24 and 51 mg/L for all of the data. The average concentrations were 20, 21 and 31 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 31, 27 and 51 mg/L for the three seasonal periods. The dissolved calcium concentrations were clearly seasonally dependent with the concentrations usually larger during the December period than in the May and August periods.

The dissolved magnesium data are shown in Figures C40, C41 and C42. The maximum dissolved magnesium concentrations were 2.0, 2.1 and 2.3 mg/L in the May, August and December periods, respectively. As indicated by the figures, the magnesium concentrations were small, and relatively uniform, as a function of time for all three seasonal periods. The average concentrations were 1.5, 1.7 and 1.8 mg/L indicated little variation with respect to seasons of the year. The minimum concentrations were 1.1, 1.2 and 1.5 mg/L.

Limited noncarbonate hardness data were in the record. The average concentrations were 28, 10 and 40 mg/L. The maximum concentrations were 52, 18 and 73 mg/L. There were only two concentrations in the August and December periods and three in the May period.

Nitrogen. The minimum, average and maximum nitrate nitrogen concentrations were 0.02, 0.57 and 1.40 mg/L for all data. The average nitrate concentrations were 0.57, 0.08 and 1.07 mg/L in the May, August and December periods, respectively. The maximum concentrations were 1.0, 0.10 and 1.4 mg/L for the three seasonal periods. The minimum concentrations were 0.20, 0.02 and 0.32 mg/L. The average seasonal concentrations indicated significant variation with respect to the season of the year. The average concentration in the December period was more than thirteen times the average concentration in the August period and about double that in the May period. The general trend in the May period has been for decreasing nitrate concentrations as a function of time. The trend in the August period has been for small and nearly uniform nitrate concentrations. The trend in the December period has usually been for relatively constant and large nitrate concentrations. The data are shown in Figures C43, C44 and C45.

pH. Figures C46, C47 and C48 show the pH values for the May, August and December periods. As shown by these figures, the pH values were all within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. These limits are a minimum pH of 6 and a maximum pH of 9 units.

The minimum, average and maximum pH values were 6.2, 7.9 and 9.0 units for all of the data. The average pH values were 8.0, 8.3 and 7.3 units which indicated a significant seasonal dependency. The minimum pH values were 7.0, 7.6 and 6.2 units. The maximum pH values were 9.0, 8.9 and 8.1 units for the three seasonal periods.

As shown by Figures C46, C47 and C48, the changes in pH as a function of time were relatively small. In general, the trends for all three seasonal periods have been for the pH values to remain relatively constant over the period of record. That is, there were no apparent trends for either long-term increasing or decreasing pH values.

Phosphorous. Figures C49, C50 and C51 show the total phosphorous data in the May, August and December periods. The minimum, average and maximum concentrations were 0.01, 0.03 and 0.09 mg/L for all of the data. The average concentrations were 0.04, 0.02 and 0.02 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.09, 0.03 and 0.03 mg/L for the three seasonal periods. The minimum concentrations were 0.01 for all three seasonal periods. The average seasonal concentrations indicated some seasonal variation. The general trend in the May period was for variable total phosphorous concentrations with an apparent tendency for increasing concentrations as a function of time. The data in the May and December periods indicated trends for nearly constant total phosphorous concentrations as a function of time. The total phosphorous concentrations were well within the usual range at this site in the August and December periods.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures C52, C53 and C54. The average concentrations were all 0.02 mg/L for the three seasonal periods. The trends were for variable, but normal, orthophosphate concentrations at the Prairie Creek site.

Temperature. Figures C55, C56 and C57 show the seasonal data in the May, August and December periods. The minimum, average and maximum temperatures were 1.5, 18.8 and 31.0 degrees Celsius for all of the data. The average seasonal temperature values were 20.3, 28.4 and 8.5 degrees Celsius in the May, August and December periods. The minimum temperatures were 17.0, 26.5 and 5.5 degrees Celsius for the three seasonal periods. The maximum temperatures were 25.5, 31.0 and 10.0 degrees Celsius. The specific standard for temperature in Beaver Lake is 32 degrees Celsius.

Transparency. Figures C58, C59 and C60 show the transparency data in the May, August and December seasonal periods. The minimum, average and maximum transparency values were 12, 45 and 84 inches for all of the data. The minimum values were 12, 34 and 22 inches in the May, August and December periods, respectively. The average values were 40, 50 and 46 inches. The maximum values were 72, 84 and 71 inches for the three seasonal periods. The data indicated a water with good clarity, but with transparency values often less than the minimum desired. For safety purposes, the general guideline is for a minimum transparency of forty-eight inches for water used for primary contact recreation. were greater than the recommended forty-eight inches.

Turbidity. Figures C61, C62 and C63 show the turbidity data for the Prairie Creek site. The minimum, average and maximum turbidity values were 0.1, 4.8 and 22.0 FTU for all of the data. The maximum turbidity values for the seasonal data were 22.0, 20.0 and 10.0 FTU in the May, August and December periods, respectively. The minimum turbidity values were 1.5, 0.1 and 0.6 FTU. The average turbidity values were 6.3, 4.4 and 2.8 FTU for the three seasonal periods. The specific standard for turbidity in Beaver Lake as established by the Arkansas Department of Pollution Control and Ecology is 25 NTU. All of the turbidity values in the May period were less than the standard for Beaver Lake. The overall trends for all three periods were for variable turbidity values with the data in the December period being more uniform. Concerning turbidity, the water has to be considered to be of good quality at this site.

Station Number 4 (Highway 12 Site). The figures showing the data graphically for this site are included in Appendix D. Summaries of the statistical analyses are included in Tables XVIII, XIX and XX.

Alkalinity. Figures D1, D2, and D3 show the total alkalinity data in the May, August and December periods. The average seasonal total alkalinity concentrations were samples collected at 0.2 depth. The five-day biochemical oxygen demand concentrations in the samples collected at 0.8 depth were also usually smaller than in the samples collected at 0.2 depth in the August period. The data were more uniform in the December period than in the May and August periods. The five-day biochemical oxygen demand concentrations in the sample collected in the August period of 1988 was unusually large at both depths. In general, the five-day biochemical oxygen demand concentrations were about typical of those encountered in lakes in Arkansas and were not remarkable.

Chloride. The minimum, average and maximum chloride concentrations for all of the data were 2.0, 4.4 and 38.0 mg/L. The average seasonal concentrations were 3.5, 6.1 and 4.1 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 5.0, 38 and 6.0 mg/L for the three seasonal periods. The minimum concentrations were 3.0, 2.0 and 3.0. The data are shown graphically in Figures D7, D8 and D9. Except for the peak concentration of 38 mg/L, the chloride concentrations were small. A trend for increasing chloride concentrations as a function of time was evident in the December period. The long-term trends in the May and August periods were for neither increasing nor decreasing concentrations as a function of time.

Chlorophyll a. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.4, 2.6 and 7.7 micrograms per liter, respectively. The maximum chlorophyll a concentrations were 7.7, 6.8 and 2.7 micro-

46, 56 and 63 mg/L in the May, August and December periods. The average concentration was 55 mg/L for all of the data in the record. The maximum alkalinity concentrations were 79, 99 and 106 mg/L. The minimum concentrations were 30, 36 and 44 mg/L.

The trends were for variable total alkalinity concentrations in the samples collected during all three seasonal periods with the data in the August period being the most uniform. The alkalinity concentrations in the samples collected at 0.8 depth were usually slightly larger than in the samples collected at 0.2 depth in the May period. They were about the same for the samples collected in the August period. The long-term trend was for the alkalinity concentrations to stay about the same with no increasing or decreasing tendency apparent.

Five-Day Biochemical Oxygen Demand. The seasonal data are shown in Figures D4, D5 and D6. The overall average concentration was 1.2 mg/L with minimum and maximum concentrations of 0.0 and 4.2 mg/L. The average seasonal five-day biochemical oxygen demand concentrations were 1.2, 1.1 and 1.0 mg/L. The maximum concentrations were 2.4, 3.6 and 2.1 mg/L for the three seasonal periods. The minimum concentrations were 0.3, 0 and 0.2 mg/L.

The data in the May period indicated the five-day biochemical oxygen demand concentrations varied somewhat in the samples collected at both the 0.2 and 0.8 depths. The five-day biochemical oxygen demand concentrations in the samples collected at 0.8 depth were usually smaller than in the grams per liter in the May, August and December periods. The average concentrations were 3.4, 2.9 and 1.8 micrograms per liter. The minimum concentrations were 0.7, 1.8 and 0.4 micrograms per liter. The data are shown graphically in Figures D10, D11 and D12.

The average seasonal chlorophyll a concentrations indicated a strong seasonal dependency which would be expected. The trend was for variable chlorophyll a concentrations in the May period. Except for the peak concentration in 1986, the trend was for nearly constant chlorophyll a concentrations in the August period. The long-term trend for the December period was for relatively steady, and small, chlorophyll a concentrations. Except for the two peak concentrations in the May period and one peak concentration in the August period, the chlorophyll a concentrations were about normal at this site. The concentrations indicated the lake is in the mesotrophic stage at this site.

Chlorophyll b. The minimum concentrations were reported at 0.1 microgram per liter for all three seasonal periods. The maximum concentrations were 0.3, 0.7 and 0.4 micrograms per liter. The seasonal averages were 0.2, 0.3 and 0.1 micrograms per liter. Overall the minimum, average and maximum concentrations were 0.1, 0.2 and 0.7 micrograms per liter. The seasonal data are shown graphically in Figures D13, D14 and D15.

As shown by Figure D13, the chlorophyll b concentrations in the August period indicated a general trend for increasing concentrations as a function of time. The trend for the

December period has been for very constant concentrations since 1984. The trend in the May period was for generally constant concentrations.

Color. The color data for the three seasonal sampling periods are shown in Figures D16, D17 and D18. As indicated by the figures, the color concentrations varied considerably as a function of time and as a function of the season of the year. The general trend in the May period was for considerable variation in the color concentrations as a function of time. They were often quite small. However, they were also very large at times. In the August period, the color concentrations in the samples collected at 0.2 depth were all small. They were frequently larger in the samples collected at 0.8 depth but all were less than 50 units. The color concentrations were usually small in the December period. However, one peak concentration was reported at 70 units. The rule of thumb is that color ought not to exceed 50 units. The minimum and maximum concentrations were 0 and 180 units for all of the data. The overall average concentration was 19 units. The average concentrations were 29.2, 10.3 and 12.4 units in the May, August and December periods. The maximum concentrations were 180, 40 and 70 units for the three seasonal periods. The minimum concentrations were all zero.

Conductivity. Figures D19, D20 and D21 show the conductivity data in the May, August and December seasonal periods. As shown by these figures, the conductivity values were relatively uniform for all three periods. The long-term trends for all three periods were for the conductivity values to remain about the same rather than either increasing or decreasing as a function of time. In the May and August periods, the conductivity values were usually larger in the samples collected at 0.8 depth than in those collected at 0.2 depth.

The minimum, average and maximum conductivity values were 90, 135 and 323 micromhos per centimeter for all of the data. The average values were 124, 144 and 137 micromhos per centimeter in the May, August and December periods. The maximum values were 175, 323 and 165 micromhos per centimeter for the three seasonal periods. The minimum value were 95, 90 and 93 micromhos per centimeter.

Reservoir Depth. The depth of water at this site is shown in Figures D22, D23 and D24 as a function of time. As shown by these figures, the depth of water was usually relatively constant and deep except in the May 1977 period.

Dissolved Oxygen. The dissolved oxygen concentrations in the May, August and December periods, respectively, are shown in Figures D25, D26 and D27. As shown by the figures, the dissolved oxygen concentrations have been relatively constant in the May and August periods in the samples collected at 0.2 depth. A general trend for increasing dissolved oxygen concentrations as a function of time was evident in the December period. The data for all three periods indicated the effects of stratification in the lake at this site. As indicated by Figure D26, the dissolved oxygen concentrations were usually very small in the samples collected at 0.8 depth in the August period.

The minimum, average and maximum concentrations for all of the data were 0.1, 6.6 and 13.8 mg/L. The minimum, average and maximum dissolved oxygen concentrations in the May data were 3.9, 7.4 and 9.3 mg/L. In the August data, the minimum, average and maximum concentrations were 0.1, 3.2 and 8.4 mg/L. The average concentration in the December period was 8.3 mg/L with the data ranging from 0.2 to 12.4 mg/L.

The dissolved oxygen concentrations, expressed as percent of saturation, are shown in Figures D28, D29 and D30 in the May, August and December sampling periods.

Fecal Coliform. The fecal coliform concentrations in the seasonal data at this site were all very small. The maximum concentration was 20 colonies per 100 mL. The average fecal coliform counts were 2.7, 1.1 and 3.5 colonies per 100 mL in the May, August and December periods. The maximum fecal coliform counts were 20, 6 and 19 colonies per 100 mL for the three seasonal periods. The minimum counts were all zero. The data are shown graphically in Figures D31, D32 and D33. As shown by these figures, the fecal coliform counts were small for all three seasons. The counts were variable in the May and December seasonal periods. The trend in the August period was for small and relatively uniform counts. The quality of water was excellent with respect to fecal coliform counts at this site.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures D34, D35 and D36 for the Highway 12 site. The minimum, average and maximum total hardness concentrations were 37, 62 and 112 mg/L for all of the data. The average concentrations were 54, 68 and 58 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 79, 110 and 72 mg/L for the three seasonal periods. The minimum concentrations were 37, 48 and 40 mg/L. The general trend in the May period was for somewhat variable total hardness concentrations with the concentrations usually slightly larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend in the August period was also for the concentrations in the samples collected at 0.8 depth to be slightly larger than in the samples collected at 0.2 depth. The data were also variable at both depths for this period. The trend in the December period was for the total hardness concentrations to be about the same in the samples collected at the two depths.

The calcium data are shown graphically in Figures D37, D38 and D39. As shown by Figure D37 in the May period, the calcium concentrations were variable with the concentrations in the samples collected at 0.8 depths usually larger than in the samples collected at 0.2 depth. The same trends were apparent in the August period data. Conversely, the calcium concentrations were usually smaller in the samples collected at 0.8 depth than in the samples collected at 0.2 depth.

The minimum, average and maximum calcium concentrations were 30, 52 and 88 mg/L, respectively, for all of the data. The average concentrations were 48, 54 and 54 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 72, 68 and 70 mg/L for the three seasonal periods. The minimum concentrations were 30, 42 and 32 mg/L.

The dissolved calcium data are shown in Figures D40, D41 and D42. The minimum, average and maximum dissolved calcium concentrations for all of the data were 12, 21 and 36 mg/L (expressed as calcium). The minimum concentrations were 12, 17 and 13 mg/L. The average concentrations were 19, 23 and 21 mg/L. The maximum concentrations were 29, 35 and 25 mg/L. The trend in the May period was for variable dissolved calcium concentrations at both depths with the concentrations in the samples collected at 0.8 depth usually being significantly larger than in the samples collected at 0.2 depth. The general trends in the August and December periods have been for decreasing dissolved calcium concentrations as a function of time.

The dissolved magnesium data are shown in Figures D43, D44 and D45. The minimum, average and maximum concentrations for all of the data were 1.2, 1.7 and 2.4 mg/L. The average concentrations were 1.6, 1.8 and 1.7 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 2.0, 2.2 and 2.1 mg/L for the three seasonal periods. The minimum concentrations were 1.2, 1.2 and 1.4 mg/L. The dissolved magnesium concentrations have generally remained relatively constant over the long term in the May period. General trends for slightly decreasing dissolved magnesium concentrations as a function of time were evident in the August and December periods.

The maximum noncarbonate hardness concentration was 36 mg/L. The average concentration in the May period was 17 mg/L with the concentrations ranging from 4 to 33 mg/L. For the August period, the minimum and maximum concentrations were 0 and 20 mg/l with an average concentration of 10 mg/L. The average concentration in the December period was 7.2 mg/L with the minimum and maximum concentrations being 2 and 18 mg/L. The data are shown graphically in Figures D46, D47 and D48. As shown by Figure D46, the trend was for decreasing concentrations as a function of time for the samples collected at both depths.

Metals. The maximum aluminum concentrations in the May, August and December periods were 1,100, 1,500 and 4,200 micrograms per liter. There is no maximum contaminant level for aluminum in drinking water. However, these would be considered relatively large aluminum concentrations. The average aluminum concentrations were 287, 163 and 321 micrograms per liter. The trend was for substantial variation in the average seasonal concentrations. The trend was also for significant variations as a function of time for all three seasonal periods. The data are shown in Figures D49, D50 and D51.

The maximum arsenic concentration was 2 micrograms per liter. For reference purposes, the maximum contaminant level for arsenic in drinking water is 50 micrograms per liter. Consequently, the arsenic concentrations in the lake at this site would be considered very small. The maximum arsenic concentrations were 2, 2 and 1 micrograms per liter in the May, August and December periods. Thus, the maximum arsenic concentration was four percent of the maximum contaminant level for treated drinking water. The average arsenic concentrations were 0.9, 1.0 and 1.0 microgram per liter. As shown by Figures D52, D53 and D54, the trends were for very small and consistent arsenic concentrations for all three seasonal periods at this site.

The maximum chromium concentration for all of the data was 40 micrograms per liter. The maximum contaminant level for chromium in drinking water is 50 micrograms per liter. Thus, the chromium concentrations were within the limit for treated water for public water supplies. The maximum concentrations were 20, 40 and 10 micrograms per liter in the May, August and December periods. The maximum concentrations in the May and August periods were excessive with respect to the protection of aquatic life. The average concentrations were 10, 9 and 8 micrograms per liter in the May, August and December periods. The trend was for uniform chromium concentrations in the December period and for relatively uniform concentrations in the May and August periods. The data are shown in Figures D55, D56 and D57.

Figures D58, D59 and D60 show the copper data for the Highway 12 site. The average copper concentrations were 4.3, 3.0 and 3.0 micrograms per liter in the May, August and

December periods. The maximum concentrations were 20, 13 and 7 micrograms per liter. For all of the data, the minimum, average and maximum concentrations were 1, 3.6 and 20 micrograms per liter. Thus, the copper concentrations were within acceptable levels for the protection of aquatic life and with respect to the use of the water as a drinking water supply source. A trend for decreasing copper concentrations as a function of time was evident in the August period since 1982.

The minimum, average and maximum iron concentrations for all of the data were 10, 430 and 4,000 micrograms per liter. The average concentrations were 494, 162 and 590 micrograms per liter in the May, August and December periods, respectively. These averages indicated a significant seasonal variation. The maximum concentrations were 2,300, 1,000 and 4,000 micrograms per liter in the May, August and December periods. The minimum concentrations were 50, 10 and 130 micrograms per liter. The trend was for small iron concentrations in the August period with the iron in the samples collected at 0.8 depth being significantly larger than in the samples collected at 0.2 depth. The trends in the May and December periods were for variable iron concentrations. The peak concentrations were relatively large. The data are shown graphically in Figures D61, D62 and D63.

Figures D64, D65 and D66 show the lead data for this site. The maximum lead concentration found in the record was 23 micrograms per liter. The maximum concentrations for the seasonal data were 11, 23 and 8 micrograms per liter for the May, August and December periods. The average concentrations for lead were 3.4, 4.4 and 3.0 micrograms per liter. All of the lead concentrations except one were less than the action level for lead in public water supplies. The lead concentrations were usually within acceptable levels for the protection of aquatic life. The concentration of 23 micrograms per liter was in a sample collected at 0.8 depth in the August period of 1981. The concentration was more than twice that in the sample collected at 0.2 depth. The trend in the December period was for small and relatively uniform lead concentrations.

The minimum, average and maximum manganese concentrations for all of the data were 10, 406 and 4,000 micrograms per liter. The maximum concentrations were 140, 2,100 and 4,000 micrograms per liter, respectively, in the May, August and December periods. The average concentrations were 56, 570 and 600 micrograms per liter. The trend in the May period was for very small and uniform manganese concentrations. The trend in the August period was for small and uniform concentrations in the samples collected at 0.2 depth. However, the trend for the samples collected at 0.8 depth was for large and variable manganese concentrations. The data for the samples collected at 0.2 depth in the December period were more variable than in the May and August periods. A general trend for decreasing manganese concentrations was evident in the December period for the samples collected at 0.2 depth. The trend for the samples collected at 0.8 depth in the December period was for occasionally very large concentrations. The manganese concentrations are illustrated graphically in Figures D67, D68 and D69.

The maximum mercury concentration was 1.3 micrograms per liter for all of the data. The maximum mercury concentrations for the three seasonal periods were 0.6, 0.6 and 1.3 micrograms per liter. The maximum contaminant level for mercury in drinking water is 2 micrograms per liter. Consequently, the largest mercury concentration was less than the maximum contaminant level for treated drinking water. The average mercury concentrations were 0.13, 0.18 and 0.18 micrograms per liter. As shown by Figures D70, D71 and D72, the trend was usually for very small, and uniform, mercury concentrations in the water at this site. However, the mercury concentration in the sample collected at 0.8 depth in the December period of 1989 was unusually large at 1.3 micrograms per liter.

Overall, the maximum nickel concentration was 11 micrograms per liter. The maximum nickel concentrations were 11, 10 and 8 micrograms per liter in the May, August and December periods. The average nickel concentrations were 3, 2.7 and 3.2 micrograms per liter, respectively, in the May, August and December periods. These were small concentrations and were well within the limits necessary for the protection of aquatic life. The data are shown in Figures D73, D74 and D75.

The potassium concentrations averaged 1.5, 1.3 and 1.4 mg/L in the May, August and December periods, respectively.

The maximum concentrations were 2.0, 1.7 and 1.8 mg/L. Figures D76, D77 and D78 show the potassium data graphically for this site. Potassium at concentrations this small would not be considered a significant parameter by almost any ground or surface water quality scale. The trend was for small small and nearly uniform potassium concentrations in the December period. They were somewhat more variable in the May and August periods but were still relatively constant. The ranges of potassium concentrations were very small. They were 1.0, 0.7 and 0.5 mg/L, respectively, in the May, August and December periods.

The recommended maximum contaminant level for zinc in public water supplies is 5 mg/L. The maximum zinc concentration for all of the data was 870 micrograms per liter. For the seasonal data, the maximum concentrations were 60, 870 and 70 micrograms per liter. The average concentrations were 16, 106 and 23 micrograms per liter in the May, August and December periods, respectively, which indicated a significant seasonal dependency as shown in Figures D79, D80 and D81. The concentrations of 870 and 740 micrograms per liter in the August period were unusually large for lakes in Arkansas. These were excessive concentrations with respect to the protection of aquatic life. The trend was for a more uniform concentrations in the May period.

Nitrogen. The average un-ionized ammonia nitrogen was 0.0013 mg/L with the range from 0 to 0.0200 mg/L for all of the data at this site. The average concentrations were 0.0006, 0.0037 and 0.0005 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.0030, 0.0200 and 0.0010 mg/L for the three seasonal periods. The minimum concentrations were all zero. The average concentrations indicated a strong seasonal dependency with the average concentration in the August period being over six times as large as in the May and December periods. The concentrations in the May and December periods were small. The peak concentration in the August period of 0.0200 was very large for un-ionized ammonia in lake water. However, the concentrations were decreasing from the peak in 1981 until analyses for this parameter were discontinued in 1983. The data are shown graphically in Figures D82, D83 and D84.

The average ammonia nitrogen concentrations were 0.05, 0.08 and 0.08 mg/L, respectively, in the May, August and December periods. Ammonia nitrogen concentrations ranged from 0.01 to 0.12 mg/L in the May period and from 0 to 0.33 mg/L in the August period. The range was from 0 to 0.24 mg/L in the December period. The general trend in the May period was for small but generally increasing ammonia concentrations as a function of time. The data in the August and December periods were variable and usually much larger as shown by Figures D85, D86 and D87.

The average organic nitrogen concentrations were 0.40, 0.78 and 0.38 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 1.20, 4.70 and 0.56 mg/L for the three seasonal periods. The minimum concentrations were 0.04, 0.11 and 0.09 mg/L. The overall minimum, average and maximum concentrations were 0, 0.49 and 4.7 mg/L. The organic nitrogen concentrations are shown in Figures D88, D89 and D90. As shown by Figure D89, the general trend for the August period was for increasing organic nitrogen concentrations when analyses were discontinued in 1982. The maximum concentration of 4.7 mg/L in the sample collected at 0.2 depth in August of 1982 was very large.

The nitrate nitrogen concentrations averaged 0.62, 0.33 and 0.28 mg/L in the May, August and December periods. The maximum concentrations were 1.60, 0.90 and 0.90 mg/L for the three seasonal periods. The minimum concentrations were 0.25, 0 and 0 mg/L. As indicated by the seasonal average concentrations, there was a strong seasonal dependency in the nitrate concentrations with the average concentration in the May period being about double that in the August and December periods. The nitrate concentrations in the samples collected at 0.2 depth in the August period were usually small and relatively consistent. However, the nitrate in the samples collected at 0.8 depth were much larger. The trend in the December period was for variable nitrate concentrations with a general decreasing trend since 1984. The nitrate concentrations in the samples collected at 0.8 depth were usually larger than in the samples collected at 0.2 depth in the May period. The nitrate data are shown in Figures D91, D92 and D93.

Overall, the minimum, average and maximum Total Kjeldahl Nitrogen concentrations were 0.02, 0.52 and 4.7 mg/L. The average concentrations were 0.46, 0.75 and 0.38 mg/L in the May, August and December seasonal periods, respectively. The maximum concentrations were 1.20, 4.70 and 0.80 mg/L for the three seasonal periods. The data are shown graphically in Figures D94, D95 and D96. The trend was for the Total Kjeldahl Nitrogen concentrations to be seasonally dependent with the August period having the largest concentrations. However, the average concentration in the August period was influenced significantly by a peak concentration of 4.7 mg/L. This concentration was very large for lakes in Arkansas. However, the concentrations in the samples collected at both depths in the succeeding year were both small.

For total nitrogen the overall statistics were 0.16, 0.86 and 2.5 mg/L. The average concentrations were 1.06, 0.78 and 0.65 mg/L, respectively, in the May, August and December periods. The minimum concentrations were 0.72, 0.29 and 0.43 mg/L. The total nitrogen concentrations were variable for all three seasonal periods. The total nitrogen data are shown in Figures D97, D98 and D99.

<u>pH</u>. The seasonal data in the May, August and December periods are shown in Figures D100, D101 and D102. As indicated by the figures, the pH values were relatively uniform for each of the three seasonal periods. The pH values in the May and August periods were usually smaller in the samples collected at 0.2 depth than in the samples collected at 0.8 depth. The general trends were for the pH values to remain relatively constant over the period of record. That is, there were no trends of either increasing or decreasing

pH values as a function of time over the long-term. All of the pH values were within the standard for pH as established by the Arkansas Department of Pollution Control and Ecology. The minimum, average and maximum pH values for all of the data were 6.0, 7.4 and 8.5 units. The average seasonal pH values were 7.4, 7.6 and 7.3 units in the May, August and December periods. The maximum pH values were 8.0, 8.5 and 8.1 units in the May, August and December periods. The minimum pH values were 7.0, 6.4 and 6.1 units.

Phosphorous. Figures D103, D104 and D105 show the seasonal total phosphorous data in the May, August and December periods. The minimum, average and maximum concentrations, were 0.01, 0.04 and 0.61 mg/L for all of the data. The average concentrations were 0.04, 0.05 and 0.03 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.17, 0.61 and 0.10 mg/L for the three seasonal periods. The minimum seasonal total phosphorous concentrations were all 0.01 mg/L. The trend for all three seasons was for variable concentrations. All of the peak concentrations were larger than usual for large unpolluted lakes. The peak concentration in the August period of 0.61 mg/L was a particularly large concentration. The total phosphorous concentrations were usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth in the August period.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures D106, D107 and D108. The maximum orthophosphate concentration for all of the data was 0.09 mg/L. For the seasonal data, the maximum concentrations were 0.09, 0.05 and 0.06 mg/L in the May, August and December periods. The orthophosphate concentrations for the samples collected during all three seasonal periods were variable. They were more uniform in the August period than in the May and December periods. At times, the orthophosphate concentrations in the samples collected at 0.8 depth were significantly larger than in the samples collected at 0.2 depth in the December period.

Sulfate. Figures D109, D110 and D111 show the sulfate data for the Highway 12 sampling site. All of the sulfate concentrations were relatively small with the maximum concentration being 11 mg/L.

The stream standard for sulfate in the White River is 20 mg/L. Consequently, all of the sulfate concentrations were less than the applicable standard for the White River.

The minimum, average and maximum sulfate concentrations for all of the data were 1, 6.7 and 11.0 mg/L. The average concentrations were 7.6, 5.9 and 6.8 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 11.0, 10.0 and 10.0 mg/L for the three seasonal periods. The minimum concentrations were 5.0, 1.0 and 4.0 mg/L. The average seasonal concentrations indicated only small variations in concentration as a function of the season of the year. The long-term trends for all three seasonal periods were for variable sulfate concentrations. An apparent trend for increasing sulfate concentrations as a function of time appeared to have been developing in the December period at the time analyses were discontinued.

Temperature. Figures D112, D113 and D114 show the seasonal data in the May, August and December periods. The maximum temperature was 29.0 degrees Celsius which was less than the standard of 32 degrees Celsius for lakes in the Ozark Highlands Ecoregion. The average temperature was 13.1 degrees Celsius. The average seasonal temperature values were 12.6, 18.8 and 8.9 degrees Celsius. The maximum seasonal temperatures were 19.5, 29.0 and 11.5 degrees Celsius in the May, August and December periods, respectively. The minimum temperatures were 6.9, 8.5 and 5.0 degrees Celsius. The average temperatures were smaller than normal because they include the temperatures of the cold water below the thermocline.

Transparency. Figures D115, D116 and D117 show the transparency data in the May, August and December seasonal periods. The minimum, average and maximum transparencies were 10, 71 and 194 inches for all of the data. The minimum transparencies were 10, 56 and 34 inches, respectively, in the May, August and December periods. The average transparency values were 56, 105 and 63 inches for the three seasonal periods. The maximum transparency values were 120, 162 and 194 inches.

The transparency values in the May period have been variable. They usually exceed the recommended minimum of forty-eight inches for water used in primary contact recreation. However, there were four years in which the transparency values were much less than the desired minimum. The transparency values were very good in the August period. The minimum value was 56 inches which exceeded the recommended minimum. The transparency values were relatively uniform in the December period.

Turbidity. Figures D118, D119 and D120 show the turbidity data for the Highway 12 site. The standard for Beaver Lake is 25 NTU for turbidity. All of the turbidity values in the August period data were much smaller than the standard. The turbidity values in the samples collected at 0.2 depth were uniform and very small in the August period. The turbidity values in the samples collected at 0.8 depth were usually small in the August period. The turbidity values in the May period were usually small but peak values in 1986 and 1990 substantially exceeded that standard. The maximum turbidity value was 59 FTU in the May period which was quite large. Except for the samples collected at 0.2 and 0.8 depths in 1985, the turbidity values were relatively small in the December period. The peak concentration was large at 60 FTU.

The minimum, average and maximum turbidities were 0.5, 8.0 and 60 FTU for all of the data. The average turbidity values were 9.7, 3.3 and 9.7 FTU, respectively, in the May, August and December periods. The maximum values were 59, 20 and 60 FTU for the three seasonal periods. The quality of the water at this site was usually good with respect to turbidity.

Station Number 5 (Monte Ne Site). The statistical analyses are summarized in Tables XXI, XXII and XXIII. The results of the graphical analyses are included in Figures E1 through E63 in Appendix E.

Alkalinity. The minimum and maximum alkalinity concentrations were 32 and 130 mg/L. The overall average concentration was 66 mg/L. The average seasonal total alkalinity concentrations were 50, 58 and 95 mg/L in the May, August and December periods, respectively. The maximum concentrations were 88, 94 and 130 mg/L for the three seasonal periods. The minimum concentrations were 32, 47 and 58 mg/L. The total alkalinity data are shown in Figures E1, E2 and E3. As shown by Figure E1, the total alkalinity concentrations were relatively uniform in the May period. There was an apparent tendency for slightly increasing alkalinity concentrations as a function of time for this period. Except for one peak concentration, the trend in the August period was for nearly uniform alkalinity concentrations. The pattern in the December period was for variable concentrations as a function of time.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.5, 1.6 and 3.0 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 1.9, 1.7 and 1.1 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 3.0, 2.6 and 1.6 mg/L for the three seasonal periods. The minimum concentrations were 0.7, 1.2 and 0.5 mg/L.

The data are shown graphically in Figures E4, E5 and E6. As shown by Figure E4, the five-day biochemical oxygen demand concentrations were variable in the May period. They were also variable in the August period. As shown in Figure E6, the general trend was for decreasing five-day biochemical oxygen demand concentrations as a function of time.

The five-day biochemical oxygen demand data for the Monte Ne site were about average for lakes in Arkansas. There were no indications of trouble with respect to this parameter.

Chloride. Only four chloride concentrations were reported for the Monte Ne site. The minimum, average and maximum concentrations for all of the data were 3, 5.2 and 9.0 mg/L. These chloride concentrations were very small compared with the recommended drinking water limit of 250 mg/L and were less than the applicable standard for the White River which is 20 mg/L.

Chlorophyll a. Figures E7, E8 and E9 show the chlorophyll a data plotted as a function of time. The minimum, average and maximum chlorophyll a concentrations for all of the data were 1.2, 5.3 and 24.0 micrograms per liter. The average chlorophyll a concentrations were 5.8, 6.3 and 4.5 micrograms per liter in the May, August and December periods, respectively. The maximum concentrations were 24.0, 16.0 and 8.0 micrograms per liter. As indicated by Figures E7, and E8, peak concentrations occurred during the May and August periods. The peak concentrations were relatively large which indicated substantial algal biomass was developed during these periods. In the May period, the chlorophyll a concentrations varied somewhat but were fairly constant except for the peak concentration in 1987. In the August period, the chlorophyll a concentrations increased from 1984 until 1986 when a peak was established. Following 1986, the concentrations steadily decreased. The trend was for more uniform concentrations in the December period. Although the chlorophyll a concentrations in the most recent samples were relatively small, the peak concentrations reported in prior years strongly suggested that careful monitoring be conducted at this site. The chlorophyll a concentrations were above the upper end of the range usually associated with mesotrophic lakes on several occasions.

Chlorophyll b. The patterns for the chlorophyll a concentrations were duplicated for the chlorophyll b concentrations at this site. That is, peak concentrations were reached in the August period of 1986 and the May period of 1987 which were large. Following the peak concentration in 1986 in the August period, the chlorophyll b concentrations have steadily decreased. The concentrations in the May period were a little more variable than for the chlorophyll a concentrations for this period. However, the chlorophyll b concentrations have been quite small since the peak concentration in 1987. The trend was for more uniform chlorophyll b concentrations in the December period. The chlorophyll b data are shown in Figures E10, E11 and E12.

The average chlorophyll b concentrations were 0.6, 0.7 and 0.2 micrograms per liter, respectively in the May, August and December periods. The maximum concentrations were 2.2, 2.3 and 0.4 micrograms per liter for the three seasonal periods. The minimum concentrations were 0.1 microgram per liter for all three seasonal periods. The average chlorophyll b concentrations indicated a significant seasonal dependency which would be expected. However, the magnitudes of the peak concentrations strongly suggested that future activity be carefully monitored at this site.

Color. Figures E13, E14 and E15 show the color data for the May, August and December seasonal periods. The maximum concentration was 240 units which was very large. Although the maximum color concentration in the May period was 240 units, only on two occasions did the color concentrations exceed the rule of thumb value of 50 units as a maximum concentration. The data in the May period have been variable particularly in the past six years. This was troublesome both because the concentrations have been larger in the past six years than in most prior years and because the very large concentration occurred in the most recent sample (1990). The color concentrations were relatively uniform and small in the August period. No trend for either long-term increasing or decreasing concentrations were evident in the August period. The concentrations in the December period were also small and nearly uniform except for a peak concentration of 70 units which occurred in the sample collected in 1985.

The average color concentrations were 34, 5.1 and 10.6 units, respectively, in the May, August and December periods. The maximum color concentrations were 240, 10 and 70 units for the three seasonal periods. The minimum concentrations were 1, 0 and 0 units.

<u>Conductivity</u>. Figures E16, E17 and E18 show the data in the May, August and December seasonal periods. As shown by these figures, the conductivity values in the lake at the Monte Ne site were moderate. The minimum, average and maximum conductivity values were 101, 159 and 260 micromhos per centimeter for all of the data in the record. The average conductivity values were 141, 138 and 194 micromhos per centimeter, respectively, in the May, August and December periods. These average values indicated a strong seasonal dependency with the values being considerably larger in the December period. The maximum conductivity values were 203, 190 and 245 micromhos per centimeter for the three seasonal periods. The minimum values were 101, 116 and 133 micromhos per centimeter.

The conductivity data were variable for all three seasonal periods, but were more uniform in the August period than the May and December periods. No long-term trends for increasing or decreasing conductivity values were evident from the data.

<u>Reservoir Depth</u>. Figures E19, E20 and E21 show the depth of water in the reservoir at the Monte Ne site for the three sets of seasonal data. As shown by the figures, the depths at the site varied significantly as a function of the season of the year.

Dissolved Oxygen. The seasonal data are shown in Figures E22, E23 and E24. The minimum, average and maximum concentrations for all of the data were 5.9, 9.5 and 12.5 mg/L. The average dissolved oxygen concentrations were 9.5, 8.4 and 10.3 mg/L, respectively, in the May, August and December periods. The minimum dissolved oxygen concentrations were 5.9, 7.4 and 8.9 mg/L for the three seasonal periods. The maximum concentrations were 12.0, 9.2 and 12.5 mg/L.

Except for the sample collected in 1978 in the May period, the water had a more than adequate supply of dissolved oxygen for all three seasonal periods. The dissolved oxygen concentration in the May period sample in 1978 was 5.9 mg/L. The general trends in the May and August periods were for the dissolved oxygen concentrations to remain about constant over the length of the record. A trend for increasing concentrations was evident in the December period as a function of time. The dissolved oxygen concentrations, expressed as a percentage of the saturation value, are shown in Figures E25, E26 and E27 in the May, August and December sampling periods.

Fecal Coliform. The minimum, average and maximum fecal coliform counts for all of the data in the record were 0, 24 and 370 colonies per 100 mL. The average fecal coliform counts were 16, 21 and 50 colonies per 100 mL, respectively, in the May, August and December periods. The maximum counts were 140, 150 and 370 colonies per 100 mL. The minimum counts were all zero. The fecal coliform data are shown in Figures E28, E29 and E30.

Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. All of the fecal coliform counts were less than the limit for primary contact recreation. The maximum counts were, however, larger than at the Highway 12 and Eureka Springs sites.

The trend in the May period was for relatively small fecal coliform counts with the exception of one peak concentration of 140 colonies per 100 mL. The same trend also was evident in the August period except the peak concentration was 150 colonies per 100 mL. The trend in the December period was also for relatively small counts except that two peaks were present in the data. The standard for the winter months is 1,000 colonies per 100 mL. Consequently, all of the fecal coliform counts were less than the applicable standard.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures E31, E32 and E33 for the Monte Ne site. The minimum, average and maximum total hardness concentrations for all of the data were 18, 74 and 132 mg/L (expressed as calcium carbonate). The average concentrations were 66, 63 and 84 mg/L in the

May, August and December periods, respectively. The maximum concentrations were 130, 77 and 132 mg/L for the three seasonal periods. The minimum concentrations were 18, 52 and 59 mg/L. The general trend in the May period has been for decreasing total hardness concentrations as a function of time. The data in the May period was characterized by having a large range of concentrations. The trend has been for nearly uniform concentrations in the August period with a trend of slightly decreasing concentrations as a function of time. Following a peak concentration in 1975, the total hardness concentrations in the samples collected during the December period have been relatively constant.

The calcium data are shown in Figures E34, E35 and E36. The minimum, average and maximum calcium concentrations were 12, 70 and 120 mg/L, respectively, for all of the data. The average concentration in the May period was 61 mg/L with the range from 12 to 120 mg/L. In the August period, the calcium concentrations ranged from 50 to 82 mg/L with the average being 62 mg/L. The average concentration in the December period was 84 mg/L. The minimum and maximum calcium concentrations were 52 and 120 mg/L in the December period. A general trend for decreasing calcium concentrations as a function of time was evident in the May period. The most recent sample was collected in 1983. No long-term trends of increasing or decreasing concentrations were evident in the August period. The data in the December period indicated a decreasing trend from 1975 until 1981. The average concentrations were 61, 62 and 84 mg/L in the May, August and

December periods which indicated a strong seasonal dependency with the concentrations usually being larger in the December period.

The dissolved calcium data are shown in Figures E37, E38 and E39. The minimum, average and maximum dissolved calcium concentrations were 4.7, 27 and 49 mg/L for all of the data. The average concentrations were 22, 24 and 31 mg/L, respectively, in the May, August and December periods. These average concentrations also indicated a significant seasonal dependency. The maximum concentrations were 48, 33 and 41 mg/L. The minimum concentrations were 4.7, 19 and 21 mg/L. The trend in the May period was for variable dissolved calcium concentrations. The long-term trend in the August period was for slightly decreasing concentrations as a function of time. The data in the December period were also variable with no evidence for either increasing or decreasing concentrations as a function of time.

The dissolved magnesium data are shown in Figures E40, E41 and E42. For all data, the minimum, average and maximum concentrations were 1.1, 1.6 and 1.9 mg/L. The average concentrations were 1.4, 1.7 and 1.7 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 1.6, 1.9 and 1.9 mg/L for the three seasonal periods. The minimum concentrations were 1.1, 1.4 and 1.6 mg/L. The ranges in concentration were quite small. They were 0.5, 0.5 and 0.3 mg/L. There was little magnesium in the water at the Monte Ne site. The general trends seem to be for slightly decreasing magnesium concentrations for all three seasonal periods at this site. However, the actual changes in concentration were very small because the magnesium concentrations are small.

The noncarbonate hardness concentrations ranged from 2 to 88 mg/L for all of the data. The average concentration in the May period was 41 mg/L with the range being from 12 to 88 mg/L. In the August period, the concentrations ranged from 18 to 30 mg/L with the average being 24 mg/L. The minimum, average and maximum concentrations in the December period were 9, 10 and 11 mg/L. Only eleven noncarbonate hardness concentrations were reported for this site.

<u>Nitrogen</u>. Figures E43, E44 and E45 show the data for nitrate nitrogen at the Monte Ne site in the May, August and December periods. As shown by the figures, the nitrate concentrations were larger in the samples collected in the December period than in either the May or August period. The trend in the August period was for nearly constant and small nitrate concentrations. The trend in the May period was for more variation in the data but no long-term trend for either increasing or decreasing concentrations was evident from the data. The trend in the December period was for larger concentrations with a general trend of decreasing concentrations as a function of time.

The maximum nitrate nitrogen concentration for all of the data was 1.60 mg/L which was relatively large. For the seasonal data, the average concentrations were 0.57, 0.09 and 1.08 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.90, 0.10

and 1.60 mg/L for the three seasonal periods. The minimum concentrations were 0.40, 0.04 and 0.26 mg/L.

pH. Figures E46, E47 and E48 show the pH values in the May, August and December periods. As shown by these figures, the pH values were all within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. These limits are a minimum pH of 6 and a maximum pH of 9 units. The minimum, average and maximum pH values were 6.3, 7.8 and 9.0 units for all of the data. In the May period, the minimum, average and maximum pH values were 7.3, 7.9 and 9.0 units. The minimum, average and maximum pH values in the August period were 7.6, 8.3 and 8.7 units. The minimum, average and maximum pH values were 6.3, 7.4 and 7.9 units in the December period. The average seasonal pH values were 7.9, 8.3 and 7.4 units which indicated a substantial seasonal variation in the pH values. As shown by Figures E46, E47 and E48, there were small variations in pH values as a function of time. The general trends in the August and December periods were for slightly increasing pH values as a function of time. The long-term trend in the May period was for the pH values to stay about the same.

Phosphorous. Figures E49, E50 and E51 show the total phosphorous data in the May, August and December periods, respectively. The minimum, average and maximum concentrations, respectively, were 0.01, 0.04 and 0.18 mg/L for all of the data. The average concentrations were 0.05, 0.03 and 0.03 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.18, 0.04 and 0.06

mg/L which indicated a strong seasonal dependency with the concentrations being significantly greater in the May period than in either the August or December period. The average in the May period was influenced by the large peak concentration of 0.18 mg/l in the sample collected in 1990. The trends in the August and December period were for fairly uniform and normal total phosphorous concentrations.

The orthophosphate data in the May, August and December periods are shown in Figures E52, E53 and E54. Except for one orthophosphate concentration in a sample collected in the May period of 1990, the orthophosphate concentrations were fairly uniform. This peak concentration was very large at 0.10 mg/L. The trends in the August and December periods were for relatively constant orthophosphate concentrations as a function of time. The trend in the May period was for relatively constant orthophosphate concentrations except for the peak concentration. The peak concentration coincided with the large peak total phosphorous concentration in the May period.

Temperature. Figures E55, E56 and E57 show the seasonal data in the May, August and December periods. The minimum, average and maximum temperatures were 5.5, 18.4 and 30.5 degrees Celsius for all of the data. The average seasonal temperature values were 20.1, 28.3 and 8.5 degrees Celsius in the May, August and December periods. The minimum temperatures were 17.3, 27.0 and 6.0 degrees Celsius for the three seasonal periods. The maximum temperatures were 24.5, 30.5 and 10.5 degrees Celsius.

Transparency. Figures E58, E59 and E60 show the transparency data for the Monte Ne site. The minimum, average and maximum transparency values were 6, 44 and 74 inches for all of the data. The maximum transparency values for the seasonal data were 66, 72 and 74 inches in the May, August and December periods. The minimum transparency values were 6, 36 and 12 inches for the three seasonal periods. The average transparency values were 37, 58 and 43 inches. The transparency values varied considerably as a function of time for all three periods. At times, the clarity of the water was very good. However, at other times, the transparencies were significantly less than the desired minimum of forty-eight inches. There were no long-term trends for either increasing or decreasing transparency values.

Turbidity. Figures E61, E62 and E63 show the turbidity data for the Monte Ne site. The minimum, average and maximum turbidity values were 0.9, 8.2 and 84 FTU for all of the data. The maximum turbidity values for the seasonal data were 84, 15 and 59 FTU in the May, August and December periods. The minimum turbidity values were 2.6, 0.9 and 1.0 FTU. The average turbidity values were 11.9, 3.6 and 7.8 FTU. The turbidity values in the May period were usually fairly constant and small. The one exception was a large turbidity value of 84 FTU in the 1990 sample. This value greatly exceeded the standard of 25 NTU for Beaver Lake. The trend in the August period was for usually small turbidity values. All were less than the applicable standard. The general trend in the December period was also for small and nearly uniform turbidity values. The exception was the sample collected in 1985 which had a turbidity value of 59 FTU also much larger than the standard for the lake.

Station Number 6 (War Eagle Site). The statistical analyses are summarized in Tables XXIV, XXV and XXVI. The results of the graphical analyses are included in Figures F1 through F63 in Appendix F.

Alkalinity. The minimum and maximum alkalinity concentrations were 39 and 124 mg/L. The overall average concentration was 79 mg/L. The average seasonal total alkalinity concentrations were 69, 93 and 74 mg/L. The average concentrations indicated a strong seasonal dependency with the alkalinity concentrations being larger during the August period. This was a departure from the data for some of the other sites in the lake. The maximum concentrations were 94, 120 and 118 mg/L for the three seasonal periods. The minimum concentrations were 53, 56 and 40 mg/L. As indicated by these data and by Figures F1, F2 and F3, the total alkalinity concentrations were generally larger during the August period than during the May and December periods. The general trend in the May period was for variable alkalinity concentrations as a function of time. The general trends in the August and December periods were also for variable total alkalinity concentrations.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.2, 1.4 and 5.7 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 1.4, 2.0 and 1.0 mg/l, respectively, in the May, August and December periods. The maximum concentrations were 2.4, 5.7 and 2.5 mg/L for the three seasonal periods. The minimum concentrations were 0.7, 0.3 and 0.2 mg/L. The data are shown graphically in Figures F4, F5 and F6. The five-day biochemical oxygen demand concentrations varied considerably in the May period. However, no long-term trend for either increasing or decreasing concentrations was evident. They were variable in the August period with two peak concentrations which are troublesome. The two peak concentrations were unusually large for a lake in Arkansas. The trend was for relatively small and fairly uniform five-day biochemical oxygen demand concentrations in the December period.

Chloride. Only four chloride concentrations were reported for the War Eagle site. The minimum, average and maximum concentrations for all of the data were 3.0, 5.8 and 7.0 mg/L. All of the chloride concentrations were well below the stream standard of 20 mg/L for the White River.

Chlorophyll a. Figures F7, F8 and F9 show the chlorophyll a data plotted as a function of time. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.1, 3.4 and 11.0 micrograms per liter. The average chlorophyll a concentrations were 2.9, 7.2 and 0.7 micrograms per liter, respectively, in the May, August and December periods. The maximum concentrations were 8.7, 11.0 and 2.2 micrograms per liter for the three seasonal periods.

The minimum concentrations were 0.7, 3.5 and 0.1 micrograms per liter.

The average concentrations indicated a significant seasonal variation which would be expected. A general trend for increasing chlorophyll a concentrations in the May period was evident. The trend was for relatively large concentrations in the August period with the concentration decreasing as a function of time. The trend in the December period was for relatively small and fairly consistent chlorophyll a concentrations. The chlorophyll a concentrations indicated the lake is in the mesotrophic stage at this site.

Chlorophyll b. The minimum, average and maximum chlorophyll b concentrations for all of the data in the record were 0.1, 0.2 and 1.2 micrograms per liter. The maximum concentrations were 1.1, 1.2 and 0.1 micrograms per liter. The chlorophyll b concentrations in all of the samples collected during the December period were 0.1 microgram per liter. The average concentrations were 0.2, 0.5 and 0.1 micrograms per liter. The chlorophyll b data are shown in Figures F10, F11 and F12. The chlorophyll b data in the May period have usually been constant. In the August period, an unusually large concentration of 1.20 micrograms per liter occurred in 1986. The chlorophyll b concentrations have been decreasing since this peak concentration. The chlorophyll b concentrations were relatively uniform in the May period except for an unusually large concentration of 1.10 micrograms per liter in the sample collected in 1989.

Color. Figurés F13, F14 and F15 show the color data for the three seasonal sampling periods The color data for all three seasonal periods were variable. The data were the most uniform in the May period. However, two peak concentrations were reported in the May period. The largest was 40 units. All of the color concentrations in the seasonal periods were less than the rule of thumb maximum value of 50 units.

The minimum, average and maximum color concentrations for all of the data were 0, 9.9 and 55 units. For the May period, the minimum, average and maximum concentrations were 0, 7.8 and 40 units. The minimum, average and maximum concentrations were 0, 8.1 and 35 units in the August period. The minimum, average and maximum concentrations for the December period were 4, 12.3 and 35 units.

Conductivity. Figures F16, F17 and F18 show the conductivity data in the May, August and December seasonal periods. The minimum, average and maximum conductivity values were 100, 181 and 293 micromhos per centimeter for all of the data in the record. The average conductivity values were 158, 219 and 172 micromhos per centimeter, respectively, in the May, August and December periods. The average values indicated a substantial seasonal dependency. The maximum values were 212, 276 and 293 micromhos per centimeter. The minimum values were 102, 160 and 106 micromhos per centimeter.

There were variations as a function of time in the conductivity values for all three seasonal periods. However, the overall trend was for the conductivity values to remain about the same in the May and August periods. A trend for decreasing conductivity values was evident in the December period. However, the conductivity value in the sample collected in 1990 was larger than any value in prior years.

Reservoir Depth. Figures F19, F20 and F21 show the depth of water in the reservoir at the War Eagle site for the three sets of seasonal data. As shown by the figures, the depth of water at this site varied considerably in all three seasonal periods and was quite small at times.

Dissolved Oxygen. The seasonal data are shown in Figures F22, F23 and F24. The minimum, average and maximum concentrations for all of the data were 6.0, 9.5 and 14.6 mg/L. The average dissolved oxygen concentrations were 8.7, 7.7 and 11.5 mg/L in the May, August and December periods, respectively. The minimum concentrations were 7.7, 6.0 and 9.8 mg/L for the three seasonal periods. The maximum concentrations were 9.7, 8.5 and 13.1 mg/L. The long-term trends in the May and August periods were for the dissolved oxygen concentrations to stay about the same. A general trend for slightly increasing concentrations as a function of time was evident in the December period.

The dissolved oxygen data indicated the water was well aerated at this site and the concentrations were adequate for aquatic life. The dissolved oxygen concentrations, expressed as percent of saturation, are shown in Figures F25, F26 and F27 in the May, August and December sampling periods.

Fecal Coliform. The minimum, average and maximum fecal coliform counts for all of the data were 3, 131 and 1,500 colonies per 100 mL. The maximum counts were 400, 1,500 and 450 colonies per 100 mL in the May, August and December periods, respectively. The average counts were 111, 243 and 110 colonies per 100 mL for the three seasonal periods. The minimum counts were 28, 10 and 4 colonies per 100 mL. The fecal coliform data are shown in Figures F28, F29 and F30.

Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. The fecal coliform counts were within the limit for primary contact recreation in the May and August periods except for one sample in each period. The peak concentrations were 400 and 1,500 colonies per 100 mL in the May and August periods. The fecal coliform concentrations were always less than the applicable standard of 1,000 colonies per 100 mL in the December period. The general trends in the May and August periods were for significant concentrations much of the time with the peak concentrations exceeding the standard. The trend in the December period has been for variable fecal coliform counts, but the counts have been relatively small since 1985.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures F31, F32 and F33 for the War Eagle site. As shown by these figures, the total hardness concentrations in the samples collected were moderate. The minimum, average and maximum total hardness concentrations for all of the data were 14, 81 and 132 mg/L (expressed as calcium carbonate). For the May period, the minimum, average and maximum concentrations were 14, 64 and 86 mg/L. The minimum, average and maximum concentrations in the August period were 71, 96 and 130 mg/L. In the December period, the minimum, average and maximum concentrations were 50, 73 and 99 mg/L. The general trend in the May period was for somewhat variable total hardness concentrations but with an apparent long-term trend of slightly decreasing concentrations. The trend in the August period was also variable with no long-term trend for either increasing or decreasing concentrations. In the December period, the general trend was also for decreasing concentrations as a function of time.

The calcium data are shown in Figures F34, F35 and F36. As shown by Figure F34, the calcium concentrations have generally been decreasing in the May period. They have been variable in the May and August periods. The minimum, average and maximum calcium concentrations were 8, 76 and 124 mg/L for all of the data. The concentrations in the May period ranged from 8 to 80 mg/L with an average concentration of 55 mg/L. The average concentration in the August period was 93 mg/L with the range being from 70 to 118 mg/L. In the December period, the average concentration was 72 mg/L with the data ranging from 50 to 90 mg/L. Thus, the average seasonal concentrations were 55, 93 and 72 indicating a strong seasonal dependency. The minimum concentration of 8 mg/L in the sample collected in the May period of 1981 was unusually small.

The dissolved calcium data are shown in Figures F37, F38 and F39. The general trend in the May period was for some variation in the dissolved calcium concentrations as a function of time. There may have been a trend developing for increasing concentrations as a function of time in the May period. The data in the August and December periods were variable with no clear cut trend for either increasing or decreasing concentrations over the long-term. The minimum, average and maximum concentrations were 3.1, 30 and 47 mg/L for all of the data. The average concentrations were 25, 38 and 30 mg/L, respectively, in the May, August and December periods. The average concentrations indicated a strong seasonal dependency with the dissolved calcium concentrations usually greater in the August period than in either the May or December periods. The maximum concentrations were 36, 47 and 46 mg/L. The minimum concentrations were 3.1, 28 and 20 mg/L.

The dissolved magnesium data are shown in Figures F40, F41 and F42. The dissolved magnesium data were nearly constant in the May period with the long-term trend being for the dissolved magnesium concentrations to stay about the same. The dissolved magnesium concentrations may have been decreasing slightly in the August period and have been smaller since 1981 in the December period than in prior years.

The minimum, average and maximum concentrations for all of the data were 1.4, 1.7 and 2.6 mg/L. The average concentrations were 1.6, 1.9 and 1.9 mg/L in the May, August and December periods. The maximum concentrations were 1.7, 2.2 and 2.6 mg/L. The minimum concentrations were 1.4, 1.7 and 1.6 mg/L.

Limited noncarbonate hardness data were available at this site. The minimum, average and maximum concentrations for all of the data were 0, 11 and 25 mg/L. The average concentrations were 9.3, 8.0 and 13 mg/L in the May, August and December periods, respectively. The maximum concentrations were 19, 16 and 15 mg/L for the three seasonal periods.

<u>Nitrogen</u>. Figures F43, F44 and F45 show the data for nitrate nitrogen for the War Eagle site in the May, August and December periods. The maximum nitrate nitrogen concentration for all of the data was 1.70 mg/L. For the seasonal data, the minimum, average and maximum concentrations were 0.50, 0.72 and 0.90 mg/L in the May period. In the August period, the minimum, average and maximum concentrations were 0.30, 0.69 and 1.10 mg/L. In the December period, the minimum, average and maximum concentrations were 0.96, 1.21 and 1.70 mg/L. Thus, the average seasonal concentrations were 0.72, 0.69 and 1.21 mg/L which indicated substantial seasonal variation. These were also relatively large nitrate concentrations for lakes in Arkansas. The data in the May period generally indicated a trend for increasing nitrate

concentrations as a function of time. The data were variable for the August and December periods.

<u>pH</u>. Figures F46, F47 and F48 show the pH values for the May, August and December periods. As shown by these figures, the pH values were always within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. The minimum, average and maximum pH values were 6.1, 7.6 and 8.1 units for all of the data. In the May period, the minimum, average and maximum pH values were 7.1, 7.6 and 8.0 units. The minimum, average and maximum pH values in the August period were 7.2, 7.7 and 8.1 units. The minimum, average and maximum pH values were 6.1, 7.5 and 8.1 units in the December period. The average seasonal pH values were 7.6, 7.7 and 7.5 units which indicated little variation in the average values as a function of the season of the year. As shown by Figures F46, F47 and F48, there were usually only slight variations in pH values as a function of the time. The trends for all three seasonal periods were for the pH values to stay about the same over the long-term.

<u>Phosphorous</u>. Figures F49, F50 and F51 show the total phosphorous data in the May, August and December periods, respectively. The minimum, average and maximum concentrations were 0.01, 0.05 and 0.25 mg/L for all of the data. The average concentrations were 0.04, 0.08 and 0.03 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.16, 0.25 and 0.05 mg/L. The minimum concentrations were 0.01, 0.02 and 0.01 mg/L. The

trend in the May period was for fairly constant total phosphorous concentrations except for the peak concentration of 0.16 mg/L in the most recent sample which was collected in 1990. The trend in the August period was for relatively constant concentrations except for a large peak concentration of 0.25 mg/L in the sample collected in 1985. The trend was for smaller concentrations in the December period.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures F52, F53 and F54. All of the orthophosphate concentrations were reported as 0.01 mg/L in the May period. Consequently, the trend was for very consistent orthophosphate concentrations for this period. The trend in the August period was for nearly constant concentrations except for a peak concentration in 1985. The trend in the December period was for relatively small concentrations. The average concentrations were 0.01, 0.05 and 0.02 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.01, 0.21 and 0.03 mg/L.

Temperature. Figures F55, F56 and F57 show the seasonal data in the May, August and December periods. The minimum, average and maximum temperatures were 4.0, 16.7 and 29.0 degrees Celsius for all of the data. The average seasonal temperature values were 18.7, 25.8 and 7.1 degrees Celsius in the May, August and December periods. The minimum temperatures were 16.0, 22.5 and 4.0 degrees Celsius in the May, August and December periods. The maximum temperatures were 21.0, 29.0 and 10.0 in the May, August and December periods.

Transparency. Figures F58, F59 and F60 show the transparency data for the War Eagle site. The minimum, average and maximum transparency values were 0, 28 and 72 inches for all of the data. The maximum transparencies for the seasonal data were 72, 48 and 72 inches in the May, August and December periods. The minimum transparency values were 10, 0 and 4 inches for the three seasonal periods. The average transparency values were 32, 22 and 32 inches. The transparency values have been variable for all three seasonal periods. The general trend in the May period was for the transparency values to be less than the desired minimum of forty-eight inches for water used in primary contact recreation activities. The transparency values were usually small in the August period with the maximum value being 48 inches. The transparency values were variable in the December period.

The clarity of the water at the War Eagle site was not as good as at other sites in the lake. It was generally not good with respect to safety for primary contact recreational activities.

Turbidity. Figures F61, F62 and F63 show the turbidity data for the War Eagle site. The minimum, average and maximum turbidity values were 1.1, 8.2 and 60 FTU for all of the data. The maximum turbidity values for the seasonal data were 30, 60 and 11 FTU in the May, August and December periods. The minimum turbidity values were 1.1, 1.1 and 1.5 FTU in the May, August and December periods. The average turbidity values were 8.3, 9.4 and 5.1 FTU. In the May period, the trend was for variable turbidity values with the values exceeding the standard for Beaver Lake on two occasions. The turbidity values were usually relatively small in the August period. However, one peak concentration of 60 FTU greatly exceeded the standard. The trend was for relatively small turbidity values in the December period.

Station Number 7 (Goshen Site). The figures showing the data graphically for this site are included in Appendix G. Summaries of the statistical analyses are included in Tables XXVII, XXVIII and XXIX.

Alkalinity. The minimum, average and maximum total alkalinity concentrations were 12, 53 and 144 mg/L for all of the data. The average seasonal total alkalinity concentrations were 38, 85 and 36 mg/L in the May, August and December periods. The average concentrations indicated a strong seasonal dependency with the total alkalinity concentrations in the August period usually considerably larger than in the May and December periods. The total alkalinity concentrations in the May period were relatively small and variable as a function of time for this site. The long-term trend was for the total alkalinity concentrations to remain about the same level. The data in the August period were also variable with a range of 91 mg/L. The trend has usually been for smaller concentrations in recent years than in the 1963 to 1970 period. The alkalinity concentrations were relatively constant in the December period. There was no long-term trend for either increasing or decreasing concentrations as a function of time in the December period. The maximum concentrations were 62, 144 and 49 mg/L in the May, August and December periods. The minimum concentrations were 25, 53 and 28 mg/L. The data are shown in Figures G1, G2 and G3.

<u>Five-Day Biochemical Oxygen Demand</u>. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.2, 3.4 and 19.0 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 2.8, 4.6 and 2.7 mg/L in the May, August and December periods, respectively. The maximum concentrations were 5.4, 19.0 and 8.4 mg/L for the three seasonal periods. The minimum concentrations were 1.0, 0.5 and 0.2 mg/L. The data are shown graphically in Figures G4, G5 and G6.

The long-term trend in the May period was for the five-day biochemical oxygen demand concentrations to remain about the same level. There was considerable variation from year to year in the May period. The range was from 1.0 to 5.4 mg/L which was a larger than usual range for lakes in Arkansas. The five-day biochemical oxygen demand concentrations in the August period were also highly variable. The peak concentration of 19.0 mg/L was extremely large for lakes. However, it occurred many years ago and has not been repeated. The five-day biochemical oxygen demand concentrations were ordinarily larger than usual for lakes in Arkansas in the August period. The range was extremely broad in the August period ranging from 0.5 to 19.0 mg/L. The data for the December period were also variable with a larger than usual range. The range was from 0.2 to 8.4 mg/L for this period. In general, the five-day biochemical oxygen demand concentrations have usually been smaller since 1981 than in prior years. However, peak concentrations have occurred periodically since 1981.

The five-day biochemical oxygen demand concentrations in the August and December period were larger than usual for lakes in Arkansas. However, the concentrations have usually been smaller in recent years in the December period and have not worsened in the August period.

Chloride. The minimum, average and maximum chloride concentrations for all of the data were 2.0, 12 and 62 mg/L. The average concentrations were 5.7, 20 and 7.1 mg/L in the May, August and December periods, respectively. The average concentrations indicated a strong seasonal dependency. In fact, the average concentration in the August period equals the stream standard for the White River. The maximum concentrations were 28, 46 and 28 mg/L. The minimum concentrations were 2.0, 5.0 and 2.0 mg/L. The trend in the May period was for relatively uniform and small chloride concentrations except for a peak concentration of 28 mg/L in the sample collected in 1977. The trend in the August period was for the chloride concentrations to frequently exceed the stream standard of 20 mg/L for the White River. The overall trend has been for larger chloride concentrations in recent years than in most prior years in the August period. The trend in the December period has been for relatively uniform and small concentrations except for two peak concentrations. Both peaks exceeded the stream standard for the White River. The data are shown graphically in Figures G7, G8 and G9.

Chlorophyll a. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.2, 7.7 and 34.4 micrograms per liter, respectively. The average chlorophyll a concentrations were 3.1, 13.9 and 3.1 micrograms per liter, respectively, in the May, August and December periods. The minimum concentrations were 0.6, 7.5 and 0.2 micrograms per liter for the three seasonal periods. The maximum concentrations were 13.0, 18.0 and 16.0 micrograms per liter. As indicated by the seasonal averages, there was a significant seasonal influence with the May and August periods dominating which would be expected. The data are shown graphically in Figures G10, G11 and G12.

For the May period, the chlorophyll a concentrations were usually relatively small expect for a peak concentration in 1988 of 13.0 micrograms per liter. The peak concentration was relatively large. The trend in the August period was for large chlorophyll a concentrations. The concentrations in the two most recent samples were larger than the two prior samples. Consequently, the situation may have been worsening in the August period. The trend in the December period had been for small concentrations until the most recent sample was collected in 1990. The most recent sample had a chlorophyll a concentration of 16.0 micrograms per liter which was very large in the December period. Clearly, substantial algal biomass was present at this site in the August period and, on occasion, in the May and December periods. The chlorophyll a concentrations were above the upper end of the range usually associated with mesotrophic lakes on occasion.

Chlorophyll b. The average chlorophyll b concentrations were 0.3, 2.0 and 0.2 micrograms per liter, respectively, in the May, August and December periods. The minimum concentrations were all 0.1 micrograms per liter. The maximum concentrations were 0.9, 4.4 and 0.9 micrograms per liter for the three seasonal periods. The minimum, average and maximum chlorophyll b for all of the data were 0.1, 1.6 and 10.6 micrograms per liter.

The seasonal data are shown graphically in Figures G13, G14 and G15. As shown by Figure G13, the chlorophyll b concentrations have been increasing at this site and were characterized by a peak concentration of 0.9 micrograms per liter in the sample collected in 1988. The chlorophyll b concentrations have been increasing during the August period as well. The last two samples had chlorophyll b concentrations of 3.6 and 4.4 micrograms per liter which was very large. The trend in the December period was for constant and small concentrations until the most recent sample was analyzed. The sample collected in 1990 had a chlorophyll b concentration of 0.9 which was very large in the December period.

Color. Figures G16, G17 and G18 show the color data for the May, August and December sampling periods. As shown by the three figures, the color concentrations varied as a function of the season of the year and as a function of time.

The color concentrations have been large on occasions in both the May and December period. The general rule of thumb is that the color concentration should not exceed 50 units. The color concentrations have been variable in the May period and have been 50 units or larger on five occasions. One extremely large concentration of 240 units was reported in 1976 in the May period. The long-term trend in the August period has been for somewhat variable but relatively small color concentrations as a function of time. There was no long-term trend for either increasing or decreasing color concentrations. The long-term trend in the December period has been for generally smaller color concentrations since 1981 than in most prior years. The peak concentration was 110 units which was large. The color concentrations have equalled or exceeded 50 units on several occasions.

The average seasonal color concentrations were 35, 15 and 32 units, respectively, in the May, August and December periods. The average concentrations indicated a strong seasonal dependency. The maximum concentrations were 240, 35 and 110 units for the three seasonal periods. The minimum concentrations were 4, 5 and 0 units. The quality of the water in the lake at the Goshen site was marginal with respect to color in the August and December periods.

<u>Conductivity</u>. Figures G19, G20 and G21 show the data in the May, August and December seasonal periods. The average conductivity values were 111, 267 and 121 micromhos per cen-

timeter in the May, August and December periods, respectively. The maximum conductivity values were 353, 458 and 265 micromhos per centimeter. The minimum values were 65, 119 and 68 micromhos per centimeter. The seasonal averages indicated a strong seasonal influence with the conductivity values the largest in the August period. The data for the May period were relatively uniform with occasional peak concentrations. No long-term trend for either increasing or decreasing conductivity values was apparent in the May period. The conductivity values were highly variable in the August period with a very broad range. The range was from 119 to 458 micromhos per centimeter which yields a magnitude of 339 micromhos per centimeter. There was no long-term trend evident for either increasing or decreasing concentrations in the August period. Although somewhat variable, the data were more uniform in the December period than in the August period. There was no long-term trend for either increasing or decreasing conductivity values for this period.

Reservoir Depth. Figures G22, G23 and G24 show the depth of water at the time of sampling for each season. As shown by these figures, the depths of the water varied but were usually six feet or more.

Dissolved Oxygen. The seasonal dissolved oxygen data are shown in Figures G25, G26 and G27. The minimum, average and maximum concentrations for all of the data were 0.5, 7.8 and 14.6 mg/L. The average dissolved oxygen concentrations were 7.5, 5.2 and 10.2 mg/L, respectively, in the May, August and December periods. The minimum concentrations were 4.3, 2.0 and 3.6 mg/L. The dissolved oxygen concentrations were less than 6 mg/L on occasions in all three seasonal periods. The maximum concentrations were 10.0, 9.5 and 13.4 mg/L. The trend for the dissolved oxygen concentrations in the May period was for significant variation from year to year. The frequency of occurrence of dissolved oxygen concentrations less than 6 mg/L has decreased considerably. Only once since 1981 has the dissolved oxygen concentration been less than 6 mg/L. There was no long-term trend for either increasing or decreasing concentrations. The pattern in the August period was for variable and less than desirable dissolved oxygen concentrations. The average was 5.2 mg/L which indicates the dissolved oxygen concentration was usually less than 6 mg/L. There was no long-term trend for increasing or decreasing concentrations as a function of time in the August period. The dissolved oxygen concentrations were usually larger than 6 mg/L during the December period. Only on three occasions were the dissolved oxygen concentrations less than 6 mg/L in this period. The long-term trend was for the dissolved oxygen concentrations to stay about the same level in the December period. Dissolved oxygen concentrations plotted as a percent of saturation are shown in Figures G28, G29 and G30.

<u>Fecal Coliform</u>. Figures G31, G32 and G33 show the seasonal data plotted as a function of time in the May, August and December periods. The maximum fecal coliform counts were 1,400, 5,200 and 160 colonies per 100 mL. The

average fecal coliform counts were 222, 674 and 21 colonies per 100 mL. Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. For the period of the year from October 1 until March 31, the applicable standard is a geometric mean of 1,000 colonies per 100 mL and a maximum of 2,000 colonies per 100 mL in more than 10 percent of the samples taken in any 30-day period.

As indicated by these figures, the fecal coliform concentration exceeded the limit of 200 colonies per 100 mL on several occasions in the May and August periods. The general trend in the May period was for variable fecal coliform concentrations with periodic peak concentrations which cause some concern. In the August period, the fecal coliform counts were also variable with occasional peak concentrations which were excessive. The maximum concentration was 5,200 colonies per 100 mL in the August period which was very large. The trend in the December period was for usually small concentrations. None of the peak concentrations in the December period exceeded the limit of 1,000 colonies per 100 mL for primary contact recreation during the winter months. The average concentrations for both the May and August periods exceeded the limit for primary contact recreation. The average values were a little misleading because both were influenced by large peak concentrations. Clearly, the fecal coliform counts need to be monitored at this site for the protection of people engaged in primary contact recreation.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures G34, G35 and G36 for the Goshen site. As shown by these figures, the total hardness concentrations varied considerably both as a function of time and as a function of the season of the year. The average total hardness concentrations in the May, August and December periods, respectively, were 42, 91 and 52 mg/L (expressed as calcium carbonate). Thus, the average concentration in the August period was more than twice that in the May period. The maximum concentrations were 78, 140 and 100 mg/L for the three seasonal periods. The minimum concentrations were 6, 42 and 30 mg/L. The minimum, average and maximum concentrations for all of the data were 6, 61 and 140 mg/L. The general trend in the May period was for some variation in the total hardness concentrations as a function of time, but for the long-term trend for the total hardness staying about the same. Two very small total hardness concentrations were evident in the May period. The smallest was 6 mg/L which was unusually small for Beaver Lake. In the August period, the trend was for highly variable total hardness concentrations with the long-term trend being for hardness to stay about the same. The range was broad in the August period data extending from 42 to 140 mg/L which was a range of 98 mg/L. The data in the December period were also variable but the long-term trend was for the concentrations to stay about the same level.

The calcium data are shown in Figures G37, G38 and G39. The maximum calcium concentrations were 44, 100 and 68 mg/L (expressed as calcium carbonate) in the May, August and December periods. The average concentrations were 31, 64 and 42 mg/L for the three seasonal periods. The average concentrations did indicate substantial variation as a function of the season of the year. The minimum concentrations were 4, 44 and 25 mg/L. As shown in Figure G37, the calcium concentrations have generally tended to decrease as a function of time in the May period. Conversely, the data in the August period indicated a trend for increasing calcium concentrations as a function of time. The data in the December period have been variable with no trend evident for either increasing or decreasing calcium concentrations.

The dissolved calcium concentrations are shown in Figures G40, G41 and G42 in the May, August and December periods. The dissolved calcium concentrations were variable for the May period. The data were characterized by a trend for decreasing concentrations from 1978 until 1981 followed by a general trend for increasing concentrations. The data in the August period were variable with no long-term trend for either increasing or decreasing concentrations evident. The data were also variable in the December period. A suggestion of slightly increasing dissolved calcium concentrations was apparent from the data. The average concentrations were 13, 29 and 16 mg/L, respectively, in the May, August and

December periods. The maximum concentrations were 19, 40 and 27 mg/L. Both the average and maximum concentrations indicated a strong seasonal dependency.

The minimum, average and maximum dissolved magnesium concentrations were 1.0, 2.4 and 9.0 mg/L for all of the data. The average concentrations were 1.8, 3.6 and 2.2 mg/L in the May, August and December periods. The ranges were from 1.2 to 3.0, 2.3 to 9.0 and 1.0 to 4.0 mg/L in the May, August and December periods, respectively. The dissolved magnesium data are shown in Figures G43, G44 and G45. The trend in the May period was for relatively uniform and small magnesium concentrations. The long-term trend was for the concentrations to remain about the same level. The data were more variable in the August period, but the magnesium concentrations have been relatively constant since 1979. The general trend in the December period has been for slightly decreasing magnesium concentrations as a function of time.

The noncarbonate hardness concentrations ranged from 0 to 45 mg/L for all of the data. The overall average was 9.8 mg/L. The maximum noncarbonate hardness concentrations were 18, 29 and 34 mg/L, respectively, in the May, August and December periods. The data are shown in Figures G46, G47 and G48. The data were variable for all three seasonal periods. Trends for increasing noncarbonate hardness concentrations in recent years were evident in the August and December periods.

Metals. Figures G49, G50 and G51 show the seasonal data for aluminum. The maximum concentrations in the May, August and December periods were 740, 980 and 1,600 micrograms per liter. There is no maximum contaminant level for aluminum in drinking water. Similarly, there is no stream standard for aluminum. The average concentrations were 330, 370 and 500 micrograms per liter. These were moderately large aluminum concentrations for lakes in Arkansas. The range of concentrations were from 100 to 740, 160 to 980 and 200 to 1,600 micrograms per liter in the May, August and December periods, respectively. The trends for all three seasonal periods were for variable aluminum concentrations with occasional peak concentrations. The peak aluminum concentration of 1,600 micrograms per liter was relatively large, but not unprecedented, for lakes in Arkansas.

The maximum arsenic concentration was 15 micrograms per liter for all of the data. For reference purposes, the maximum contaminant level for arsenic in drinking water is 50 micrograms per liter. Consequently, the arsenic concentrations in the lake at this site would be considered acceptably small. The arsenic data are shown in Figures G52, G53 and G54. The trend in the May period has been for constant and small arsenic concentrations since 1983. The concentrations in the August period were more variable, but the overall trend was for the arsenic concentrations to stay about the same level. The trend in the December period has been for constant and small concentrations since 1983. The maximum arsenic concentrations were 6, 14 and 6 micrograms per liter, respectively, in the May, August and December seasonal periods.

The maximum chromium concentration for all of the data was 40 micrograms per liter. The maximum contaminant level for chromium in drinking water is 50 micrograms per liter. The maximum concentrations were 20, 40 and 20 micrograms per liter, respectively, in the May, August and December periods. These were excessive with respect to the protection of aquatic life. The chromium data are shown in Figures G55, G56 and G57. The average concentrations were 5, 4 and 5 micrograms per liter. The trend was for variable concentrations for all three seasonal periods. The peak concentration of 40 micrograms per liter occurred during the August period in 1982. The second largest concentration was 20 mg/l.

The copper data are shown graphically in Figures G58, G59 and G60 in the May, August and December periods. In larger concentrations, copper imparts an undesirable taste to water. Consequently, the recommended limit is 1 mg/L for drinking water. The maximum copper concentrations were 60, 63 and 26 micrograms per liter, respectively, in the May, August and December periods. The average concentrations were 13, 17 and 13 micrograms per liter. The average concentrations were larger than usual for lakes in Arkansas and the peak concentrations were too large. For protection of aquatic life, the copper concentrations should not exceed the 20 to 30 micrograms per liter range. The concentrations have been larger than 30 micrograms per liter on four occasions in the May period and two occasions in the August periods. These peak concentrations, however, occurred in the earlier years of the record. The general trends for the three seasonal periods have been for variable concentrations. The concentrations were in the 20 to 30 micrograms per liter range sufficiently often to cause concern. Continued monitoring is strongly suggested for this parameter at this site.

The minimum, average and maximum iron concentrations for all of the data were 180, 1,285 and 4,600 micrograms per liter. The average concentrations were 990, 1,110 and 1,180 micrograms per liter in the May, August and December periods, respectively. Although indicating a significant seasonal dependency, the iron concentrations were relatively large for all three periods. The data were variable for all three periods. As indicated by the average concentrations, the iron concentrations were usually larger than 500 micrograms per liter for all three periods. The maximum concentrations were 2,600, 4,100 and 3,100 micrograms per liter in the May, August and December periods. The minimum concentrations were 280, 180 and 470 micrograms per liter in the May, August and December periods. The were no long-term trends for either increasing or decreasing iron concentrations as a function of time. The iron data are shown in Figures G61, G62 and G63. As shown by these figures, iron usually exceeded the recommended limit of 300 micrograms per liter for iron in drinking water. The quality of the water in the lake at this site was not very good with respect to iron.

The maximum lead concentrations for the seasonal data were 16, 20 and 20 micrograms per liter in the May, August and December periods. The average concentrations were 3.1, 4.7 and 4.3 micrograms per liter. The seasonal lead data are shown graphically in Figures G64, G65 and G66 in the May, August and December periods, respectively. As shown by the three figures, the lead concentrations were relatively large on several occasions in the earlier years of the record. They have been relatively small, but variable, since 1980 in the May period. They have been relatively small since 1985 in the August and December periods. The lead concentrations were larger than the action level for lead in drinking water supplies during all three seasonal periods. However, the lead concentrations were usually within acceptable levels for the protection of aquatic life.

The recommended maximum contaminant level for manganese in drinking water is 0.05 mg/L. Figures G67, G68 and G69 show the seasonal data for manganese. The average concentrations were 150, 660 and 130 micrograms per liter indicating substantial variation as a function of the season of the year with the largest manganese concentrations occurring during the August period. The maximum concentrations were 330, 1,800 and 260 micrograms per liter, respectively, in the May, August and December periods. The overall trends in the May and December periods were for moderately large manganese concentrations. The trend in the August period was for large and highly variable manganese concentrations in the August period.

The mercury data are shown in Figures G70, G71 and G72 in the May, August and December periods, respectively. The maximum concentration was 1.0 microgram per liter which occurred in a sample collected in the December period in 1970. All other concentrations were 0.5 microgram per liter or less. The maximum mercury concentrations were 0.5, 0.5 and 1.0 micrograms per liter, respectively, in the May, August and December periods. The average concentrations were 0.14, 0.18 and 0.26 microgram per liter. All of the mercury concentrations were considerably less than the 20 micrograms per liter maximum contaminant level for drinking water. The mercury concentrations were usually within acceptable levels for the protection of aquatic life.

The maximum nickel concentrations were 11, 12, and 10 micrograms per liter in the May, August and December periods. These were small concentrations and were well within the levels necessary for the protection of aquatic life. The average nickel concentrations were 3.8, 6.8 and 6.3 micrograms per liter. The data were variable for all three periods. The nickel data are shown in Figures G73, G74 and G75.

The average seasonal potassium concentrations were 1.9, 3.6 and 1.6 mg/L in the May, August and December periods, respectively. The maximum seasonal concentrations were 5.9, 6.8 and 2.6 mg/L. The data are shown graphically in Figures G76, G77 and G78. Potassium at concentrations this small would not be considered a significant parameter by almost any ground or surface water quality scale. The overall trend in the May period was for nearly uniform potassium concentrations as a function of time with the exception of a peak concentration in a sample collected in 1977. The trend was for variable concentrations in the August period. The trend in the December period was for relatively constant and small potassium concentrations.

The recommended maximum contaminant level for zinc in public water supplies is 5 mg/L. For the seasonal data, the maximum concentrations were 110, 170 and 200 micrograms per liter. These maximum concentrations in the August and December periods were excessive for the protection of aquatic life. The average concentrations were 27, 37 and 41 micrograms per liter for the three seasonal periods. The data are shown graphically in Figures G79, G80 and G81. The trend in the May period has been for smaller zinc concentrations since 1982 than in most prior years. Except for a peak concentration in the sample collected in 1989, the zinc concentrations have been relatively small since 1982 for the August period.

Nitrogen. Figures G82, G83 and G84 show the data for un-ionized ammonia nitrogen data for the Goshen site for the May, August and December periods. As shown by Figure G82, the un-ionized ammonia concentrations were relatively constant and small in the May period. The trend in the August period was for highly variable un-ionized ammonia concentrations with a very large range. The range was from 0.0002 to

0.1100 mg/L which was very large for un-ionized ammonia nitrogen. In the December period, the trend has been for small and relatively constant un-ionized ammonia concentrations. The average concentrations were 0.0020, 0.0200 and 0.0023 mg/L, respectively, in the May, August and December periods. The average concentrations indicated a strong seasonal dependency. The maximum concentrations were 0.0100, 0.1100 and 0.0100 mg/L in the May, August and December periods. The maximum concentration of 0.1100 mg/L was very large.

The ammonia nitrogen concentrations are shown graphically in Figures G85, G86 and G87. The average concentrations were 0.21, 0.94 and 0.51 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.68, 6.00 and 2.70 mg/L in the May, August and December periods, respectively. The trend in the May period was for moderate and relatively uniform ammonia concentrations as a function of time. The ammonia concentrations were highly variable in the August period with a very large range. The range was from 0.00 to 6.00 mg/L which was an exceptionally large range. The maximum concentration of 6.00 mg/L was also exceptionally large. The pattern was for variable but smaller ammonia concentrations in the December period than the August period.

The organic nitrogen concentrations for the Goshen site are shown in Figures G88, G89 and G90. The general trend in the May period was for variable, but moderate, organic nitrogen concentrations as a function of time. The trend in the August period was for larger organic nitrogen concentrations with at least a suggestion of a trend for increasing concentrations as a function of time. The trend in the December period was also for variable organic nitrogen concentrations. However, the general trend has been for decreasing concentrations since 1980. The average organic nitrogen concentrations were 0.36, 1.08 and 0.54 mg/L in the May, August and December periods, respectively. The minimum concentrations were 0.03, 0.10 and 0.0 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.74, 1.80 and 1.40 mg/L.

The nitrate nitrogen data are shown in Figures G91, G92 and G93. The long-term trend in the May period was for the nitrate concentrations to remain about the same. The data were somewhat variable as a function of time. The data were highly variable in the August period ranging from 0.11 to 2.20 mg/L. The long-term trends in the August and December periods were for the nitrate nitrogen concentrations to remain about the same level. The trends for all three periods were for larger than usual nitrate concentrations. This was particularly true in the August period. The average concentrations were 0.53, 0.99 and 0.80 mg/L in the May, August and December periods, respectively. The maximum nitrate concentrations were 0.99, 2.20 and 1.80 mg/L. The average concentrations indicated a significant variation in concentration as a function of the season of the year with the nitrate concentrations being the largest in the August period.

The Total Kjeldahl Nitrogen data are shown graphically in Figures G94, G95 and G96. As shown by Figure G94, the overall trend was for relatively constant Total Kjeldahl Nitrogen concentrations as a function of time in the May period. The peak concentration of 4.40 mg/L in the sample collected in the May period of 1987 was remarkably large. The data in the August period indicated a substantial range in concentrations. Most of the data were relatively constant. However, unusually large peak concentrations occurred in the mid-1980's in the August period. The trend in the December period was for variable concentrations as a function of time, but with a long-term trend for the concentrations to remain about the same level. The average seasonal concentrations were 0.99, 2.00 and 0.84 mg/L in the May, August and December periods, respectively. The ranges of concentrations were 0.38 to 4.40, 0.58 to 6.70 and 0.10 to 1.70 mg/L, respectively, in the May, August and December periods.

The total nitrogen data are shown in Figures G97, G98 and G99. Except for the peak concentration in 1987, the overall trend in the May period was for relatively uniform nitrogen concentrations as a function of time. The overall trend in the August period was for variable total nitrogen concentrations. The trend in the December period was also for variable total nitrogen concentrations. The average seasonal concentrations were 1.47, 3.27 and 1.59 mg/L in the May, August and December periods, respectively. The maximum concentrations were 4.90, 7.00 and 2.90 mg/L for the three seasonal periods. The averages indicated a significant seasonal variation in the total nitrogen concentrations. The total nitrogen concentrations were larger than usual for lakes in Arkansas.

<u>pH</u>. Figures G100, G101 and G102 show the pH values for the May, August and December periods. As shown by these figures, the pH values were all within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. These limits are a minimum pH of 6 and a maximum pH of 9 units.

The minimum, average and maximum pH values were 5.8, 7.4 and 8.8 units for all of the data. The average pH values were 7.3, 7.5 and 7.4 units, respectively, in the May, August and December periods. The minimum pH values in the August period were 6.4, 6.5 and 6.7 units. The maximum pH values were 7.8, 8.2 and 8.1 units in the December period. As shown by Figures G100, G101 and G102, the variations in pH were relatively small. In general, the tendency was for the pH values to remain relatively constant over the period of record for all three seasonal periods.

<u>Phosphorous</u>. The minimum, average and maximum concentrations were 0.01, 0.65 and 6.80 mg/L for all of the data. The average concentrations were 0.28, 1.13 and 0.33 mg/L in the May, August and December periods, respectively. The maximum concentrations were 2.70, 2.60 and 1.50 mg/L for the three seasonal periods. As shown by Figures G103, G104 and G105, the total phosphorous concentrations were variable for all three periods. The figures and the average seasonal

values indicated a strong seasonal dependency. In the August period, the range of concentrations was extremely large extending from 0.05 to 2.60 mg/L. The total phosphorous data in the December have also been variable but with smaller concentrations than the August period. The data for all three seasonal periods indicated very large total phosphorous concentrations on numerous occasions at this site. These need to be carefully examined. Large unpolluted lakes generally have total phosphorous concentrations in the range from 0.01 to 0.05 mg/L.

A limited amount of total phosphate data were available for the Goshen site. The data are shown graphically in Figures G106, G107 and G108. The minimum, average and maximum concentrations for all of the data were 0.18, 3.41 and 14.0 mg/L. The average concentrations were 0.36, 2.23 and 1.14 mg/L, respectively, in the May, August and December periods.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures G109, G110 and G111. The maximum orthophosphate concentration for all of the data was 4.90 mg/L which was very large. For the seasonal data, the maximum concentrations were 0.49, 2.20 and 1.00 mg/L in the May, August and December periods. The long-term trend in the May period was for the orthophosphate concentrations to be large, but with no discernable trend for increasing or decreasing concentrations. The trend in the August period was for very large orthophosphate concentrations with the concentrations increasing as a function of time. The trend in the December period was also for relatively large orthophosphate concentrations. The concentrations have remained about the same since 1980 in the December period. Like the total phosphorous data, the orthophosphate concentrations have been very large to extremely large at the Goshen site.

Sulfate. The average sulfate concentrations were 9.4, 19 and 15 mg/L, respectively, in the May, August and December periods. The data are shown in Figures G112, G113 and G114. As shown by these figures, the sulfate concentrations were variable in the May period and highly variable in the August and December periods. The concentrations frequently exceed the stream standard of 20 mg/L for the White River. There were no long-term trends for either increasing or decreasing sulfate concentrations as a function of time. The maximum concentrations were 23, 51 and 41 mg/L, respectively, in the May, August and December periods.

Temperature. Figures G115, G116 and G117 show the seasonal data in the May, August and December periods. The minimum, average and maximum temperatures were 0, 16.5 and 30.0 degrees Celsius for all of the data. The average seasonal temperature values were 20.0, 26.6 and 6.9 degrees Celsius in the May, August and December periods. The minimum temperatures were 11.0, 21.0 and 1.0 degrees Celsius for the three seasonal periods. The maximum temperatures were 27.0, 30.0 and 14.0 in the May, August and December periods. The specific standard for temperature in Beaver Lake is 32 degrees Celsius. Consequently, all of the temperature values were less than the standard.

Transparency. Figures G118, G119 and G120 show the transparency data in the May, August and December seasonal periods. The minimum, average and maximum transparency values were 4, 26 and 216 inches for all of the data. The minimum values were 6, 12 and 4 inches, respectively, in the May, August and December periods. The average values were 21, 24 and 40 inches for the three seasonal periods. The maximum values were 42, 38 and 216 inches. The trends for all three seasonal periods have been for variable transparency values with the data being more uniform in the May period than in the August and December periods. A general trend for increasing transparency values as a function of time in the August period has existed since 1981. The transparency values in the May and August periods were considerably smaller than desired for water used in primary contact recreation. The recommended minimum transparency is forty-eight inches. The maximum transparency values were less than the recommended minimum for both the May and August periods. Clearly, the clarity of the water was not very good at the Goshen site with respect to the safety aspects of primary contact recreation.

Turbidity. Figures G121, G122 and G123 show the turbidity data for the Goshen site. The minimum, average and maximum turbidity values were 1.5, 23 and 120 FTU for all of the data. The maximum turbidity values for the seasonal data were 90, 60 and 120 FTU in the May, August and December periods. The minimum turbidity values were 1.5, 3.5 and 3.0 FTU in the May, August and December periods. The average turbidity values were 18.4, 19.6 and 32.7 FTU in the May, August and December periods. The specific standard for turbidity in Beaver Lake as established by the Arkansas Department of Pollution Control and Ecology is 25 NTU. As indicated by the figures, the stream standard was often exceeded at this site. In fact, the average turbidity of 32.7 FTU in the December period was more than 30 percent greater than the stream standard. The only sample which exceeded 25 FTU was collected at 0.8 depth in the August period of 1985. The general trend for all three seasonal periods was for variable, and usually large, turbidity values. The quality of the water was not good with respect to turbidity at the Goshen site.

Station Number 8 (Avoca Site). The figures showing the data graphically for this site are included in Appendix H. A summary of the statistical analyses are included in Tables XXX, XXXI and XXXII.

Alkalinity. The minimum, average and maximum total alkalinity concentrations were 36, 58 and 128 mg/L for all of the data. The average seasonal total alkalinity concentrations were 47, 52 and 75 mg/L in the May, August and December periods. The total alkalinity concentrations in the May period were relatively constant as a function of time. The long-term trend was for the concentrations to remain about the same level. The data were also relatively uniform in the August period with the long-term also being for the concentrations to remain about the same level. The data were variable in the December period, but no discernable trend for either increasing or decreasing concentrations was apparent. The maximum concentrations were 60, 60 and 128 mg/L in the May, August and December periods. The magnitudes of the ranges were 24, 18 and 83 mg/L, respectively, in the May, August and December periods. These ranges indicated the variability of the total alkalinity concentrations in the December period compared with the May and August periods. The data are shown in Figures H1, H2 and H3.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.4, 1.8 and 7.0 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 2.3, 1.5 and 1.1 mg/L in the May, August and December periods, respectively. The average concentrations indicated a significant seasonal dependency with the largest concentrations usually occurring in the May period. This tendency was not unusual. The maximum concentrations were 5.7, 2.7 and 2.0 mg/L for the three seasonal periods. The minimum concentrations were 0.9, 0.7 and 0.4 mg/L. The data are shown graphically in Figures H4, H5 and H6. The five-day biochemical oxygen demand concentration of 7.0 mg/L was unusually large for a lake with good water quality. It occurred in a sample collected in the May period of 1977. Fortunately, all of the other five-day biochemical oxygen demand concentrations were much smaller.

The long-term trend in the May period was for variable five-day biochemical oxygen demand concentrations as a function of time. There was no discernable long-term trend for either increasing or decreasing concentrations. The same trends existed in the August and December periods. That is, the data were variable, but no long-term trends for either increasing or decreasing concentrations were evident.

Chloride. The minimum, average and maximum chloride concentrations for all of the data were 3.0, 4.0 and 7.0 mg/L. All of the chloride concentrations were small and well within the limit of 20 mg/L for the White River as established by the Arkansas Department of Pollution Control and Ecology. The average concentrations were 3.7, 3.7 and 4.6 mg/L in the May, August and December periods, respectively. The maximum concentrations were 5.0, 4.0 and 7.0 mg/L. The minimum concentrations were all 3.0 mg/L. The trends in the May and August periods were for relatively uniform and small chloride concentrations. The trend in the December period was for increasing chloride concentrations from 1979 until the end of the record in 1983. The data are shown graphically in Figures H7, H8 and H9. The quality of the water in the lake was excellent at this site with respect to the chloride concentrations.

Chlorophyll a. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.1, 5.4 and 14.0 micrograms per liter, respectively. The average chlorophyll a concentrations were 7.1, 4.4 and 4.1 micrograms per liter, respectively, in the May, August and December periods. The minimum concentrations were 1.8, 2.3 and 0.1 micrograms per liter for the three seasonal periods. The maximum concentrations were 14.0, 6.9 and 7.6 micrograms per liter. As indicated by the seasonal averages, there was a significant seasonal influence with the chlorophyll a concentrations in the May period usually being larger than in the August and December periods. The chlorophyll a concentration of 14.0 micrograms per liter in the May period was troublesome both because it was large and because the general trend has been for increasing chlorophyll a concentrations as a function of time. Conversely, the general trend in the August period has been for decreasing concentrations as a function of time. The trend in the December period has been for variable, but large, concentrations. The data are shown graphically in Figures H10, H11 and H12. The chlorophyll a concentrations indicated the lake is in the mesotrophic stage at this site.

Chlorophyll b. The minimum, average and maximum chlorophyll b concentrations in the May period were 0.1, 0.3 and 1.3 micrograms per liter. The trend in the May period has been for larger chlorophyll b concentrations since 1987 than for prior years. Prior to 1987, the chlorophyll b concentrations were constant and small. The trend in the August period has been for larger concentrations since 1986 than the two prior years. Conversely, the peak concentration in the December period was in the first sample in the record. This concentration, 1.3 mg/L, was a large chlorophyll b concentration and was very large in the December period. Following the peak concentrations, the chlorophyll b concentrations gradually increased until 1987 and have been smaller since. The seasonal data are shown graphically in Figures H13, H14 and H15.

Color. Figures H16, H17 and H18 show the color data for the three seasonal sampling periods. As shown by the three figures, the color concentrations varied as a function of the season of the year and as a function of time.

The color concentrations have not been excessive in any of the samples collected in the August and December periods. In the December period, the color concentrations were relatively constant except for the sample collected in 1985. The peak concentration in 1985 was 40 units which was much larger than any other concentration in this period. The overall trend in the August period has been for the color concentrations to stay about the same level. The data in the August period were more variable but without a large peak concentration. The maximum concentration was 14 units in the August period. The trend in the May period was for highly variable color concentrations. The range was relatively large extending from 1 to 70 units. However, the color concentrations exceeded the rule of thumb limit of 50 units on only one occasion.

The average color concentrations were 19.9, 4.7 and 6.6 units, respectively, in the May, August and December periods. As indicated, the average concentrations indicated a strong seasonal dependency. The maximum concentrations were 70, 14 and 40 units for the three seasonal periods. The minimum concentrations were 1, 0 and 0 units. The quality of the water in the lake at the Avoca site was usually very good with respect to color.

Conductivity. Figures H19, H20 and H21 show the data for the three seasonal periods. The average conductivity values were 129, 128 and 162 micromhos per centimeter in the May, August and December periods, respectively. A strong seasonal dependency was indicated by the average values with the conductivity values usually being the largest in the December period. The maximum conductivity values were 168, 151 and 244 micromhos per centimeter. The data in the May, August and December periods did not indicate either a long-term trend for increasing or decreasing conductivity values. The data were variable as a function of time but the long-term trends were for the conductivity values to stay about the same.

Reservoir Depth. Figures H21, H22 and H23 show the depth of water at the time of sampling for each season. As shown by these figures, the depths of the water were variable for all three seasonal periods. The depths ranged from 2 to 141 feet during the August period.

Dissolved Oxygen. The seasonal dissolved oxygen data are shown in Figures H25, H26 and H27. The minimum, average and maximum concentrations for all of the data were 6.7, 9.5 and 14.0 mg/L. The average dissolved oxygen concentrations were 9.3, 7.9 and 10.8 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 11.0, 9.5 and 13.2 mg/L. The minimum concentrations were 6.7, 6.8 and 9.5 mg/L. Consequently, the dissolved oxygen concentrations always exceeded 6 mg/L which indicated the water was well aerated at this site. The trends for the dissolved oxygen concentrations in the May and August periods were for some variation from year to year with no apparent trend for either increasing or decreasing concentrations over the long-term. The trend for the dissolved oxygen concentrations in the December period was for slightly increasing concentrations as a function of time. Dissolved oxygen concentrations plotted as a function of percent of saturation are shown in Figures H28, H29 and H30.

<u>Fecal Coliform</u>. Figures H31, H32 and H33 show the seasonal data plotted as a function of time in the May, August and December periods. The maximum fecal coliform counts were 108, 74 and 66 colonies per 100 mL. The average fecal coliform counts were 12.9, 10.3 and 9.0 colonies per 100 mL in the May, August and December periods, respectively. Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. For the period of the year from October 1 until March 31, the applicable standard is a geometric mean of 1,000 colonies per 100 mL and a maximum of 2,000 colonies per 100 mL in more than 10 percent of the samples taken in any 30-day period.

As indicated by these figures, all of the fecal coliform concentrations were relatively small and well within the limit for primary contact recreation. The general trend was in the May period was for variable concentrations. The trend in the August period was for more uniform fecal coliform counts except for a peak concentration of 74 colonies per 100 mL in the 1985 sample. The trend in the December period was also for variable coliform counts.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures H34, H35 and H36 for the Avoca site. As shown by these figures, the total hardness concentrations in the samples collected were moderate. The average total hardness concentrations in the May, August and December periods, respectively, were 58, 60 and 68 mg/L (expressed as calcium carbonate). The average concentrations indicated only a nominal seasonal dependency. The maximum concentrations were 69, 75 and 82 mg/L for the three seasonal periods. The minimum concentrations were 44, 50 and 44 mg/L. The minimum, average and maximum concentrations for all of the data were 44, 65 and 130 mg/L. The general trend in the May and August periods were for the total hardness concentrations to stay relatively constant with no long-term trend for either increasing or decreasing concentrations. The data in the December period were more variable, but no long-term trend for either increasing or decreasing concentrations was discernable.

The calcium data are shown in Figures H37, H38 and H39. The maximum calcium concentrations were 62, 68 and 66 mg/L (expressed as calcium carbonate) in the May, August and December periods. The average concentrations were 51, 54 and 56 mg/L, respectively, in the May, August and December periods. The average concentrations indicated only a nominal variation as a function of the season of the year. The minimum concentrations were 48, 48 and 38 mg/L. The calcium concentrations were relatively constant throughout the record in the May period with the long-term trend being for the concentrations to stay about the same. The general trend was for the calcium concentrations to stay about the same over the sampling period in the August period. The trend in the December period was for more variation in the data but with no discernable trend for either increasing or decreasing concentrations as a function of time over the entire length of the record.

The dissolved calcium concentrations are shown in Figures H40, H41 and H42 in the May, August and December periods. The dissolved calcium concentrations varied only slightly as a function of time in the May period. The long-term trend for the dissolved calcium concentrations to stay about the same. The dissolved calcium data in the August period were nearly uniform with the long-term trend being for the concentrations to stay about the same level. The long-term trend for dissolved calcium in the samples collected in the December period was for more variable data. A slight tendency for increasing dissolved calcium concentrations may have been developing in the December period. The average concentrations were 20, 22 and 25 mg/L, respectively, in the May, August and December periods. The average concentrations indicated some variation as a function of the season of the year. The maximum concentrations were 25, 27 and 42 mg/L.

The minimum, average and maximum dissolved magnesium concentrations were 1.2, 1.7 and 2.1 mg/L for all of the data. The average concentrations were 1.6, 1.7 and 1.7 mg/L in the May, August and December periods. The average values indicate very little variation with respect to the season of the year. The ranges were from 1.2 to 1.8, 1.5 to 2.1 and 1.5 to 2.1 mg/L in the May, August and December periods, respectively. The dissolved magnesium data are shown in Figures H43, H44 and H45. The trend in the May period appeared to be for slightly decreasing magnesium concentrations as a function of time. The same trend was also apparent in the December data. However, the changes were very small and subtle. The long-term trend in the August period was for the dissolved magnesium concentrations to remain about the same level.

The noncarbonate hardness concentrations ranged from 3 to 65 mg/L for all of the data. The overall average was 15 mg/L. The maximum noncarbonate hardness concentrations were 18, 18 and 13 mg/L, respectively, in the May, August and December periods. The average concentrations were 12, 14 and 9 mg/L.

<u>Metals</u>. Figures H46, H47 and H48 show the seasonal data for aluminum. The maximum concentrations in the May, August and December periods were 960, 600 and 1,000 micrograms per

liter. There is no maximum contaminant level for aluminum in drinking water. Similarly, there is no stream standard for aluminum. The average concentrations were 290, 115 and 145 micrograms per liter, respectively, in the May, August and December periods. These average concentrations were not unusually large aluminum concentrations for lakes in Arkansas. However, the maximum concentrations were relatively large. The range of concentrations were from 50 to 960, 10 to 600 and 0 to 1,000 micrograms per liter in the May, August and December periods, respectively. The trends for all three seasonal periods were usually for small concentrations with occasional peak concentrations which were relatively large.

The maximum arsenic concentration was 2 micrograms per liter. For reference purposes, the maximum contaminant level for arsenic in drinking water is 50 micrograms per liter. Consequently, the arsenic concentrations in the lake at this site would be considered very small. The maximum concentration was only four percent of the maximum contaminant level for drinking water. The arsenic data are shown in Figures H49, H50 and H51. The trend in the May period was for very uniform arsenic concentrations as a function of time. All were reported as 1 microgram per liter. The arsenic concentrations in the August and December periods were nearly uniform. The maximum arsenic concentrations were 1, 2 and 1 micrograms per liter, respectively, in the May, August and December seasonal periods.

The maximum chromium concentration for all of the data was 50 micrograms per liter. The maximum contaminant level for chromium in drinking water is 50 micrograms per liter. The maximum concentrations were 20, 50 and 20 micrograms per liter, respectively, in the May, August and December periods. These were excessive with respect to the protection of aquatic life. The chromium data are shown in Figures H52, H53 and H54. The average concentrations were 9, 11 and 7 micrograms per liter. The trend has been for relatively constant concentrations for the past seven to eight years at all three sites.

The copper data are shown graphically in Figures H55, H56 and H57 in the May, August and December periods. The maximum copper concentrations were 30, 150 and 66 micrograms per liter, respectively, in the May, August and December periods. The average concentrations were 6, 18 and 8 micrograms per liter. The minimum, average and maximum copper concentrations were 0, 9 and 150 micrograms per liter for all of the data. A good guideline for copper concentrations for the protection of aquatic life is 20 and 30 micrograms per liter for continuing and periodic conditions, respectively. Based on these criteria, the peak concentration of 150 and 66 micrograms per liter in the August and December periods were excessive. However, the copper concentrations have been relatively constant and small since 1979 in the May period, since 1981 in the August period and since 1983 in the December period. Future monitoring should be conducted to determine if the copper concentrations become excessive again.

The minimum, average and maximum iron concentrations for all of the data were 0, 300 and 2,300 micrograms per liter. The average concentrations were 485, 195 and 225 micrograms per liter in the May, August and December periods, respectively. The maximum concentrations were 2,300, 720 and 1,400 micrograms per liter in the May, August and December periods. The minimum concentrations were 70, 20 and 0 micrograms per liter in the May, August and December periods. The general trend in the May period was for variable, but often relatively small, iron concentrations as a function of time. However, occasional peaks with large iron concentrations occur. The trend in the August period was for relatively small iron concentrations with occasional peak concentrations. The data in the December period were nearly constant except for the peak concentration of 1,400 micrograms per liter in the sample collected in 1985. The iron data are shown in Figures H58, H59 and H60. As indicated by these figures, the iron concentrations were occasionally quite large.

The maximum lead concentrations for the seasonal data were 9, 8 and 24 micrograms per liter in the May, August and December periods. The average concentrations were 3, 3 and 5 micrograms per liter. The seasonal lead data are shown graphically in Figures H61, H62 and H63 in the May, August and December periods, respectively. As shown by Figure H63, the lead concentrations varied considerably as a function of time ranging from 0 to 24 micrograms per liter in the December period. The trends in the August and December periods were also for variable concentrations. The one peak concentration in the December period exceeded the action level of 15 micrograms per liter for drinking water. However, the lead concentrations were usually within acceptable levels for the protection of aquatic life.

The recommended maximum contaminant level for manganese in drinking water is 0.05 mg/L. Figures H64, H65 and H66 show the seasonal data for manganese. The average concentrations were 55, 44 and 67 micrograms per liter which indicated some variation as a function of the season of the year. The maximum concentrations were 230, 80 and 150 micrograms per liter, respectively, in the May, August and December periods. The overall trend for all the May seasonal period has been for relatively small manganese concentrations since 1982. The trend in the August period has been for relatively small manganese concentrations since 1981. The trend in the December period has been for variable concentrations, but they have been smaller the past four years than in most prior years.

The mercury data are shown in Figures H67, H68 and H69 in the May, August and December periods, respectively. The maximum concentration was 1.0 microgram per liter which occurred in a sample collected in the May period in 1977. All other concentrations were 0.5 microgram per liter or less. The maximum mercury concentrations were 1.0, 0.5 and 0.5 microgram per liter, respectively, in the May, August and December periods. The average concentrations were 0.2, 0.2 and 0.1 microgram per liter. All of the mercury concentrations were considerably less than the 20 micrograms per liter maximum contaminant level for drinking water. The mercury concentrations were usually within acceptable levels for the protection of aquatic life.

The maximum nickel concentrations were 9, 4, and 6 micrograms per liter in the May, August and December periods. These were small concentrations and were well within the levels necessary for the protection of aquatic life. The average nickel concentrations were 3.1, 1.7 and 2.2 micrograms per liter. The data are shown graphically in Figures H70, H71 and H72.

The average seasonal potassium concentrations were all 1.4 mg/L in the May, August and December periods, respectively. The maximum seasonal concentrations were 1.7, 1.8 and 1.9 mg/L in the May, August and December periods, respectively. The data are shown graphically in Figures H73, H74 and H75. The trends in the May and August periods were for variable potassium concentrations. In the December period, the potassium concentrations were nearly constant from 1979 until the end of the record in 1983.

The recommended maximum contaminant level for zinc in public water supplies is 5 mg/L. For the seasonal data, the maximum concentrations were 40, 70 and 140 micrograms per liter. The zinc concentrations were usually well within acceptable levels. The data are shown graphically in Figures H76, H77 and H78. The zinc concentrations were variable as a function of time for the all three seasonal periods. However, the trends for all three periods have been for constant and small zinc concentrations in recent years.

Nitrogen. Figures H79, H80 and H81 show the data for un-ionized ammonia nitrogen data for the Avoca site in the May, August and December periods. As shown by Figure H79, the un-ionized ammonia concentrations were nearly uniform except for the large concentration of 0.040 mg/L in the most recent sample collected in 1984. The data in the August period were variable with no long-term trend apparent. The un-ionized ammonia concentrations in the December period were small with no long-term trend for either increasing or decreasing concentrations apparent. The average concentrations were 0.0100, 0.0100 and 0.0005 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.0400, 0.0200 and 0.0010 mg/L in the May, August and December periods.

The ammonia nitrogen concentrations are shown graphically in Figures H82, H83 and H84. The average concentrations were 0.12, 0.04 and 0.03 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.39, 0.07 and 0.06 mg/L in the May, August and December periods, respectively. The trend in the May period was for variable ammonia concentrations with occasional peak concentrations which were relatively large. The trends in the August and December periods were also for relatively large concentrations on occasion.

The organic nitrogen concentrations for the Avoca site are shown in Figures H85, H86 and H87. The general trend in the May period was for relatively constant organic nitrogen concentrations as a function of time. The long-term trend was for the organic nitrogen concentrations to stay about the same. The data in the August period indicated a general trend for increasing concentrations as a function of time. The trend in the December period was also for increasing organic nitrogen concentrations as a function of time although only three data points were included in the December period. The average organic nitrogen concentrations were 0.52, 0.62 and 0.47 mg/L in the May, August and December periods, respectively. The minimum concentrations were 0.36, 0.12 and 0.27 mg/L for the three seasonal periods. The maximum concentrations were 0.67, 1.60 and 0.68 mg/L.

The nitrate nitrogen data are shown in Figures H88, H89 and H90. The overall trend in the May period was for variable, but relatively large, nitrate concentrations. The long-term trend was for increasing concentrations as a function of time. The trend in the August period was for small, and relatively constant, nitrate concentrations. The general trend in the December period was for increasing nitrate concentrations as a function of time. The average concentrations were 0.50, 0.06 and 0.41 mg/L in the May, August and December periods, respectively. The maximum nitrate concentrations were 1.00, 0.10 and 1.30 mg/L. The average concentrations indicated a significant variation in concentration as a function of the season of the year with the nitrate concentrations being the largest in the December period.

The Total Kjeldahl Nitrogen data are shown graphically in Figures H91, H92 and H93. As shown by Figure H91, a relatively large Total Kjeldahl Nitrogen concentration of 2.2 mg/L occurred in the most recent sample collected at the 0.8 depth in 1984. Prior to the sample collected in 1984, the general trend in the May period had been for slightly decreasing Total Kjeldahl Nitrogen concentrations as a function of time. The general trend in the August period was for increasing Total Kjeldahl Nitrogen concentrations as a function of time. However, the most recent sample in 1983 had a very small Total Kjeldahl Nitrogen concentration. The average seasonal concentrations were 0.78, 0.58 and 0.34 mg/L in the May, August and December periods, respectively. The ranges of concentrations were 0.40 to 2.20, 0.10 to 1.60 and 0.10 to 0.74 mg/L, respectively, in the May, August and December periods.

The total nitrogen data are shown in Figures H94, H95 and H96. The overall trend in the May period was for variable, but relatively large, total nitrogen concentrations. The trend in the August period was for increasing total nitrogen concentrations as a function of time. The trend in the December period was for nearly constant concentrations. The maximum seasonal concentrations were 1.20, 0.86 and 0.75 mg/L in the May, August and December periods, respectively. The average concentrations were 0.96, 0.48 and 0.65 mg/L for the three seasonal periods. The averages indicated a significant seasonal variation in the total nitrogen concentrations.

pH. Figures H97, H98 and H99 show the pH values for the May, August and December periods. As shown by these figures, the pH values were usually within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. These limits are a minimum pH of 6 and a maximum pH of 9 units.

The minimum, average and maximum pH values were 6.6, 8.0 and 9.3 units for all of the data. The average pH values were 8.0, 8.5 and 7.5 units, respectively, in the May, August and December periods. The maximum pH values were 8.7, 9.3 and 8.1 units in the May, August and December periods. As shown by the figures, the variations in pH were relatively small. In general, the trends were for the pH values to stay about the same for all three seasonal periods.

Phosphorous. Figures H100, H101 and H102 show the total phosphorous data in the May, August and December periods. The minimum, average and maximum concentrations were 0.01, 0.04 and 0.18 mg/L for all of the data. The average concentrations were 0.04, 0.03 and 0.03 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.09, 0.05 and 0.13 mg/L for the three seasonal periods. As shown by Figure H100, the total phosphorous concentrations were variable in the May period. The general trend seemed to be for increasing total phosphorous concentrations as a function of time. The data were more uniform in the August period with the long-term trend being for the concentrations to remain about the same level. Following a peak concentration of 0.13 mg/L in 1975, the total phosphorous concentrations have been relatively uniform in the December period. There was no trend for either increasing or decreasing concentrations over the long-term period in the December period. The peak seasonal concentrations were larger than usual for large unpolluted lakes.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures H103, H104 and H105. The maximum orthophosphate concentration for all of the data was 0.18 mg/L. For the seasonal data, the maximum concentrations were 0.18, 0.04 and 0.09 mg/L in the May, August and December periods. Except for one large peak orthophosphate concentration of 0.18 mg/L, the trend in the May period was for relatively constant concentrations as a function of time. The trend in the August data was also for relatively constant orthophosphate concentrations as a function of time. The orthophosphate concentrations were also relatively uniform in the December period following a peak concentration of 0.09 mg/l in the sample collected in 1975. There were no long-term trends for either increasing or decreasing orthophosphate concentrations during any of the three seasonal periods.

Sulfate. The average sulfate concentrations were 8.4, 6.3 and 7.0 mg/L, respectively, in the May, August and December periods. The data are shown in Figures H106, H107 and H108. As shown by these figures, the sulfate concentrations were all smaller than the stream standard of 20 mg/L. There was some variation in the data for all three periods. The trends for all three seasonal periods were for the sulfate concentrations to stay about the same over the long term. The maximum concentrations were 11, 9 and 11 mg/L, respectively, in the May, August and December periods.

<u>Temperature</u>. Figures H109, H110 and H111 show the seasonal data in the May, August and December periods. The average seasonal temperature values were 20.4, 28.6 and 8.5 degrees Celsius in the May, August and December periods. The maximum temperatures were 26.0, 31.5 and 10.5 degrees Celsius in the May, August and December periods. The specific standard for temperature in Beaver Lake is 32 degrees Celsius. The minimum temperatures were 17.0, 26.5 and 6.0 degrees Celsius.

<u>Transparency</u>. Figures H112, H113 and H114 show the transparency data in the May, August and December seasonal periods. The minimum, average and maximum transparency values were 6, 49 and 85 inches for all of the data. The minimum values were 6, 24 and 24 inches, respectively, in the May, August and December periods. The average values were 41, 57 and 49 inches for the three seasonal periods. The maximum values were 68, 85 and 84 inches. The transparency values were variable for all three periods. They were often less than the desirable forty-eight inches in the May period. The transparency values were usually greater than forty-eight inches in the August period. Consequently, the

water usually has good clarity in the August period but often does not in the May period.

Turbidity. Figures H115, H116 and H117 show the turbidity data for the Avoca site. The minimum, average and maximum turbidity values were 0, 5.4 and 30 FTU for all of the data. The maximum turbidity values for the seasonal data were 30, 16 and 23 FTU in the May, August and December periods. The minimum turbidity values were 1.7, 0.5 and 0 FTU for the three seasonal periods. The average turbidity values were 8.8, 3.1 and 3.7 FTU. The specific standard for turbidity in Beaver Lake as established by the Arkansas Department of Pollution Control and Ecology is 25 NTU. All of the turbidity values were less than the standard, except for one peak concentration in the May period. There seemed to be a general trend for increasing turbidity concentrations in the May period. The long-term trend in the August period has been for small, and relatively uniform, turbidity values except for a peak value of 14 FTU in 1980. The general trend in the December was also for small, and relatively constant, turbidity values except for a sample collected in 1985.

Station Number 9 (Rogers Site). The figures showing the data graphically for this site are included in Appendix I. Summaries of the statistical analyses are included in Tables XXXIII, XXXIV and XXXV.

Alkalinity. The minimum, average and maximum total alkalinity concentrations were 19, 50 and 80 mg/L for all of the data. The average seasonal total alkalinity concentrations were 42, 53 and 58 mg/L in the May, August and December periods. The average concentrations indicated the alkalinity concentrations varied as a function of the season of the year. The total alkalinity concentrations in the May period varied somewhat as a function of time. The long-term trend was for the concentrations to remain about the same level. The alkalinity concentrations were usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend in the August period was also for some variation in the alkalinity concentrations as a function of time with the long-term trend being for the concentrations to remain about the same level. The total alkalinity concentrations in the samples collected at 0.8 depth were usually larger than in the samples collected at 0.2 depth. The December period data were also variable with the long-term trend being for the concentrations to remain about the same. The alkalinity in the samples collected at 0.2 and 0.8 depths were usually about the same. The maximum concentrations were 62, 66 and 80 mg/L in the May, August and December periods. The magnitudes of the ranges were 41, 25 and 45 mg/L, respectively, in the May, August and December periods. These ranges indicated the variability of the total alkalinity concentrations in the May and December periods compared with the August period. The data are shown in Figures I1, I2 and I3.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.3, 1.4 and 3.0 mg/L for all of the data.

The average five-day biochemical oxygen demand concentrations were 1.4, 1.4 and 1.1 mg/L in the May, August and December periods, respectively. The average concentrations indicated some seasonal dependency with the largest concentrations usually occurring in the May and August periods. This tendency was not unusual. The maximum concentrations were 2.8, 3.0 and 2.6 mg/L for the three seasonal periods. The minimum concentrations were 0.3, 0.4 and 0.5 mg/L. The data are shown graphically in Figures I4, I5 and I6.

The long-term trend in the May period was for variable five-day biochemical oxygen demand concentrations as a function of time. There was no discernable long-term trend for either increasing or decreasing concentrations. The five-day biochemical oxygen demand was usually smaller in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend in the August period was for more uniform, but still variable, concentrations. No long-term trend for either increasing or decreasing concentrations was evident for either the samples collected at 0.2 depth or 0.8 depth. The five-day biochemical oxygen demand was usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend in the December period was for relatively uniform and small five-day biochemical oxygen demand.

<u>Chloride</u>. The minimum, average and maximum chloride concentrations for all of the data were 2.0, 4.0 and 7.0 mg/L. All of the chloride concentrations were small and well within the limit of 20 mg/L for the White River as

established by the Arkansas Department of Pollution Control and Ecology. The average concentrations were 3.6, 3.6 and 5.0 mg/L in the May, August and December periods, respectively. The maximum concentrations were 5.0, 5.0 and 7.0 mg/L. The minimum concentrations were 2.0, 2.0 and 3.0 mg/L. The trends in the May and August periods were for relatively uniform and small chloride concentrations. The chloride concentrations in the samples collected at 0.8 depth were usually larger than in the samples collected at 0.2 depth. The general trend in the December period was for increasing chloride concentrations from 1979 until the end of the record in 1983. The data are shown graphically in Figures I7, I8 and I9. The quality of the water in the lake was excellent at this site with respect to the chloride concentrations.

Chlorophyll a. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.2, 5.6 and 32.0 micrograms per liter, respectively. The average chlorophyll a concentrations were 10.3, 3.5 and 3.1 micrograms per liter, respectively, in the May, August and December periods. The minimum concentrations were 1.0, 1.5 and 0.2 micrograms per liter for the three seasonal periods. The maximum concentrations were 32.0, 10.0 and 4.8 micrograms per liter. As indicated by the seasonal averages, there was a significant seasonal influence with the chlorophyll a concentrations in the May period usually larger than in the August and December periods. The chlorophyll a concentration of 32.0 micrograms per liter in the May period was troublesome because it was large. There was a general trend for increasing chlorophyll a concentrations from 1983 until the peak in 1987. However, the chlorophyll a concentrations have been relatively small since. The general trend in the August period has been for small concentrations except for a peak concentration in 1986. The trend in the December period has been for relatively constant, but large in the December period, concentrations. The data are shown graphically in Figures I10, I11 and I12. The chlorophyll a concentrations were much above the upper end of the range usually associated with mesotrophic lakes on occasion.

Chlorophyll b. The minimum, average and maximum chlorophyll b concentrations in the May period were 0.1, 0.5 and 2.1 micrograms per liter. The pattern in the May period was usually for small and constant chlorophyll b concentrations. However, three peak concentrations were reported in 1986, 1987 and 1990. The largest of the peak concentrations was 2.1 mg/L which was an unusually large chlorophyll b concentration. However, the concentrations for the next two years were small. Consequently, the trend was usually for small concentrations with occasional peak concentrations. The trend in the August period was for uniform and small concentrations until 1986. The chlorophyll b concentration in the sample collected in 1986 was relatively large at 1.1 micrograms per liter. Although the concentrations in the samples collected since 1986 have been smaller, they were larger than in samples collected in the years prior to 1986. Consequently, there appeared to be a trend developing for increasing chlorophyll b concentrations as a function of time for this period. Except for the first sample collected in the December period in 1983, the chlorophyll b concentrations have been relatively small in this period. There was a short-term trend for increasing concentrations as a function of time, but the trend was not sustained in the two most recent samples.

The seasonal data are shown graphically in Figures I13, I14 and I15. The peak chlorophyll b concentrations have been sufficiently large as to strongly suggest that monitoring be continued.

Color. Figures I16, I17 and I18 show the color data for the May, August and December seasonal periods. As shown by the three figures, the color concentrations varied as a function of the season of the year, as a function of depth and as a function of time.

The color concentrations have been very large on a few occasions in the May period. The minimum, average and maximum color concentrations were 0, 26 and 400 units for all of the data in the record. The average concentrations were 42, 14 and 14 units, respectively, in the May, August and December periods. The average concentrations indicated an apparent trend for a strong seasonal influence. However, the average concentrations were influenced significantly by the very large color concentrations in the samples collected in 1977 and 1990. The maximum color concentrations were 400, 40 and 70 units for the three seasonal periods. The minimum concentrations were 2, 0 and 4 units. The maximum color concentration occurred in a sample collected at the 0.8 depth in the May period of 1990. The sample collected at 0.2 depth on the same day was 120 units. The color concentrations in the samples collected at 0.8 depth usually were larger than in the samples collected at 0.2 depth in the May period. The concentrations were also usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth in the August period. The trend was for variable, but relatively small, color concentrations in the August period. All of the concentrations were less than 50 units. In the December period, the color concentrations were usually about the same in the samples collected at 0.2 and 0.8 depths. The trend in the December period was for variable, but usually relatively small, color concentrations. No trends were evident for either increasing or decreasing concentrations as a function of time over the long-term were apparent in the August and December periods. The general trend has been for increasing color concentrations as a function of time since 1983 in the May period.

Conductivity. Figures I19, I20 and I21 show the data for the three seasonal periods. The average conductivity values were 121, 133 and 143 micromhos per centimeter in the May, August and December periods, respectively. Some seasonal dependency was indicated by the average values with the conductivity values usually the largest in the December period. The maximum conductivity values were 190, 170 and 183 micromhos per centimeter. The data in the May period indicates a long-term trend for decreasing conductivity values with the passage of time. The conductivity values were usually greater in the samples collected at 0.8 depth than in the samples collected at 0.2 depth in the May period. The long-term trend in the August period has been for the conductivity values to stay about the same. There was some variation in the data from year to year. The conductivity values were larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The December period data were more variable than the data for either the May or August periods. However, the long-term trend was for the conductivity values to stay at about the same level. That is, no trend for either increasing or decreasing values as a function of time was apparent for the entire record.

Reservoir Depth. Figures I22, I23 and I24 show the depth of water at the time of sampling for each season. As shown by these figures, the depth of the water was usually greater than 50 feet at this site.

Dissolved Oxygen. The seasonal dissolved oxygen data are shown in Figures I25, I26 and I27. The minimum, average and maximum concentrations for all of the data were 0.1, 6.8 and 13.0 mg/L. The average dissolved oxygen concentrations were 6.3, 3.4 and 10.0 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 10.3, 8.4 and 12.3 mg/L. The minimum concentrations were 0.8, 0.1 and 7.6 mg/L. The dissolved oxygen concentrations were usually good in the samples collected at 0.2 depth in the May and August periods. Only two samples had dissolved oxygen concentrations less than 6 mg/L in the May period and one in the August period. A very small concentration of 0.8 mg/L did occur in a sample collected in the May period in 1978. This was very unusual both because the concentration was so small for a sample collected at 0.2 depth and because the sample collected at 0.8 depth had a dissolved oxygen concentration nearly five times as large. The dissolved oxygen concentrations in the samples collected in the December period were all well above 6 mg/L.

As shown by Figures I25 and I26, the effects of stratification on the dissolved oxygen concentrations in the samples collected at 0.8 depth were clearly shown. There was very little dissolved oxygen in the samples collected at 0.8 depth in the August period and approximately half as much as in the samples collected at 0.2 depth in the May period.

The overall trend in the May period was for the dissolved oxygen concentrations to vary considerably as a function of time, but no trend for either increasing or decreasing concentrations as a function of time was evident. The trend in the August period was for less variation in the concentrations, but with no apparent trend for either increasing or decreasing concentrations over the length of the record. The trend in the December period was for slightly increasing dissolved oxygen concentrations as a function of time. The dissolved oxygen concentrations expressed as percent of saturation are shown in Figures I28, I29 and I30.

Fecal Coliform. Figures I31, I32 and I33 show the seasonal data plotted as a function of time in the May, August and December periods. The maximum fecal coliform counts were 23, 6 and 21 colonies per 100 mL. The average fecal coliform counts were 5.0, 2.0 and 2.7 colonies per 100 mL in the May, August and December periods, respectively. Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. For the period of the year from October 1 until March 31, the applicable standard is a geometric mean of 1,000 colonies per 100 mL and a maximum of 2,000 colonies per 100 mL in more than 10 percent of the samples taken in any 30-day period.

As indicated by the figures, all of the fecal coliform concentrations were small and well within the limit for primary contact recreation. The general trend was in the May period was for variable concentrations. The trend for the August period was for very small, and more uniform, coliform counts. The trend in the December period was for very small coliform concentrations with one peak concentration of 21 colonies per 100 mL. There were no trends for either increasing or decreasing coliform counts as a function of time in the May, August and December periods. The quality of the water at this site was excellent with respect to fecal coliform concentrations.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures I34, I35 and I36 for the Avoca site. As shown by these figures, the total hardness concentrations in the samples collected were moderate. The average total hardness concentrations in the May, August and December periods, respectively, were 51, 60 and 58 mg/L (expressed as calcium carbonate). The average concentrations indicated only some seasonal dependency. The maximum concentrations were 68, 76 and 71 mg/L for the three seasonal periods. The minimum concentrations were 27, 44 and 42 mg/L. The minimum, average and maximum concentrations for all of the data were 27, 56 and 76 mg/L. The general trend in the May period was for considerable variation in the total hardness concentrations. However, the long-term trend was for the concentrations to stay about the same. The range was unusually large in the May period extending from 27 to 68 mg/L which was a range of 41 mg/L. The total hardness concentrations were usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. Although the range of 32 mg/L in the August period was smaller than the range in the May period, the pattern was also for variable concentrations with no long-term trend for either increasing or decreasing concentrations as a function of time. The total hardness concentrations were usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The data in the December period were also variable. Despite significant smaller concentrations in the samples collected in 1984 and 1985, the overall trend was for the total hardness concentrations to stay about the same in the December period.

The calcium data are shown in Figures I37, I38 and I39. The maximum calcium concentrations were 62, 68 and 62 mg/L (expressed as calcium carbonate) in the May, August and December periods. The average concentrations were 44, 55 and 60 mg/L, respectively, in the May, August and December periods. The average concentrations indicated a significant variation as a function of the season of the year. The minimum concentrations were 20, 42 and 58 mg/L. The magnitudes of the ranges were 42, 26 and 4 mg/L, respectively, in the May, August and December periods. The calcium concentrations were nearly constant throughout the record in the December period with the long-term trend being for the concentrations nearly constant concentrations. The general trend in the May period was for considerable variation in the samples collected at 0.2 depth with the concentrations in the samples collected at 0.8 depth being more uniform. The calcium concentrations in the samples collected at 0.8 depth were usually larger than in the samples collected at 0.2 depth. The calcium concentrations in the samples collected at 0.8 depth were larger than in the samples collected at 0.2 depth in the August period. The data were more uniform in the August period than in the May period. The long-term trend was for the calcium concentrations to stay about the same level.

The dissolved calcium concentrations are shown in Figures I40, I41 and I42 in the May, August and December periods. The dissolved calcium concentrations varied considerably in the May period with the range extending from 7.6 to 25 mg/L. The magnitudes of the ranges were 17.4, 10 and 12 mg/L, respectively, in the May, August and December periods. The concentrations in the samples collected at 0.8 depth were usually larger than in the samples collected at 0.2 depth. The variations in concentrations were so large that a long-term trend was difficult to discern. There may have been a trend for decreasing concentrations as a function of time in the May period, but if the trend was present it was not clearly defined. The long-term trend in the August period appeared to be for decreasing concentrations as a function of time. All of the dissolved calcium concentrations in the samples collected at 0.8 depth were larger than in the samples collected at 0.2 depth. The data were more uniform in the December period with the long-term trend being for the dissolved calcium concentrations to stay about the same level. The concentrations in the samples collected at the two depths were usually about the same. The average dissolved calcium concentrations were 17, 22 and 23 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 25, 27 and 26 mg/L for the three periods. The minimum concentrations were 7.6, 17 and 14 mg/L.

The minimum, average and maximum dissolved magnesium concentrations were 0.9, 1.7 and 2.3 mg/L for all of the data. The average concentrations were 1.5, 1.8 and 1.9 mg/L in the May, August and December periods. The average values indicate some variation with respect to the season of the year. The ranges were from 0.9 to 2.1, 1.4 to 2.3 and 1.6 to 2.2 mg/L in the May, August and December periods, respectively. The dissolved magnesium data are shown in Figures I43, I44 and I45. The trend in the May period has generally been for decreasing magnesium concentrations as a function of time since 1981. The magnesium concentrations were usually slightly larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The long-term trends in the August and December periods were for the concentrations to stay about the same. As in the May period, the pattern was usually for slightly larger magnesium concentrations in the samples collected at 0.8 depth than in the samples collected in the December period in the August period. The dissolved magnesium concentrations were about the same in the samples collected at the two depths in the December period.

The noncarbonate hardness concentrations ranged from 0 to 23 mg/L for all of the data. The overall average was 9.6 mg/L. The maximum noncarbonate hardness concentrations were 23, 21 and 10 mg/L, respectively, in the May, August and December periods. The average concentrations were 11, 13 and 6 mg/L. The data are shown graphically in Figures I46, I47 and I48. The long-term trend in the May period was for decreasing concentrations as a function of time. The trend in the August period was for considerable variation in the data. The trend in the December period was for relatively uniform concentrations.

Metals. Figures I49, I50 and I51 show the seasonal data for aluminum. The maximum concentrations in the May, August and December periods were 4,400, 1,600 and 1,400 micrograms per liter. The maximum concentration in the May period was extremely large for lakes in Arkansas. There is no maximum contaminant level for aluminum in drinking water. Similarly, there is no stream standard for aluminum. The average concentrations were 500, 285 and 260 micrograms per liter, respectively, in the May, August and December periods. The range of concentrations were from 40 to 4,400, 10 to 1,600 and 40 to 1,400 micrograms per liter in the May, August and December periods, respectively. The trend in the May period was for considerable variation in the data particularly in the samples collected at 0.8 depth. The aluminum concentrations in the samples collected at 0.8 depth were usually larger in the samples collected at 0.2 depth. Although not clearly defined, there may have been a trend developing for increasing aluminum concentrations as a function of time in the May period. The trend in the August period was for the aluminum concentrations to usually be much larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. A large peak concentration was also reported in the August period in the samples collected at 0.8 depth. The aluminum concentrations in the samples collected at 0.8 depth were usually larger than in the samples collected at 0.2 depth in the December period.

The trend in the December period was for relatively small concentrations with occasional relatively large peak concentrations.

The maximum arsenic concentration was 6 micrograms per liter. For reference purposes, the maximum contaminant level for arsenic in drinking water is 50 micrograms per liter. Consequently, the arsenic concentrations in the lake at this site would be considered small. The maximum concentration was only twelve percent of the maximum contaminant level for drinking water. The arsenic data are shown in Figures I52, I53 and I54. The trend in the May period was for nearly uniform arsenic concentrations as a function of time. The exception was in the most recent sample (1990) which contained 6 micrograms per liter in the sample collected at 0.8 depth. The trend for the samples collected at 0.2 depth in the August period was for nearly uniform and small concentrations. The samples collected at 0.8 depth had relatively constant concentrations. The trend in the December period was for very uniform and small concentrations in the samples collected at both depths. All of the concentrations were reported as 1 microgram per liter. The maximum arsenic concentrations were 6, 2 and 1 micrograms per liter, respectively, in the May, August and December seasonal periods.

The maximum chromium concentration for all of the data was 60 micrograms per liter. The maximum contaminant level for chromium in drinking water is 50 micrograms per liter. The maximum concentrations were 20, 60 and 10 micrograms per liter, respectively, in the May, August and December periods. The maximum concentrations were larger than desirable for the protection of aquatic life. The chromium data are shown in Figures I55, I56 and I57. The average concentrations were 11, 12 and 7 micrograms per liter. The trend has been for relatively constant concentrations in the May and December periods. Except for the sample collected in 1981, the chromium concentrations were constant in the August period. The maximum concentration in the August period occurred in the sample collected at 0.8 depth in 1981. All of the rest of the data were 30 micrograms per liter or less. Since 1983, the trend has been for very uniform chromium concentrations in the December period.

The copper data are shown graphically in Figures I58, I59 and I60 in the May, August and December periods. The maximum copper concentrations were 20, 24 and 7 micrograms per liter, respectively, in the May, August and December periods. The average concentrations were 4, 5 and 3 micrograms per liter. The minimum, average and maximum copper concentrations were 1, 4 and 24 micrograms per liter for all of the data. Following peak concentrations of 20 micrograms per liter in the samples collected at both depths in 1977, the copper concentrations have been small and relatively consistent in the May period. The trend in the August period was for more variation in the data. However, there does not appear to be a trend for either increasing or decreasing concentrations as a function of time for the entire length of the record. The maximum concentration of

24 micrograms per liter occurred in a sample collected at 0.8 depth in 1983. This concentration was remarkable because it was much larger than any other value. The trend has been for variable, but small, copper concentrations in the December period with no discernable trend for increasing or decreasing concentrations as a function of time over the length of the record.

The minimum, average and maximum iron concentrations for all of the data were 10, 760 and 9,000 micrograms per liter. The average concentrations were 910, 790 and 495 micrograms per liter in the May, August and December periods, respectively. The maximum concentrations were 9,000, 2,500 and 2,100 micrograms per liter for the three seasonal periods. The minimum concentrations were 110, 10 and 120 micrograms per liter in the May, August and December periods. The general trend in the May period was for highly variable iron concentrations at both depths. The peak concentrations for the 0.2 and 0.8 depths occurred in the most recent sample (1990). The maximum concentration was 9,000 micrograms per liter which was an extremely large iron concentration and occurred in the sample collected at 0.8 depth. The sample collected at 0.2 depth in 1990 was nearly 3,000 mg/L. The trend in the August period in the samples collected at 0.2 depth was for relatively small iron concentrations with no apparent trend for either increasing or decreasing concentrations. The pattern for the samples collected at 0.8 depth was for much larger concentrations than in the samples collected at 0.2 depth. Iron in the samples collected at

0.8 depth has been decreasing since 1984 in the August period. The trend was for variable, and occasionally large, iron concentrations in the December period. However, the iron concentrations have been relatively small and uniform for the past four years. The iron data are shown in Figures I61, I62 and I63.

The maximum lead concentrations for the seasonal data were 50, 8 and 12 micrograms per liter in the May, August and December periods. The average concentrations were 6, 3 and 3 micrograms per liter. The seasonal lead data are shown graphically in Figures I64, I65 and I66 in the May, August and December periods, respectively. As shown by Figure I64, the lead concentrations occasionally varied considerably as a function of depth. The peak concentration of 50 micrograms per liter was more than 5 times as large as in any sample collected at 0.2 depth. The trend for the samples collected at 0.2 depth was for small, and relatively uniform, lead concentrations as a function of time. The lead concentrations were usually about the same in the samples collected at the two depths. However, on three occasions the lead concentrations were much larger in the samples collected at 0.8 depth. The trend in the August period was for small, and relatively uniform, lead concentrations as a function of time. There was no trend for either increasing or decreasing concentrations as a function of time over the entire length of the record.

The recommended maximum contaminant level for manganese in drinking water is 0.05 mg/L. Figures I67, I68 and I69 show the seasonal data for manganese. The average concentrations were 93, 1,000 and 120 micrograms per liter indicating a very large variation as a function of the season of the year. The maximum concentrations were 570, 2,800 and 480 micrograms per liter, respectively, in the May, August and December periods. The overall trend for all the May seasonal period was for relatively small manganese concentrations in the samples collected at 0.2 depth. The pattern was for the manganese concentrations in the samples collected at 0.8 depth to be much larger than in the samples collected at 0.2 depth in the May period. The trend in the August period was for relatively small manganese concentrations in the samples collected at 0.2 depth, but for very large concentrations in the samples collected at 0.8 depth. All of the manganese concentrations in the samples collected at 0.8 depth were greater than 1,500 micrograms per liter which were very large manganese concentrations. The trend in the December period was for more variable data, but with the concentrations being smaller than in the May and August periods.

The mercury data are shown in Figures I70, I71 and I72 in the May, August and December periods, respectively. The maximum concentration was 0.5 microgram per liter which occurred in a sample collected in the May period in 1977. The maximum mercury concentrations were 0.5, 0.3 and 0.3 microgram per liter, respectively, in the May, August and December periods. The average concentrations were all 0.1 micrograms per liter. All of the mercury concentrations were considerably less than the 20 micrograms per liter maximum contaminant level for drinking water. All of the mercury concentrations were within acceptable levels for the protection of aquatic life.

The maximum nickel concentrations were 50, 27, and 8 micrograms per liter in the May, August and December periods. These were relatively small concentrations. The average nickel concentrations were 6.5, 4.8 and 3.4 micrograms per liter. The data are shown graphically in Figures I73, I74 and I75. As shown in Figure I73, except for the relatively large nickel concentrations in the samples collected in 1977, the concentrations were small and relatively uniform. The data were more variable in the August period, but no long-term trend for either increasing or decreasing concentrations was apparent. The trend in the December period was for small, and relatively uniform, nickel concentrations as a function of time.

The average seasonal potassium concentrations were all 1.4 mg/L in the May, August and December periods, respectively. The maximum seasonal concentrations were 2.0, 1.7 and 1.6 mg/L in the May, August and December periods, respectively. The data are shown graphically in Figures I76, I77 and I78. The trends in the May and August periods were for variable potassium concentrations. In the December period, the potassium concentrations were more uniform.

The recommended maximum contaminant level for zinc in public water supplies is 5 mg/L. For the seasonal data, the maximum concentrations were 110, 90 and 50 micrograms per liter. The zinc concentrations were usually well within acceptable levels. The data are shown graphically in Figures I79, I80 and I81. The zinc concentrations were variable as a function of time for the all three seasonal periods. They were also variable as a function of depth with the largest zinc concentrations occurring in the samples collected at 0.8 depth.

<u>Nitrogen</u>. Figures I82, I83 and I84 show the data for un-ionized ammonia nitrogen for the Rogers site in the May, August and December periods. The general trend in the May period was for small concentrations with occasional peak concentrations. Both peak concentrations occurred in samples collected at 0.2 depth. The pattern was for very small concentrations in the samples collected at 0.8 depth in the May period. The trend in the August period was for considerable variation in the concentrations with the peak concentration of 0.049 mg/L being very large. In all samples collected in the August period, the un-ionized ammonia concentrations were less in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend for the samples collected at 0.2 depth in the December period was for small concentrations. The un-ionized ammonia concentrations were usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. No trends for either increasing or decreasing concentrations as a function of time were apparent in the May and December period. The trend in the August period was for decreasing concentrations as a function of time from the peak concen-

tration in 1981 until the end of the record in 1983. The average concentrations were 0.0012, 0.0100 and 0.0007 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.0100, 0.0500 and 0.0030 mg/L in the May, August and December periods.

The ammonia nitrogen concentrations are shown graphically in Figures I85, I86 and I87. The average concentrations were 0.07, 0.22 and 0.08 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.15, 0.61 and 0.18 mg/L for the three seasonal periods. The trend in the May period was for small, and relatively constant, ammonia concentrations as a function of time. The trend in the August period was variable ammonia concentrations particularly in the samples collected at 0.8 depth. The trend in the December period was for smaller concentrations than in the August period. The ammonia concentrations were usually larger in the samples collected at 0.8 depth than in the samples collected at 0.2 depth.

The organic nitrogen concentrations for the Rogers site are shown in Figures I88, I89 and I90. The general trend in the May period was for increasing organic nitrogen concentrations as a function of time. The data in the August period also indicated a general trend for increasing concentrations as a function of time. The average nitrogen concentrations were 0.38, 0.67 and 0.49 mg/L in the May, August and December periods, respectively. The minimum concentrations were 0.09, 0.03 and 0 mg/L for the three seasonal periods. The maximum concentrations were 1.20, 1.80 and 1.00 mg/L.

The nitrate nitrogen data are shown in Figures I91, I92 and I93. The overall trend in the May period was for variable, and relatively large, nitrate concentrations as a function of time. In all of the samples, the nitrate concentrations were greater in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend in the August period was for small, and relatively uniform, nitrate concentrations in the samples collected at 0.2 depth. The pattern was for larger nitrate concentrations in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The trend in the December period was for variable nitrate concentrations with the concentrations in the samples collected at the two depths being about the same. The average concentrations were 0.62, 0.16 and 0.47 mg/L in the May, August and December periods, respectively. The maximum nitrate concentrations were 1.00, 0.59 and 1.00 mg/L. The average concentrations indicated a significant variation in concentration as a function of the season of the year with the nitrate concentrations being the largest in the May and December periods.

The Total Kjeldahl Nitrogen data are shown graphically in Figures I94, I95 and I96. The general trend in the May period was for relatively uniform Total Kjeldahl Nitrogen concentrations with occasional peaks and valleys. The Total Kjeldahl Nitrogen concentrations were usually smaller in the samples collected at 0.8 depth than in the samples collected at 0.2 depth. The general trend in the August period was for increasing Total Kjeldahl Nitrogen concentrations in the samples collected at 0.8 depth. The average Total Kjeldahl Nitrogen concentrations were 0.48, 0.79 and 0.49 mg/L in the May, August and December periods, respectively. The ranges of concentrations were 0.11 to 1.30, 0.10 to 2.20 and 0.10 to 1.20 mg/L, respectively, in the May, August and December periods.

The total nitrogen data are shown in Figures I97, I98 and I99. The overall trend in the May period was for relatively constant total nitrogen concentrations as a function of time. The trend for the samples collected at 0.8 depth in the August period was for increasing total nitrogen concentrations as a function of time. The trend in the December period was for more uniform concentrations. The maximum seasonal concentrations were 1.90, 2.60 and 1.40 mg/L in the May, August and December periods, respectively. The average concentrations were 1.07, 0.92 and 0.83 mg/L for the three seasonal periods. The averages indicated a significant seasonal variation in the total nitrogen concentrations.

pH. Figures I100, I101 and I102 show the pH values in the May, August and December periods. As shown by these figures, the pH values were within the limits established by the Arkansas Department of Pollution Control and Ecology in Regulation No. 2. These limits are a minimum pH of 6 and a maximum pH of 9 units.

The minimum, average and maximum pH values were 6.4, 7.5 and 9.0 units for all of the data. The average pH values were 7.5, 7.7 and 7.5 units, respectively, in the May, August and December periods. The maximum pH values were 9.0, 8.7 and 8.2 units in the May, August and December periods. As shown by Figure I100, there were occasionally significant variations in pH. The long-term trend was for the pH values to stay about the same. The pH values in the samples collected at 0.8 depth were usually less than in the samples collected at 0.2 depth. The trend in the August period was also for the pH values to stay at about the same level. In all of the samples collected in the August period, the pH values were less in the samples collected at the 0.8 depth than in the samples collected at 0.2 depth. The trend in the December period was for slightly decreasing pH values as a function of time. The pH values were about the same in the samples collected at the two depths.

Phosphorous. Figures I103, I104 and I105 show the total phosphorous data in the May, August and December periods. The minimum, average and maximum concentrations were 0.01, 0.04 and 0.24 mg/L for all of the data. The average concentrations were 0.05, 0.05 and 0.03 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.24, 0.17 and 0.06 mg/L for the three seasonal periods. As shown by Figure I103, the total phosphorous concentrations were variable in the May period. The peak concentration of 0.24 mg/L was relatively large and occurred in the sample collected at 0.8 depth in 1990. The trend in the August period was also for variable total phosphorous concentrations with more variation occurring in the samples collected at the 0.8 depth than in the samples collected at 0.2 depth. The total phosphorous concentrations were smaller and more consistent in the samples collected in the December period. The total phosphorous concentrations were larger than usual for large unpolluted lakes.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures I106, I107 and I108. The maximum orthophosphate concentration for all of the data was 0.18 mg/L. For the seasonal data, the maximum concentrations were 0.18, 0.14 and 0.05 mg/L in the May, August and December periods. The trends for the orthophosphate data paralleled those for the total phosphorous data. The average orthophosphate concentrations were 0.03, 0.02 and 0.02 mg/L.

Sulfate. The average sulfate concentrations were 8.8, 6.3 and 7.1 mg/L, respectively, in the May, August and December periods. The data are shown in Figures I109, I110 and I111. As shown by these figures, the sulfate concentrations were all smaller than the stream standard of 20 mg/L. There were variations in the data in all three seasonal periods. The trend in the May period was for the sulfate concentrations to stay about the same over the long term. A suggestion of a trend for slightly decreasing sulfate concentrations as a function of time was apparent in the August period. The general trend in the December period was for increasing sulfate concentrations as a function of time. The maximum concentrations were 13, 10 and 10 mg/L, respectively, in the May, August and December periods.

Temperature. Figures I112, I113 and I114 show the seasonal data in the May, August and December periods. The average seasonal temperature values were 14.2, 20.0 and 8.1 degrees Celsius in the May, August and December periods. The maximum temperatures were 25.5, 30.0 and 11.0 degrees Celsius in the May, August and December periods. The specific standard for temperature in Beaver Lake is 32 degrees Celsius. The minimum temperatures were 7.9, 9.5 and 5.0 degrees Celsius.

Transparency. Figures I115, I116 and I117 show the transparency data in the May, August and December seasonal periods. The minimum, average and maximum transparency values were 10, 54 and 112 inches for all of the data. The minimum values were 10, 72 and 18 inches, respectively, in the May, August and December periods. The average values were 34, 98 and 46 inches for the three seasonal periods. The maximum values were 60, 112 and 66 inches. The transparency values were variable for all three periods, but were more consistent in the August period. The transparency values were usually less than the desirable forty-eight inches in the May period. In fact, the average value was only 34 inches. The transparency values were excellent in the August period with a minimum value of 72 inches. They were often less than forty-eight inches in the December period, but this is of less concern than in the May period because primary contact recreation does not regularly occur in the December period.

Turbidity.. Figures I118, I119 and I120 show the turbidity data for the Rogers site. The minimum, average and maximum turbidity values were 0.6, 12.1 and 82 FTU for all of the data. The maximum turbidity values for the seasonal data were 82, 41 and 33 FTU in the May, August and December periods. The minimum turbidity values were 1.3, 0.6 and 2.1 FTU for the three seasonal periods. The average turbidity values were 12.3, 10.9 and 8.1 FTU. The specific standard for turbidity in Beaver Lake as established by the Arkansas Department of Pollution Control and Ecology is 25 NTU.

The general trend in the May period was for relatively small turbidity values in the samples collected at the 0.2 depth. The exception was a very large turbidity concentration in the sample collected at 0.2 depth in 1990. This value greatly exceeded the standard of 25 NTU for Beaver Lake. The turbidity values may have been increasing as a function of time in the May period at the 0.2 depth. The pattern was for more variable turbidity values in the samples collected at 0.8 depth in the May period. The long-term trend in the August period has been for small turbidity values in the samples collected at 0.2 depth. The pattern was for the turbidity values in the samples collected at the 0.8 depth to be much larger than in the samples collected at 0.2 depth. The trend in the December period was usually for relatively small turbidity values with occasional peak concentrations.

Station Number 10 (Highway 68 Site). The figures showing the data graphically for this site are included in Appendix

J. Summaries of the statistical analyses are included in Tables XXXVI, XXXVII and XXXVIII.

Alkalinity. The minimum, average and maximum total alkalinity concentrations were 26, 51 and 84 mg/L for all of the data. The average seasonal total alkalinity concentrations were 50, 61 and 46 mg/L in the May, August and December periods. The average concentrations indicated the alkalinity concentrations vary as a function of the season of the year with the total alkalinity concentrations largest in the August period. The total alkalinity concentrations in the May period were variable as a function of time ranging from 26 to 84 mg/L. The magnitude of the range was 58 mg/l which is large. However, the long-term trend was for the concentrations to remain about the same level. The trend for the August period was also for nearly uniform alkalinity concentrations with no indication of either increasing or decreasing concentrations as a function of time. The trend for the December period has been for increasing concentrations since 1987. The maximum concentrations were 84, 66 and 66 mg/L in the May, August and December periods. The magnitudes of the ranges were 58, 12 and 37 mg/L, respectively, in the May, August and December periods. These ranges indicated the variability of the total alkalinity concentrations in the May and December periods compared with the August period. The data are shown in Figures J1, J2 and J3.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.2, 1.8 and 6.7 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 1.3, 3.0 and 1.4 mg/L in the May, August and December periods, respectively. The average concentration in the August period was influenced considerably by an unusually large five-day biochemical oxygen demand concentration of 6.7 mg/L in the sample collected in 1985. The trend in the May period was for nearly uniform concentrations as a function of time. The long-term trend was for the five-day biochemical oxygen demand concentrations to stay about the same. The five-day biochemical oxygen demand data in the August period were variable with an unusually large concentration of 6.7 mg/L in the sample collected in 1985 and a relatively large concentration of 3.8 mg/L in the sample collected in 1988. The trend in the December period was for the data to be somewhat variable with the concentrations ranging from 0.2 to 2.7 mg/L. The long-term trend was for the five-day biochemical oxygen demand concentrations to stay about the same level. The maximum concentrations were 1.8, 6.7 and 2.7 mg/L for the three seasonal periods. The minimum concentrations were 1.0, 1.0 and 0.2 mg/L. The data are shown graphically in Figures J4, J5 and J6.

Chlorophyll a. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.1, 11.7 and 46.0 micrograms per liter, respectively. The average chlorophyll a concentrations were 16.5, 15.2 and 1.34 micrograms per liter, respectively, in the May, August and December periods. The minimum concentrations were 0.1, 4.4 and

0.2 microgram per liter for the three seasonal periods. The maximum concentrations were 46.0, 36.0 and 3.7 micrograms per liter. As indicated by the seasonal averages, there was a significant seasonal influence with respect to the chlorophyll a concentrations. The average concentrations were very large in the May and August periods. Obviously, significant microbiological events occurred in 1984, 1987 and 1988 in the May period and in 1986 and 1987 in the August period. Although certainly discontinuous, the overall trend in the May period was for increasing chlorophyll a concentrations as a function of time. The trend was less clear in the August period, but large chlorophyll a concentrations occurred in the two years. The trend in the December period has been for relatively small, but increasing, chlorophyll a concentrations. The data are shown graphically in Figures J7, J8 and J9.

Chlorophyll b. The minimum, average and maximum chlorophyll b concentrations in the May period were 0.1, 1.6 and 5.2 micrograms per liter. The long-term trend in the May period was for increasing chlorophyll b concentrations. The peak concentrations in the samples collected in 1987 and 1988 were very large chlorophyll b concentrations. The trend in the August period paralleled that for the chlorophyll a concentrations. The concentrations peaked in 1986 and have been steadily declining since. However, the pattern appeared to be for increasing concentrations as a function of time. The trend in the December period was for small and constant chlorophyll b concentrations. The seasonal data are shown graphically in Figures J10, J11 and J12.

Color. Figures J13, J14 and J15 show the color data for the three seasonal sampling periods. As shown by the three figures, the color concentrations varied as a function of the season of the year and as a function of time.

The average color concentrations were 28, 116 and 38 units. These average values apparently indicated a strong seasonal dependency. However, an extremely large color concentration of 450 units occurred in 1985 in the August period. All three of the remaining color concentrations were less than 20 units in the August period. The data were variable in the May period with the color concentrations exceeding 50 units on two occasions. The pattern in the May period was for a peak concentration in 1985 followed by steadily declining concentrations until 1989 in turn followed by a second peak concentration in 1990. Consequently, the long-term trend was unclear. The trend in the August period was usually for relatively small color concentrations with an extremely large peak in 1985. The trend in the December period was also for variable color concentrations. The pattern was for increasing color reaching a peak in 1987 followed by steadily declining concentrations.

The maximum color concentrations were 70, 450 and 110 units in the May, August and December periods, respectively. The minimum concentrations were 5, 1 and 5 units.

Conductivity. Figures J16, J17 and J18 show the data for the three seasonal periods. The average conductivity values were 127, 165 and 115 micromhos per centimeter in the May, August and December periods, respectively. A strong seasonal dependency was indicated by the average values with the conductivity values usually being the largest in the August period. The maximum conductivity values were 188, 182 and 173 micromhos per centimeter. The magnitudes of the ranges were 105, 43 and 77 micromhos per centimeter. As indicated by the magnitude of the range in the May period, the data were quite variable. There may have been a trend developing for slightly increasing conductivity values as a function of time. The trend in the August period was for relatively uniform conductivity values which have been increasing slightly as a function of time. The trend in the December period had been for relatively constant values until the sample was collected in 1990. The conductivity value in the sample collected in 1990 was slightly less than double that in the sample collected in 1989.

Reservoir Depth. Figures J19, J20 and J21 show the depth of water at the time of sampling for each season. As shown by these figures, the depths of the water were relatively constant in the May and August periods and usually relatively constant in the December period. The lake was unusually low in 1985.

Dissolved Oxygen. The seasonal dissolved oxygen data are shown in Figures J22, J23 and J24. The minimum, average and maximum concentrations for all of the data were 0.4, 6.6 and 12.8 mg/L. The average dissolved oxygen concentrations were 5.6, 2.1 and 11.4 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 10.8, 6.7 and 12.8 mg/L. The minimum concentrations were 1.3, 0.4 and 9.6 mg/L. The trend for the dissolved oxygen concentrations in the May period was for considerable variation from year to year with the long-term trend being for the concentrations to stay about the same. The trend in the August period was usually for small dissolved oxygen concentrations with one peak concentration of 6.7 mg/L. The trend in the December period was for slightly increasing dissolved oxygen concentrations as a function of time. The dissolved oxygen levels were very good in the December period. Dissolved oxygen concentrations plotted as a function of percent of saturation are shown in Figures J25, J26 and J27.

Fecal Coliform. Figures J28, J29 and J30 show the seasonal data plotted as a function of time in the May, August and December periods. The maximum fecal coliform counts were 74, 60 and 370 colonies per 100 mL. The average fecal coliform counts were 24.3, 15.5 and 128 colonies per 100 mL in the May, August and December periods, respectively. Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. For the period of the year from October 1 until March 31, the applicable standard is a geometric mean of 1,000 colonies per 100 mL and a maximum of 2,000 colonies per 100 mL in more than 10 percent of the samples taken in any 30-day period.

As indicated by these figures, all of the fecal coliform concentrations in the May and August periods were relatively small and well within the limit for primary contact recreation. The general trend was in the May period was for variable concentrations. The trend in the August period was usually for very small fecal coliform counts with one peak concentration of 60 colonies per 100 mL in the 1985 sample. The trend in the December period was larger counts, but all were less than the limit for primary contact recreation.

Hardness. The total hardness data in the May, August and December seasonal samples are shown in Figures J31, J32 and J33 for the Highway 68 site. As shown by these figures, the total hardness concentrations in the samples collected were moderate. Only three data points were available for each seasonal period. The trend in the August period was for increasing concentrations as a function of time. The trends in the May and December periods were for the concentrations to stay about the same. The average total hardness concentrations in the May, August and December periods, respectively, were 48, 59 and 47 mg/L (expressed as calcium carbonate). The average concentrations indicated some seasonal dependency. The maximum concentrations were 56, 72 and 52 mg/L for the three seasonal periods. The minimum concentrations were 36, 48 and 40 mg/L. The minimum, average and maximum concentrations for all of the data were 36, 51 and 72 mg/L.

The dissolved calcium concentrations are shown in Figures J34 and J35 in the May and December periods. The general trend in the December period was for decreasing dissolved calcium concentrations as a function of time. No clearly discernable trend was evident in the December period. The average concentrations were 23, 22 and 19 mg/L, respectively, in the May, August and December periods. The average concentrations indicated only a small variation as a function of the season of the year. The maximum concentrations were 33, 22 and 27 mg/L.

The minimum, average and maximum dissolved magnesium concentrations were 1.5, 1.8 and 2.0 mg/L for all of the data. The average concentrations were 1.8, 1.9 and 1.8 mg/L in the May, August and December periods. The average values indicate very little variation with respect to the season of the year. The magnitudes of the ranges were 0.5, 0 and 0.4 mg/L in the May, August and December periods, respectively. The dissolved magnesium data are shown in Figures J36 and J37. The general trend in the May period was for slightly decreasing magnesium concentrations as a function of time. No discernable trend was evident in the December period.

<u>Nitrogen</u>. Figures J38, J39 and J40 show the data for The overall trend in the May period was for variable, but relatively large, nitrate concentrations. There appeared to be a trend developing for decreasing nitrate concentrations as a function of time. The trend in the August period was

usually for constant and small nitrate concentrations except for a peak concentration of 0.70 mg/L. The general trend in the December period was for decreasing nitrate concentrations as a function of time. The average concentrations were 0.62, 0.25 and 0.68 mg/L in the May, August and December periods, respectively. The maximum nitrate concentrations were 0.90, 0.70 and 1.00 mg/L. The average concentrations indicated a significant variation in concentration as a function of the season of the year with the nitrate concentrations being the largest in the May and December periods.

pH. Figures J41, J42 and J43 show the pH values for the May, August and December periods. As shown by these figures, all of the pH values were within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. These limits are a minimum pH of 6 and a maximum pH of 9 units.

The minimum, average and maximum pH values were 6.4, 7.2 and 7.9 units for all of the data. The average pH values were 7.2, 7.3 and 7.3 units, respectively, in the May, August and December periods. The maximum pH values were 7.6, 7.7 and 7.9 units for the three seasonal periods. As shown by the figures, the variations in pH were relatively small. In general, the trends were for the pH values to stay about the same for all three seasonal periods.

Phosphorous. Figures J44, J45 and J46 show the total phosphorous data in the May, August and December periods. The minimum, average and maximum concentrations were 0.02, 0.07 and 0.31 mg/L for all of the data. The average concentrations were 0.05, 0.11 and 0.06 mg/L in the May, August and December periods, respectively. The maximum concentrations were 0.08, 0.31 and 0.12 mg/L for the three seasonal periods. As shown by Figure J44, the general trend was for increasing total phosphorous concentrations as a function of time. The general trend in the August period was usually for relatively large total phosphorous concentrations with a peak concentration of 0.31 mg/L. This peak was unusually large in the August period. The trend in the December period was for increasing concentrations until a peak was reached in 1987 followed by steadily decreasing concentrations until the end of the record in 1990. The total phosphorous concentrations were relatively large at this site.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures J47, J48 and J49. The maximum orthophosphate concentration for all of the data was 0.26 mg/L. For the seasonal data, the maximum concentrations were 0.04, 0.26 and 0.08 mg/L in the May, August and December periods. The trend in the May period was for somewhat variable orthophosphate concentrations. The trend in the August period was usually for nearly constant concentrations except for a large peak concentration of 0.26 mg/L in the sample collected in 1985. The trend in the December period appeared to be for declining concentrations as a function of time.

<u>Temperature</u>. Figures J50, J51 and J52 show the seasonal data in the May, August and December periods. The average

seasonal temperature values were 15.8, 26.5 and 5.6 degrees Celsius in the May, August and December periods. The maximum temperatures were 17.5, 28.0 and 8.5 degrees Celsius for the May, August and December periods. The specific standard for temperature in Beaver Lake is 32 degrees Celsius. The minimum temperatures were 14.5, 24.0 and 4.0 degrees Celsius.

Transparency. Figures J53, J54 and J55 show the transparency data in the May, August and December seasonal periods. The minimum, average and maximum transparency values were 12, 37 and 86 inches for all of the data. The minimum values were 12, 28 and 12 inches, respectively, in the May, August and December periods. The average values were 28, 52 and 32 inches for the three seasonal periods. The maximum values were 50, 64 and 86 inches. The transparency values were variable for all three periods. They were usually less than the desirable forty-eight inches in the May period. The transparency values were usually greater than forty-eight inches in the August period. Consequently, the water usually has good clarity in the August period but often does not in the May period. The transparency values were usually small in the December period.

Turbidity. Figures J56, J57 and J58 show the turbidity data for the Highway 68 site. The minimum, average and maximum turbidity values were 2, 19 and 80 FTU for all of the data. The maximum turbidity values for the seasonal data were 42, 80 and 50 FTU in the May, August and December periods. The minimum turbidity values were 3.7, 2.0 and 2.5 FTU for the three seasonal periods. The average turbidity values were 16, 22 and 20 FTU. The specific standard for turbidity in Beaver Lake as established by the Arkansas Department of Pollution Control and Ecology is 25 NTU. All of the turbidity values were less than the standard, except for one peak value of 42 FTU in the May period. The trend in the August period was for small turbidity values except for the unusually large peak value of 80 FTU in the 1985 sample. The long-term trend in the December period has been for variable turbidity values in the December period. The turbidity standard was also exceeded in the December period.

Station Number 11 (Richland Creek Site). The statistical analyses are summarized in Tables XXXIX, XL and XLI. The results of the graphical analyses are included in Figures K1 through K54 in Appendix K.

Alkalinity. The minimum and maximum alkalinity concentrations were 33 and 100 mg/L. The overall average concentration was 61 mg/L. The average seasonal total alkalinity concentrations were 50, 89 and 41 mg/L. The average concentrations indicated a strong seasonal dependency with the alkalinity concentrations being larger during the August period. This was a departure from the data for some of the other sites in the lake. The maximum concentrations were 66, 100 and 48 mg/L for the three seasonal periods. The minimum concentrations were 38, 58 and 33 mg/L. As indicated by these data and by Figures K1, K2 and K3, the total alkalinity concentrations were generally larger during the August period than during the May and December periods. The general trend in the May period was for variable alkalinity concentrations as a function of time with no indication of long-term increasing or decreasing concentrations. The same general trend was apparent in the December period. The general trend in the December period was for nearly uniform total alkalinity concentrations.

Five-Day Biochemical Oxygen Demand. The minimum, average and maximum five-day biochemical oxygen demand concentrations were 0.6, 1.7 and 4.2 mg/L for all of the data. The average five-day biochemical oxygen demand concentrations were 1.6, 2.2 and 1.2 mg/l, respectively, in the May, August and December periods. The maximum concentrations were 4.2, 2.2 and 1.2 mg/L for the three seasonal periods. The minimum concentrations were 0.8, 1.1 and 0.6 mg/L. The data are shown graphically in Figures K4, K5 and K6. The five-day biochemical oxygen demand concentrations were nearly uniform in the May period except for the unusually large concentration of 4.2 mg/L in the sample collected in 1987. The five-day biochemical oxygen demand concentrations varied considerably in the August period. However, no long-term trend for either increasing or decreasing concentrations was evident. Following a peak concentration in the sample collected in 1984, the five-day biochemical oxygen demand concentrations were nearly constant in the December period.

Chloride. Only one chloride concentration was reported for the Richland Creek site. The value was 4 mg/L.

Chlorophyll a. Figures K7, K8 and K9 show the chlorophyll a data plotted as a function of time. The minimum, average and maximum chlorophyll a concentrations for all of the data were 0.1, 4.5 and 25.9 micrograms per liter. The average chlorophyll a concentrations were 1.9, 3.0 and 0.2 micrograms per liter, respectively, in the May, August and December periods. The maximum concentrations were 6.0, 4.6 and 0.6 micrograms per liter for the three seasonal periods. The minimum concentrations were 0.1, 1.5 and 0.1 micrograms per liter.

The average concentrations indicated a significant seasonal variation as a function of the season of the year which would be expected. A general trend for increasing chlorophyll a concentrations as a function of time may have been developing in the May period. The general trend for the August period was decreasing concentrations as a function of time. The trend in the December period was for small and relatively constant chlorophyll a concentrations. The chlorophyll a concentrations indicated the lake is in the mesotrophic stage at this site.

Chlorophyll b. The minimum, average and maximum chlorophyll b concentrations for all of the data in the record were 0.1, 1.6 and 13.4 micrograms per liter. The maximum concentrations were 0.4, 0.4 and 0.1 micrograms per liter, respectively, in the May, August and December periods. The average concentrations were 0.2, 0.2 and 0.1 microgram per liter for the three seasonal periods. The chlorophyll b data are shown in Figures K10, K11 and K12. The chlorophyll b data in the May period were constant except for a peak concentration of 0.4 microgram per liter. The trend in the August period was for increasing concentrations as a function of time. The trend in the December period was for very constant chlorophyll b concentrations. All were reported as 0.1 microgram per liter.

Color. Figures K13, K14 and K15 show the color data for the three seasonal sampling periods. The maximum concentration was 80 units. The color data in the May period was relatively constant and small except for a peak concentration of 65 units in the sample collected in 1987. The trend in the August period was for relatively small color concentrations with no evidence of long-term increasing or decreasing color values. The general trend in the December period was for decreasing color concentrations as a function of time. The maximum concentration in the December period was relatively large at 80 units.

The minimum, average and maximum color concentrations for all of the data were 2, 19 and 80 units. For the May period, the minimum, average and maximum concentrations were 5, 21 and 65 units. The minimum, average and maximum concentrations were 2, 7.2 and 20 units in the August period. The minimum, average and maximum concentrations in the December period were 5, 32 and 80 units.

Conductivity. Figures K16, K17 and K18 show the conductivity data for the three seasonal periods. The minimum, average and maximum conductivity values were 99, 174 and 250 micromhos per centimeter for all of the data in the record.

The average conductivity values were 124, 219 and 120 micromhos per centimeter, respectively, in the May, August and December periods. The average values indicated a substantial seasonal dependency. The maximum values were 154, 238 and 139 micromhos per centimeter. The minimum values were 99, 187 and 100 micromhos per centimeter.

The general trend in the May period was for slightly decreasing conductivity values as a function of time. The trend in the August period was for the conductivity values to remain about the same level over the long term. The trend in the December period was for very slightly increasing conductivity values as a function of time.

Reservoir Depth. Figures K19, K20 and K21 show the depth of water in the reservoir at the Richland Creek site for the three sets of seasonal data. As shown by Figures K19 and K20, the depth of water at this site was very small at times.

Dissolved Oxygen. The seasonal data are shown in Figures K22, K23 and K24. The minimum, average and maximum concentrations for all of the data were 6.0, 10.1 and 12.7 mg/L. The average dissolved oxygen concentrations were 9.8, 9.2 and 11.3 mg/L in the May, August and December periods, respectively. The minimum concentrations were 7.5, 6.0 and 9.5 mg/L for the three seasonal periods. The maximum concentrations were 11.5, 12.0 and 12.7 mg/L. The long-term trend in the May period was for the dissolved oxygen concentrations to stay about the same. The general trend in the

December period may have been for slightly increasing dissolved oxygen concentrations as a function of time.

The dissolved oxygen data indicated the water was well aerated at this site and the concentrations were adequate for aquatic life. The dissolved oxygen concentrations, expressed as percent of saturation, are shown in Figures K25, K26 and K27 in the May, August and December sampling periods.

Fecal Coliform. The minimum, average and maximum fecal coliform counts for all of the data were 10, 550 and 14,000 colonies per 100 mL. The maximum counts were 14,000, 91 and 5,100 colonies per 100 mL in the May, August and December periods, respectively. The average counts were 2,825, 50 and 1,320 colonies per 100 mL for the three seasonal periods. The minimum counts were 110, 10 and 24 colonies per 100 mL. Beaver Lake and the White River are designated as primary contact waters. Consequently, the applicable standard based on Regulation No. 2 is a geometric mean of 200 colonies per 100 mL for the period between April 1 and September 30. Additionally, the fecal coliform count shall not exceed 400 colonies per 100 mL in more than 10 percent of the samples in any one month. The fecal coliform counts were very bad at this site in the May period. Two of the five counts exceeded the limit for primary contact recreation. The largest was 14,000 colonies per 100 mL which was dangerously large. It occurred in a sample collected in the May period of 1987. All of the fecal coliform counts in the August period were less than the limit for primary contact recreation. The fecal coliform concentrations were usually less than the applicable standard of 1,000 colonies per 100 mL in the December period. However, the count of 5,100 colonies in the sample collected in 1984 was very large. Clearly, the fecal coliform counts need to be closely monitored in this area of the lake. The fecal coliform data are shown in Figures K28, K29 and K30.

<u>Hardness</u>. The total hardness data in the May, August and December seasonal samples are shown in Figures K31, K32 and K33 for the Richland Creek site. As shown by these figures, the total hardness concentrations in the samples collected were moderate. The minimum, average and maximum total hardness concentrations for all of the data were 48, 65 and 108 mg/L (expressed as calcium carbonate). For the May period, the minimum, average and maximum concentrations were 50, 57 and 66 mg/L. The minimum, average and maximum concentrations in the August period were 58, 80 and 108 mg/L. In the December period, the minimum, average and maximum concentrations were 48, 53 and 60 mg/L. The general trend in the May period was for relatively uniform total hardness concentrations. However, only three data points were included in the record. The trend in the August period was for variable concentrations with no long-term trend for either increasing or decreasing concentrations. In the December period, the general trend was for relatively uniform concentrations as a function of time.

Only five dissolved calcium concentrations were available in the record. The minimum, average and maximum concentrations were 15, 26 and 39 mg/L. The average concentrations were 19, 37 and 20, respectively, in the May, August and December periods.

Five data points were also available in the record for dissolved magnesium. The minimum, average and maximum concentrations were 1.4, 2.1 and 2.8 mg/L. The average concentrations were 1.6, 2.6 and 2.1 mg/L.

Nitrogen. Figures K34, K35 and K36 show the data for nitrate nitrogen for the Richland Creek site in the May, August and December periods. The maximum nitrate nitrogen concentration for all of the data was 1.60 mg/L. For the seasonal data, the minimum, average and maximum concentrations were 0.37, 0.51 and 0.60 mg/L in the May period. For the August period, the minimum, average and maximum concentrations were 0.10, 0.55 and 1.20 mg/L. In the December period, the minimum, average and maximum concentrations were 0.90, 1.13 and 1.30 mg/L. Thus, the average seasonal concentrations were 0.51, 0.55 and 1.13 mg/L which indicated substantial seasonal variation. These were also relatively large nitrate concentrations for lakes in Arkansas. The data in the May period generally indicated a slight trend for decreasing nitrate concentrations as a function of time. The general trend in the August period was for decreasing concentrations as a function of time. The data in the December period indicated a general trend for slightly increasing nitrate concentrations as a function of time.

pH. Figures K37, K38 and K39 show the pH values for the May, August and December periods. As shown by these figures, the pH values were always within the limits established by the Arkansas Department of Pollution and Control in Regulation No. 2. The minimum, average and maximum pH values were 7.3, 7.6 and 8.5 units for all of the data. In the May period, the minimum, average and maximum pH values were 7.4, 7.5 and 7.7 units. The minimum, average and maximum pH values in the August period were 7.3, 7.8 and 8.5 units. The minimum, average and maximum pH values were 7.3, 7.4 and 7.5 units in the December period. The average seasonal pH values were 7.5, 7.8 and 7.4 units which indicated little variation in the average values as a function of the season of the year. The trends in the May and December seasonal periods were for nearly constant pH values. The trend in the August period was for very slightly increasing pH values as a function of time.

Phosphorous. Figures K40, K41 and K42 show the total phosphorous data in the May, August and December periods, respectively. The minimum, average and maximum concentrations were 0.01, 0.07 and 0.32 mg/L for all of the data. The average concentrations were 0.05, 0.06 and 0.10 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.17, 0.16 and 0.32 mg/L. The minimum concentrations were all 0.01 mg/L. The trend in the May period was for constant total phosphorous concentrations from 1984 until 1987. The concentration in the 1987 sample was 0.17 mg/L. The trend in the August period was for nearly constant concentrations except for the sample collected in 1985. Following a peak concentration of 0.32 mg/L in the initial sample in 1984, the total phosphorous concentrations have exhibited a trend for slightly increasing concentrations as a function of time. The total phosphorous concentrations were ordinarily larger than usual for large unpolluted lakes.

The orthophosphate concentrations in the May, August, and December periods are shown in Figures K43, K44 and K45. The average concentrations were 0.02, 0.05 and 0.07 mg/L, respectively, in the May, August and December periods. The maximum concentrations were 0.06, 0.15 and 0.22 mg/L for the three seasonal periods. The minimum concentrations were all 0.10 mg/L. The trends were identical to those for total phosphorous.

Temperature. Figures K46, K47 and K48 show the seasonal data in the May, August and December periods. The minimum, average and maximum temperatures were 6.5, 19.2 and 32.5 degrees Celsius for all of the data. The average seasonal temperature values were 18.7, 27.6 and 7.9 degrees Celsius in the May, August and December periods. The minimum temperatures were 18.0, 23.0 and 6.5 degrees Celsius in the May, August and December periods. The maximum temperatures were 20.5, 32.5 and 9.5 in the May, August and December periods.

Transparency. Figures K49, K50 and K51 show the transparency data for the Richland Creek site. The minimum, average and maximum transparency values were 2, 26 and 72 inches for all of the data. The maximum transparencies for the seasonal data were 72, 48 and 72 inches in the May, August and December periods. The minimum transparency values were 12, 2 and 4 inches for the three seasonal periods. The average transparency values were 27, 22 and 31 inches. The transparency values usually have been small for all three periods. The general trend in the May period was for small transparency values except for 1985. The transparency value in 1985 was the only one which equalled or exceeded the desired minimum of forty-eight inches for water used in primary contact recreation activities. The average transparency value was only 27 inches in the May period. The transparency values were usually small in the August period with the maximum value being 48 inches. The transparency values were also usually small in the December period with only one value exceeding forty-eight inches. The clarity of the water at the Richland Creek site was not good with respect to safety for primary contact recreational activities.

Turbidity. Figures K52, K53 and K54 show the turbidity data for the Richland Creek site. The minimum, average and maximum turbidity values were 1.0, 17 and 95 FTU for all of the data. The maximum turbidity values for the seasonal data were 77, 95 and 9.8 FTU in the May, August and December periods. The minimum turbidity values were 1.5, 1.0 and 2.9 FTU in the May, August and December periods. The average turbidity values were 18, 26 and 5.7 FTU. In the May period, the trend was for nearly constant turbidity values with the exception of the peak value of 77 FTU. The turbidity values were small in the August period except for the peak value of 95 units in the sample collected in 1985. The trend was for relatively small turbidity values in the December period. On the two occasions when the turbidity standard of 25 NTU was exceeded, the turbidity values were very large.

Table IX. Water Quality Data for the White River Site: Period of Record and Spring Season.

STATION 1 WHITE RIVER	PERIOD OF RECORD N	MEAN	MIN	MAX	SPRING SEASON N	MEAN	MIN	MAX
Temperature, Celsius	234	9.8600	2.2000	30.0000	37	10.2700	6.0000	20.0000
Flow, CFS	51	1755.0600	20.0000	4660.0000	10	1717.0000	20.0000	4660.0000
Turbidity, FTU	37	1.6700	0.4000	14.0000	13	1.9800	0.4000	14.0000
Color, Units	54	4.8500	0.0000	20.0000	15	3.9300	0.0000	10.0000
Conductivity, Micromhos/cm	239	137.2900	61.0000	462.0000	36	134.3300	104.0000	168.0000
Dissolved Oxygen, mg/L	234	9.4500	2.1000	15.8000	37	10.5400	8.4000	14.8000
Dissolved Oxygen, % Saturation	234	82.2800	19.4000	140.2000	37	93.2800	70.6000	137.0000
Biochemical Oxygen Demand, mg/L	77	1.1500	0.1000	4.2000	18	1.2600	0.4000	2.3000
pH, Standard Units	233	7.6200	6.2000	8.8500	37	7.8200	7.0000	8.8500
Carbon Dioxide, mg/L	6	3.2300	1.4000	7.2000	2	2.5000	2.4000	2.6000
Total Alkalinity, mg/L (as CaCO3)	75	58.0800	27.0000	106.0000	17	57.5300	48.0000	69.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	12	74.3300	64.0000	89.0000	3	72.0000	65.0000	76.0000
Carbonate Alkalinity, mg/L (as CO3)	12	0.0000	0.0000	0.0000	3	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	21	0.6900	0.2300	1.6000	6	0.4500	0.2300	0.6100
Organic Nitrogen, mg/L (as N)	21	0.3900	0.0000	1.2000	6	0.2000	0.0000	0.3200
Ammonia Nitrogen, mg/L (as N)	27	0.0300	0.0000	0.0800	8	0.0400	0.0100	0.0800
Un-ionized Ammonia Nitrogen, mg/L (as N)	20	0.0003	0.0000	0.0010	7	0.0004	0.0001	0.0010
Total Kjeldahl Nitrogen, mg/L (as N)	27	0.4800	0.0100	3.2000	8	0.2600	0.1000	0.3700
Nitrate Nitrogen, mg/L (as N)	43	0.3300	0.0300	1.5000	14	0.3600	0.1600	1.5000
Total Phosphate, mg/L (as PO4)	8	0.0400	0.0000	0.1200	3	0.0800	0.0300	0.1200
Total Phosphorous, mg/L (as P)	48	0.0200	0.0000	0.4400	14	0.0200	0.0100	0.0400
Total Hardness, mg/L (as CaCO3)	41	65.6300	40.0000	82.0000	10	64.3000	40.0000	74.0000
Noncarbonate Hardness, mg/L (asCaCO3)	17	7.8800	0.0000	22.0000	4	10.2500	1.0000	15.0000
Calcium, mg/l (as CaCO3)	29	54.5500	25.0000	68.0000	6	52.0000	25.0000	60.0000
Dissolved Calcium, mg/L (as Ca)	38	21.7900	10.0000	27.0000	11	20.8200	10.0000	24.0000
Dissolved Magnesium, mg/L (as Mg)	38	2.4900	1.0000	4.0000	11	2.3100	1.4000	3.7000
Potassium, mg/L	26	1.3100	0.7000	1.8000	7	1.2700	0.7000	1.8000
Chloride, mg/L	64	3.8900	1.0000	8.0000	12	3.5800	3.0000	5.0000
Sulfate, mg/L	36	6.8100	1.0000	11.0000	8	7.3800	5.0000	9.0000
Arsenic, ug/L	48	1.4200	0.0000	10.0000	14	0.8600	0.0000	1.0000
Chromium, ug/L	49	11.1000	0.0000	100.0000	14	9.2900	0.0000	20.0000
Copper, ug/L	41	13.1700	1.0000	240.0000	13	2.7700	1.0000	8.0000
Iron, ug/L	49	119.1800	10.0000	700.0000	14	108.5700	20.0000	700.0000
Lead, ug/L	42	9.0200	0.0000	200.0000	13	4.0800	0.0000	14.0000
Manganese, ug/L	51	60.4900	0.0000	440.0000	14	27.8600	10.0000	140.0000
Nickel, ug/L	42	11.7900	0.0000	290.0000	13	3.2300	1.0000	9.0000
Zinc, ug/L	42	32.7900	0.0000	610.0000	13	16.1500	10.0000	40.0000
Aluminum, ug/L	44	92.0500	10.0000	500.0000	14	87.8600	10.0000	500.0000
Fecal Coliform (Colonies/100 ml)	25	3.5600	0.0000	24.0000	4	4.0000	4.0000	4.0000
Fecal Coliform (Colonies/100 ml)	42	20.7400	0.0000	150.0000	14	25.3600	0.0000	150.0000
Calcium Hardness, mg/L (as CaCO3)	39	64.4400	40.0000	78.0000	11	61.4500	40.0000	72.0000
Orthophosphate, mg/L (as P)	43	0.0100	0.0000	0.0300	14	0.0100	0.0100	0.0300
Ammonia Nitrogen, mg/L (as NH4)	6	0.0300	0.0000	0.1000	2	0.0600	0.0100	0.1000
Total Phosphorous, mg/L (as PO4)	15	0.1500	0.0000	1.4000	5	0.0800	0.0300	0.1200
Total Nitrogen, mg/L (as NO3)	21	3.0600	1.0000	7.1000	6	2.0200	1.0000	2.7000
Mercury, ug/L	47	0.1500	0.0000	0.5000	14	0.1100	0.0000	0.5000

Table X. Water Quality Data for the White River Site: Period of Record and Summer Season.

STATION 1 WHITE RIVER	PERIOD OF RECORD N	MEAN	MIN	MAX	SUMMER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	234	9.8600	2.2000	30.0000	36	13.2500	8.0000	30.0000
Flow, CFS	51	1755.0600	20.0000	4660.0000	9	1932.5600	46.0000	3810.0000
Turbidity, FTU	37	1.6700	0.4000	14.0000	10	1.5900	0.4000	4.5000
Color, Units	54	4.8500	0.0000	20.0000	13	7.7700	0.0000	20.0000
Conductivity, Micromhos/cm	239	137.2900	61.0000	462.0000	38	131.3200	100.0000	165.0000
Dissolved Oxygen, mg/L	234	9.4500	2.1000	15.8000	36	8.4800	5.6000	12.5000
Dissolved Oxygen, % Saturation	234	82.2800	19.4000	140.2000	36	80.8400	49.6000	130.0000
Biochemical Oxygen Demand, mg/L	77	1.1500	0.1000	4.2000	19	1.4300	0.1000	4.2000
pH, Standard Units	233	7.6200	6.2000	8.8500	36	7.6200	6.3000	8.7200
Carbon Dioxide, mg/L	6	3.2300	1.4000	7.2000	1	3.4000	3.4000	3.4000
Total Alkalinity, mg/L (as CaCO3)	75	58.0800	27.0000	106.0000	17	60.9400	48.0000	106.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	12	74.3300	64.0000	89.0000	2	65.5000	64.0000	67.0000
Carbonate Alkalinity, mg/L (as CO3)	12	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	21	0.6900	0.2300	1.6000	6	0.8900	0.4500	1.4000
Organic Nitrogen, mg/L (as N)	21	0.3900	0.0000	1.2000	6	0.6300	0.1000	1.1000
Ammonia Nitrogen, mg/L (as N)	27	0.0300	0.0000	0.0800	7	0.0300	0.0000	0.0600
Un-ionized Ammonia Nitrogen, mg/L (as N)	20	0.0003	0.0000	0.0010	5	0.0002	0.0000	0.0004
Total Kjeldahl Nitrogen, mg/L (as N)	27	0.4800	0.0100	3.2000	7	0.5800	0.1000	1.1000
Nitrate Nitrogen, mg/L (as N)	43	0.3300	0.0300	1.5000	12	0.3200	0.0300	0.7000
Total Phosphate, mg/L (as PO4)	8	0.0400	0.0000	0.1200	3	0.0300	0.0000	0.0600
Total Phosphorous, mg/L (as P)	48	0.0200	0.0000	0.4400	13	0.0500	0.0100	0.4400
Total Hardness, mg/L (as CaCO3)	41	65.6300	40.0000	82.0000	10	62.8000	49.0000	76.0000
Noncarbonate Hardness, mg/L (asCaCO3)	17	7.8800	0.0000	22.0000	3	9.0000	2.0000	22.0000
Calcium, mg/l (as CaCO3)	29	54.5500	25.0000	68.0000	7	56.7100	46.0000	68.0000
Dissolved Calcium, mg/L (as Ca)	38	21.7900	10.0000	27.0000	9	22.3300	18.0000	27.0000
Dissolved Magnesium, mg/L (as Mg)	38	2.4900	1.0000	4.0000	9	2.2000	1.0000	3.5000
Potassium, mg/L	26	1.3100	0.7000	1.8000	7	1.3600	1.1000	1.6000
Chloride, mg/L	64	3.8900	1.0000	8.0000	13	4.1500	1.0000	8.0000
Sulfate, mg/L	36	6.8100	1.0000	11.0000	9	6.4400	1.0000	11.0000
Arsenic, ug/L	48	1.4200	0.0000	10.0000	13	1.6900	0.0000	10.0000
Chromium, ug/L	49	11.1000	0.0000	100.0000	13	8.7700	0.0000	20.0000
Copper, ug/L	41	13.1700	1.0000	240.0000	11	7.0000	1.0000	41.0000
Iron, ug/L	49	119.1800	10.0000	700.0000	13	160.7700	10.0000	460.0000
Lead, ug/L	42	9.0200	0.0000	200.0000	11	3.3600	0.0000	7.0000
Manganese, ug/L	51	60.4900	0.0000	440.0000	14	56.4300	0.0000	160.0000
Nickel, ug/L	42	11.7900	0.0000	290.0000	11	2.6400	1.0000	6.0000
Zinc, ug/L	42	32.7900	0.0000	610.0000	11	71.6400	8.0000	610.0000
Aluminum, ug/L	44	92.0500	10.0000	500.0000	12	126.6700	10.0000	320.0000
Fecal Coliform (Colonies/100 ml)	25	3.5600	0.0000	24.0000	7	5.5700	0.0000	24.0000
Fecal Coliform (Colonies/100 ml)	42	20.7400	0.0000	150.0000	12	21.5000	0.0000	140.0000
Calcium Hardness, mg/L (as CaCO3)	39	64.4400	40.0000	78.0000	9	64.7800	49.0000	77.0000
Orthophosphate, mg/L (as P)	43	0.0100	0.0000	0.0300	12	0.0100	0.0000	0.0200
Ammonia Nitrogen, mg/L (as NH4)	6	0.0300	0.0000	0.1000	2	0.0200	0.0000	0.0400
Total Phosphorous, mg/L (as PO4)	15	0.1500	0.0000	1.4000	5	0.3300	0.0300	1.4000
Total Nitrogen, mg/L (as NO3)	21	3.0600	1.0000	7.1000	6	3.9700	2.0000	6.3000
Mercury, ug/L	47	0.1500	0.0000	0.5000	12	0.1600	0.0000	0.5000

Table XI. Water Quality Data for the White River Site: Period of Record and Winter Season.

STATION 1 WHITE RIVER	PERIOD OF RECORD N	MEAN	MIN	MAX	WINTER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	234	9.8600	2.2000	30.0000	38	8.5900	3.5000	12.0000
Flow, CFS	51	1755.0600	20.0000	4660.0000	7	1958.8600	355.0000	3890.0000
Turbidity, FTU	37	1.6700	0.4000	14.0000	10	1.6300	0.5000	4.0000
Color, Units	54	4.8500	0.0000	20.0000	13	3.9200	0.0000	10.0000
Conductivity, Micromhos/cm	239	137.2900	61.0000	462.0000	40	147.1800	92.0000	462.0000
Dissolved Oxygen, mg/L	234	9.4500	2.1000	15.8000	38	8.5700	3.9000	12.5000
Dissolved Oxygen, % Saturation	234	82.2800	19.4000	140.2000	38	72.2600	32.8000	103.3000
Biochemical Oxygen Demand, mg/L	77	1.1500	0.1000	4.2000	15	0.8400	0.1000	1.8000
pH, Standard Units	233	7.6200	6.2000	8.8500	38	7.3700	6.2000	8.1700
Carbon Dioxide, mg/L	6	3.2300	1.4000	7.2000				
Total Alkalinity, mg/L (as CaCO3)	75	58.0800	27.0000	106.0000	13	59.7700	48.0000	73.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	12	74.3300	64.0000	89.0000	1	82.0000	82.0000	82.0000
Carbonate Alkalinity, mg/L (as CO3)	12	0.0000	0.0000	0.0000	1	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	21	0.6900	0.2300	1.6000	3	1.1100	0.5400	1.6000
Organic Nitrogen, mg/L (as N)	21	0.3900	0.0000	1.2000	3	0.7200	0.1400	1.2000
Ammonia Nitrogen, mg/L (as N)	27	0.0300	0.0000	0.0800	5	0.0300	0.0000	0.0700
Un-ionized Ammonia Nitrogen, mg/L (as N)	20	0.0003	0.0000	0.0010	4	0.0001	0.0000	0.0002
Total Kjeldahl Nitrogen, mg/L (as N)	27	0.4800	0.0100	3.2000	5	1.1000	0.1000	3.2000
Nitrate Nitrogen, mg/L (as N)	43	0.3300	0.0300	1.5000	10	0.3400	0.2000	0.4200
Total Phosphate, mg/L (as PO4)	8	0.0400	0.0000	0.1200	2	0.0000	0.0000	0.0000
Total Phosphorous, mg/L (as P)	48	0.0200	0.0000	0.4400	11	0.0100	0.0000	0.0300
Total Hardness, mg/L (as CaCO3)	41	65.6300	40.0000	82.0000	8	67.3800	56.0000	82.0000
Noncarbonate Hardness, mg/L (asCaCO3)	17	7.8800	0.0000	22.0000	3	8.3300	0.0000	15.0000
Calcium, mg/l (as CaCO3)	29	54.5500	25.0000	68.0000	6	54.5000	50.0000	62.0000
Dissolved Calcium, mg/L (as Ca)	38	21.7900	10.0000	27.0000	9	21.8900	20.0000	25.0000
Dissolved Magnesium, mg/L (as Mg)	38	2.4900	1.0000	4.0000	9	2.7200	2.1000	4.0000
Potassium, mg/L	26	1.3100	0.7000	1.8000	5	1.4200	1.3000	1.6000
Chloride, mg/L	64	3.8900	1.0000	8.0000	10	4.0000	2.0000	7.0000
Sulfate, mg/L	36	6.8100	1.0000	11.0000	7	6.5700	5.0000	9.0000
Arsenic, ug/L	48	1.4200	0.0000	10.0000	12	1.0000	0.0000	3.0000
Chromium, ug/L	49	11.1000	0.0000	100.0000	12	14.1700	0.0000	100.0000
Copper, ug/L	41	13.1700	1.0000	240.0000	11	13.2700	1.0000	110.0000
Iron, ug/L	49	119.1800	10.0000	700.0000	12	138.3300	40.0000	350.0000
Lead, ug/L	42	9.0200	0.0000	200.0000	11	5.0000	1.0000	20.0000
Manganese, ug/L	51	60.4900	0.0000	440.0000	13	108.0800	0.0000	440.0000
Nickel, ug/L	42	11.7900	0.0000	290.0000	11	8.0900	1.0000	50.0000
Zinc, ug/L	42	32.7900	0.0000	610.0000	11	23.8200	10.0000	100.0000
Aluminum, ug/L	44	92.0500	10.0000	500.0000	11	80.0000	10.0000	250.0000
Fecal Coliform (Colonies/100 ml)	25	3.5600	0.0000	24.0000	3	1.3300	0.0000	4.0000
Fecal Coliform (Colonies/100 ml)	42	20.7400	0.0000	150.0000	10	22.8000	0.0000	75.0000
Calcium Hardness, mg/L (as CaCO3)	39	64.4400	40.0000	78.0000	9	65.8900	59.0000	76.0000
Orthophosphate, mg/L (as P)	43	0.0100	0.0000	0.0300	10	0.0100	0.0000	0.0200
Ammonia Nitrogen, mg/L (as NH4)	6	0.0300	0.0000	0.1000	2	0.0100	0.0000	0.0200
Total Phosphorous, mg/L (as PO4)	15	0.1500	0.0000	1.4000	4	0.0300	0.0000	0.0600
Total Nitrogen, mg/L (as NO3)	21	3.0600	1.0000	7.1000	3	4.9700	2.4000	7.1000
Mercury, ug/L	47	0.1500	0.0000	0.5000	12	0.1300	0.0000	0.5000

Table XII. Water Quality Data for the Eureka Springs Site: Period of Record and Spring Season.

STATION 2 EUREKA SPRINGS	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	4419	11.2000	2.2000	31.0000	773	11.1600	4.5000	26.5000
Turbidity, FTU	74	0.9500	0.2000	5.5000	26	1.0000	0.2000	5.2000
Transparency, Inches	175	185.8500	8.0000	462.0000	29	227.2400	8.0000	462.0000
Color, Units	97	4.2300	0.0000	30.0000	28	4.6100	0.0000	10.0000
Conductivity, Micromhos/cm	4404	135.4800	59.0000	270.0000	773	135.3600	108.0000	270.0000
Dissolved Oxygen, mg/L	4386	7.7800	0.0000	17.8000	754	9.3300	4.0000	11.7000
Dissolved Oxygen, % Saturation	4386	69.9900	0.0000	204.6000	754	84.0800	32.8000	121.8000
Biochemical Oxygen Demand, mg/L	112	1.0400	0.0000	4.2000	32	1.1500	0.0800	2.9000
pH, Standard Units	4331	7.6400	5.7000	9.8000	747	7.8300	7.0000	9.8000
Carbon Dioxide, mg/L	12	2.8300	0.1000	10.0000	4	1.4800	0.1000	3.2000
Total Alkalinity, mg/L (as CaCO3)	104	55.6800	27.0000	79.0000	28	55.9600	47.0000	66.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	13	68.1500	56.0000	78.0000	4	68.2500	63.0000	73.0000
Carbonate Alkalinity, mg/L (as CO3)	10	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	41	0.6500	0.1500	2.6000	12	0.4900	0.2500	0.7600
Organic Nitrogen, mg/L (as N)	41	0.4100	0.0300	2.5000	12	0.2500	0.0300	0.4900
Ammonia Nitrogen, mg/L (as N)	53	0.0400	0.0000	0.1800	16	0.0500	0.0100	0.1400
Un-ionized Ammonia Nitrogen, mg/L (as N)	39	0.0016	0.0000	0.0100	13	0.0024	0.0001	0.0100
Total Kjeldahl Nitrogen, mg/L (as N)	53	0.4100	0.0700	2.5000	16	0.4000	0.0700	1.7000
Nitrate Nitrogen, mg/L (as N)	107	0.2200	0.0000	0.6000	35	0.2500	0.0700	0.6000
Total Phosphate, mg/L (as PO4)	12	0.0500	0.0000	0.2500	4	0.1400	0.0300	0.2500
Total Phosphorous, mg/L (as P)	121	0.0200	0.0100	0.0800	38	0.0200	0.0100	0.0800
Total Hardness, mg/L (as CaCO3)	71	63.0800	19.0000	110.0000	18	61.3900	19.0000	110.0000
Noncarbonate Hardness, mg/L (asCaCO3)	22	12.9100	0.0000	54.0000	6	16.5000	6.0000	54.0000
Calcium, mg/l (as CaCO3)	58	53.5700	10.0000	98.0000	12	53.0800	10.0000	98.0000
Dissolved Calcium, mg/L (as Ca)	61	21.5400	4.1000	39.0000	20	20.9100	4.1000	39.0000
Dissolved Magnesium, mg/L (as Mg)	61	2.0900	1.0000	4.0000	20	1.9700	1.7000	2.4000
Potassium, mg/L	50	1.3900	0.9000	2.3000	14	1.4000	0.9000	1.8000
Chloride, mg/L	75	3.6900	2.0000	8.0000	18	3.3900	2.0000	5.0000
Sulfate, mg/L	56	6.7700	1.0000	10.0000	14	7.4300	5.0000	10.0000
Arsenic, ug/L	90	1.0800	0.0000	10.0000	28	0.8600	0.0000	1.0000
Chromium, ug/L	87	10.1000	0.0000	100.0000	26	9.4200	0.0000	20.0000
Copper, ug/L	78	9.2300	0.0000	240.0000	26	3.7700	1.0000	21.0000
Iron, ug/L	89	74.3800	10.0000	340.0000	26	61.9200	10.0000	180.0000
Lead, ug/L	78	6.4100	0.0000	200.0000	26	4.0400	0.0000	15.0000
Manganese, ug/L	91	31.1500	0.0000	250.0000	28	12.8600	0.0000	40.0000
Nickel, ug/L	78	7.0500	0.0000	290.0000	26	3.0000	0.0000	10.0000
Zinc, ug/L	78	24.9900	0.0000	400.0000	26	18.0800	0.0000	70.0000
Aluminum, ug/L	86	59.0700	10.0000	400.0000	28	58.5700	10.0000	160.0000
Fecal Coliform (Colonies/100 ml)	18	3.7200	0.0000	24.0000	4	4.0000	4.0000	4.0000
Fecal Coliform (Colonies/100 ml)	39	10.3100	0.0000	350.0000	13	1.0000	0.0000	9.0000
Calcium Hardness, mg/L (as CaCO3)	61	62.3900	19.0000	106.0000	20	60.3500	19.0000	106.0000
Orthophosphate, mg/L (as P)	117	0.0100	0.0000	0.0500	38	0.0100	0.0100	0.0500
Chlorophyll A, ug/L	37	1.2000	0.1000	4.4000	11	0.8000	0.1000	1.8000
Chlorophyll B, ug/L	37	0.1000	0.1000	0.2000	11	0.1000	0.1000	0.1000
Ammonia Nitrogen, mg/L (as NH4)	12	0.0400	0.0000	0.2000	4	0.0500	0.0100	0.1000
Total Phosphorous, mg/L (as PO4)	28	0.0600	0.0300	0.2500	9	0.0800	0.0300	0.2500
Total Nitrogen, mg/L (as NO3)	41	2.8700	0.7000	12.0000	12	2.1700	1.1000	3.4000
Mercury, ug/L	90	0.2000	0.0000	3.8000	28	0.1200	0.0000	0.5000
Depth of Reservoir, Feet	4455	188.2000	146.0000	210.0000	773	192.7400	170.0000	204.0000

Table XIII. Water Quality Data for the Eureka Springs Site: Period of Record and Summer Season.

STATION 2	PERIOD OF RECORD				SUMMER SEASON			
EUREKA SPRINGS	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	4419	11.2000	2.2000	31.0000	787	15.2600	5.5000	31.0000
Turbidity, FTU	74	0.9500	0.2000	5.5000	20	0.7300	0.2000	1.5000
Transparency, Inches	175	185.8500	8.0000	462.0000	28	186.7900	108.0000	294.0000
Color, Units	97	4.2300	0.0000	30.0000	23	4.5200	0.0000	14.0000
Conductivity, Micromhos/cm	4404	135.4800	59.0000	270.0000	790	136.5400	101.0000	170.0000
Dissolved Oxygen, mg/L	4386	7.7800	0.0000	17.8000	787	6.7400	0.2000	17.8000
Dissolved Oxygen, % Saturation	4386	69.9900	0.0000	204.6000	787	68.1700	1.7000	204.6000
Biochemical Oxygen Demand, mg/L	112	1.0400	0.0000	4.2000	30	1.0300	0.0000	4.2000
pH, Standard Units	4331	7.6400	5.7000	9.8000	788	7.7500	6.8000	9.4200
Carbon Dioxide, mg/L	12	2.8300	0.1000	10.0000	2	5.1500	0.3000	10.0000
Total Alkalinity, mg/L (as CaCO3)	104	55.6800	27.0000	79.0000	25	55.7200	46.0000	79.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	13	68.1500	56.0000	78.0000	2	63.5000	62.0000	65.0000
Carbonate Alkalinity, mg/L (as CO3)	10	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	41	0.6500	0.1500	2.6000	11	0.9400	0.1500	2.6000
Organic Nitrogen, mg/L (as N)	41	0.4100	0.0300	2.5000	11	0.7200	0.0600	2.5000
Ammonia Nitrogen, mg/L (as N)	53	0.0400	0.0000	0.1800	13	0.0500	0.0000	0.1800
Un-ionized Ammonia Nitrogen, mg/L (as NH3)	39	0.0016	0.0000	0.0100	10	0.0027	0.0000	0.0100
Total Kjeldahl Nitrogen, mg/L (as N)	53	0.4100	0.0700	2.5000	13	0.6600	0.1000	2.5000
Nitrate Nitrogen, mg/L (as N)	107	0.2200	0.0000	0.6000	29	0.1800	0.0000	0.6000
Total Phosphate, mg/L (as PO4)	12	0.0500	0.0000	0.2500	4	0.0200	0.0000	0.0300
Total Phosphorous, mg/L (as P)	121	0.0200	0.0100	0.0800	33	0.0200	0.0100	0.0700
Total Hardness, mg/L (as CaCO3)	71	63.0800	19.0000	110.0000	17	63.1800	49.0000	75.0000
Noncarbonate Hardness, mg/L (asCaCO3)	22	12.9100	0.0000	54.0000	4	12.2500	5.0000	19.0000
Calcium, mg/l (as CaCO3)	58	53.5700	10.0000	98.0000	13	55.1500	46.0000	65.0000
Dissolved Calcium, mg/L (as Ca)	61	21.5400	4.1000	39.0000	15	22.0700	18.0000	26.0000
Dissolved Magnesium, mg/L (as Mg)	61	2.0900	1.0000	4.0000	15	1.9400	1.0000	2.4000
Potassium, mg/L	50	1.3900	0.9000	2.3000	12	1.3900	1.1000	1.7000
Chloride, mg/L	75	3.6900	2.0000	8.0000	18	4.2200	3.0000	8.0000
Sulfate, mg/L	56	6.7700	1.0000	10.0000	14	6.5000	1.0000	10.0000
Arsenic, ug/L	90	1.0800	0.0000	10.0000	24	1.2900	0.0000	10.0000
Chromium, ug/L	87	10.1000	0.0000	100.0000	24	8.9200	0.0000	20.0000
Copper, ug/L	78	9.2300	0.0000	240.0000	21	4.9000	1.0000	41.0000
Iron, ug/L	89	74.3800	10.0000	340.0000	24	66.2500	10.0000	270.0000
Lead, ug/L	78	6.4100	0.0000	200.0000	21	3.4300	0.0000	9.0000
Manganese, ug/L	91	31.1500	0.0000	250.0000	24	16.6700	10.0000	60.0000
Nickel, ug/L	78	7.0500	0.0000	290.0000	21	2.1900	0.0000	7.0000
Zinc, ug/L	78	24.9900	0.0000	400.0000	21	39.4300	0.0000	400.0000
Aluminum, ug/L	86	59.0700	10.0000	400.0000	23	50.0000	10.0000	240.0000
Fecal Coliform (Colonies/100 ml)	18	3.7200	0.0000	24.0000	7	5.5700	0.0000	24.0000
Fecal Coliform (Colonies/100 ml)	39	10.3100	0.0000	350.0000	10	35.1000	0.0000	350.0000
Calcium Hardness, mg/L (as CaCO3)	61	62.3900	19.0000	106.0000	15	63.0700	49.0000	75.0000
Orthophosphate, mg/L (as P)	117	0.0100	0.0000	0.0500	32	0.0100	0.0000	0.0200
Chlorophyll A, ug/L	37	1.2000	0.1000	4.4000	11	1.9200	0.5000	4.4000
Chlorophyll B, ug/L	37	0.1000	0.1000	0.2000	11	0.1100	0.1000	0.2000
Ammonia Nitrogen, mg/L (as NH4)	12	0.0400	0.0000	0.2000	4	0.0600	0.0000	0.2000
Total Phosphorous, mg/L (as PO4)	28	0.0600	0.0300	0.2500	9	0.0500	0.0300	0.1200
Total Nitrogen, mg/L (as NO3)	41	2.8700	0.7000	12.0000	11	4.2100	0.7000	12.0000
Mercury, ug/L	90	0.2000	0.0000	3.8000	23	0.1500	0.0000	0.5000
Depth of Reservoir, Feet	4455	188.2000	146.0000	210.0000	798	187.9700	173.0000	210.0000

Table XIV. Water Quality Data for the Eureka Springs Site: Period of Record and Winter Season.

STATION 2 EUREKA SPRINGS	PERIOD OF RECORD N	MEAN	MIN	MAX	WINTER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	4419	11.2000	2.2000	31.0000	642	9.4400	6.0000	16.0000
Turbidity, FTU	74	0.9500	0.2000	5.5000	20	1.1000	0.4000	5.5000
Transparency, Inches	175	185.8500	8.0000	462.0000	29	164.3400	84.0000	228.0000
Color, Units	97	4.2300	0.0000	30.0000	29	4.6200	0.0000	30.0000
Conductivity, Micromhos/cm	4404	135.4800	59.0000	270.0000	623	135.7300	89.0000	219.0000
Dissolved Oxygen, mg/L	4386	7.7800	0.0000	17.8000	642	6.3600	0.0000	11.3000
Dissolved Oxygen, % Saturation	4386	69.9900	0.0000	204.6000	642	55.3800	0.0000	93.0000
Biochemical Oxygen Demand, mg/L	112	1.0400	0.0000	4.2000	24	0.7300	0.0000	2.9000
pH, Standard Units	4331	7.6400	5.7000	9.8000	601	7.3000	5.7000	8.1000
Carbon Dioxide, mg/L	12	2.8300	0.1000	10.0000				
Total Alkalinity, mg/L (as CaCO3)	104	55.6800	27.0000	79.0000	26	55.5000	44.0000	66.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	13	68.1500	56.0000	78.0000				
Carbonate Alkalinity, mg/L (as CO3)	10	0.0000	0.0000	0.0000				
Total Nitrogen, mg/L (as N)	41	0.6500	0.1500	2.6000	6	0.6300	0.3500	0.8700
Organic Nitrogen, mg/L (as N)	41	0.4100	0.0300	2.5000	6	0.4400	0.2200	0.6600
Ammonia Nitrogen, mg/L (as N)	53	0.0400	0.0000	0.1800	10	0.0300	0.0000	0.0700
Un-ionized Ammonia Nitrogen, mg/L (as N)	39	0.0016	0.0000	0.0100	8	0.0003	0.0000	0.0010
Total Kjeldahl Nitrogen, mg/L (as N)	53	0.4100	0.0700	2.5000	10	0.3100	0.1000	0.6600
Nitrate Nitrogen, mg/L (as N)	107	0.2200	0.0000	0.6000	26	0.2200	0.0800	0.3700
Total Phosphate, mg/L (as PO4)	12	0.0500	0.0000	0.2500	4	0.0000	0.0000	0.0000
Total Phosphorous, mg/L (as P)	121	0.0200	0.0100	0.0800	27	0.0200	0.0100	0.0700
Total Hardness, mg/L (as CaCO3)	71	63.0800	19.0000	110.0000	19	60.2100	47.0000	68.0000
Noncarbonate Hardness, mg/L (asCaCO3)	22	12.9100	0.0000	54.0000	4	7.2500	0.0000	13.0000
Calcium, mg/l (as CaCO3)	58	53.5700	10.0000	98.0000	17	49.8800	38.0000	55.0000
Dissolved Calcium, mg/L (as Ca)	61	21.5400	4.1000	39.0000	15	20.5300	15.0000	22.0000
Dissolved Magnesium, mg/L (as Mg)	61	2.0900	1.0000	4.0000	15	2.2500	1.8000	4.0000
Potassium, mg/L	50	1.3900	0.9000	2.3000	10	1.4800	1.2000	2.3000
Chloride, mg/L	75	3.6900	2.0000	8.0000	12	3.7500	2.0000	6.0000
Sulfate, mg/L	56	6.7700	1.0000	10.0000	11	6.7300	5.0000	10.0000
Arsenic, ug/L	90	1.0800	0.0000	10.0000	23	0.9600	0.0000	3.0000
Chromium, ug/L	87	10.1000	0.0000	100.0000	23	10.4300	0.0000	100.0000
Copper, ug/L	78	9.2300	0.0000	240.0000	21	10.1900	0.0000	110.0000
Iron, ug/L	89	74.3800	10.0000	340.0000	23	93.4800	10.0000	340.0000
Lead, ug/L	78	6.4100	0.0000	200.0000	21	3.7600	1.0000	20.0000
Manganese, ug/L	91	31.1500	0.0000	250.0000	23	49.7800	10.0000	250.0000
Nickel, ug/L	78	7.0500	0.0000	290.0000	21	4.4800	0.0000	50.0000
Zinc, ug/L	78	24.9900	0.0000	400.0000	21	21.5200	10.0000	70.0000
Aluminum, ug/L	86	59.0700	10.0000	400.0000	22	67.2700	10.0000	400.0000
Fecal Coliform (Colonies/100 ml)	18	3.7200	0.0000	24.0000	2	0.0000	0.0000	0.0000
Fecal Coliform (Colonies/100 ml)	39	10.3100	0.0000	350.0000	10	3.3000	0.0000	29.0000
Calcium Hardness, mg/L (as CaCO3)	61	62.3900	19.0000	106.0000	15	60.6000	47.0000	66.0000
Orthophosphate, mg/L (as P)	117	0.0100	0.0000	0.0500	26	0.0100	0.0000	0.0400
Chlorophyll A, ug/L	37	1.2000	0.1000	4.4000	7	1.1700	0.4000	2.2000
Chlorophyll B, ug/L	37	0.1000	0.1000	0.2000	7	0.1000	0.1000	0.1000
Ammonia Nitrogen, mg/L (as NH4)	12	0.0400	0.0000	0.2000	4	0.0100	0.0000	0.0200
Total Phosphorous, mg/L (as PO4)	28	0.0600	0.0300	0.2500	8	0.0400	0.0300	0.0600
Total Nitrogen, mg/L (as NO3)	41	2.8700	0.7000	12.0000	6	2.7700	1.6000	3.9000
Mercury, ug/L	90	0.2000	0.0000	3.8000	23	0.2900	0.0000	3.8000
Depth of Reservoir, Feet	4455	188.2000	146.0000	210.0000	652	188.6000	175.0000	205.0000

Table XV. Water Quality Data for the Prairie Creek Site: Period of Record and Spring Season.

STATION 3 PRAIRIE CREEK	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	46	18.7500	1.5000	31.0000	14	20.2600	17.0000	25.5000
Turbidity, FTU	38	4.8200	0.1000	22.0000	13	6.3400	1.5000	22.0000
Transparency, Inches	42	45.4000	12.0000	84.0000	14	40.5000	12.0000	72.0000
Color, Units	45	9.8400	0.0000	80.0000	14	19.5700	1.0000	80.0000
Conductivity, Micromhos/cm	46	156.9300	101.0000	307.0000	14	138.3600	101.0000	235.0000
Dissolved Oxygen, mg/L	46	9.6000	6.2000	13.4000	14	9.6800	6.2000	11.0000
Dissolved Oxygen, % Saturation	46	99.7400	73.8000	122.2000	14	105.5100	73.8000	122.2000
Biochemical Oxygen Demand, mg/L	39	1.6000	0.4000	2.8000	13	2.0200	0.9000	2.6000
pH, Standard Units	46	7.8700	6.2000	9.0000	14	7.9600	7.0000	9.0000
Carbon Dioxide, mg/L	3	2.7700	0.9000	3.8000	1	3.8000	3.8000	3.8000
Total Alkalinity, mg/L (as CaCO3)	40	68.0500	31.0000	240.0000	12	47.6700	31.0000	62.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	99.5000	59.0000	140.0000	1	59.0000	59.0000	59.0000
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500	1	0.0500	0.0500	0.0500
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0100	0.0100	0.0100	1	0.0100	0.0100	0.0100
Total Kjeldahl Nitrogen, mg/L (as N)	1	0.8000	0.8000	0.8000	1	0.8000	0.8000	0.8000
Nitrate Nitrogen, mg/L (as N)	19	0.5700	0.0200	1.4000	7	0.5700	0.2000	1.0000
Total Phosphorous, mg/L (as P)	19	0.0300	0.0100	0.0900	7	0.0400	0.0100	0.0900
Total Hardness, mg/L (as CaCO3)	32	69.8100	19.0000	128.0000	9	57.4400	19.0000	83.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	19.3600	0.0000	73.0000	3	28.0000	7.0000	52.0000
Calcium, mg/l (as CaCO3)	26	60.5000	11.0000	120.0000	7	51.5700	11.0000	78.0000
Dissolved Calcium, mg/L (as Ca)	29	24.5000	4.5000	51.0000	10	20.0500	4.5000	31.0000
Dissolved Magnesium, mg/L (as Mg)	29	1.6300	1.1000	2.3000	10	1.4800	1.1000	2.0000
Chloride, mg/L	4	6.5000	4.0000	14.0000	1	4.0000	4.0000	4.0000
Fecal Coliform (Colonies/100 ml)	3	1.0000	0.0000	3.0000				
Fecal Coliform (Colonies/100 ml)	39	9.0800	0.0000	95.0000	14	4.7100	0.0000	23.0000
Calcium Hardness, mg/L (as CaCO3)	29	67.9300	19.0000	135.0000	10	56.2000	19.0000	83.0000
Orthophosphate, mg/L (as P)	19	0.0200	0.0100	0.0300	7	0.0200	0.0100	0.0300
Chlorophyll A, ug/L	22	4.1100	0.1000	14.0000	8	4.5800	0.1000	7.3000
Chlorophyll B, ug/L	22	0.3400	0.1000	1.7000	8	0.2500	0.1000	0.9000
Total Phosphorous, mg/L (as PO4)	2	0.0900	0.0900	0.0900				
Depth of Reservoir, Feet	104	7.4100	4.0000	16.0000	35	9.3100	4.0000	16.0000

Table XVI. Water Quality Data for the Prairie Creek Site: Period of Record and Summer Season.

STATION 3 PRAIRIE CREEK	PERIOD OF RECORD N	MEAN	MIN	MAX	SUMMER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	46	18.7500	1.5000	31.0000	14	28.3600	26.5000	31.0000
Turbidity, FTU	38	4.8200	0.1000	22.0000	11	4.4500	0.1000	20.0000
Transparency, Inches	42	45.4000	12.0000	84.0000	11	50.0000	34.0000	84.0000
Color, Units	45	9.8400	0.0000	80.0000	13	5.0800	2.0000	10.0000
Conductivity, Micromhos/cm	46	156.9300	101.0000	307.0000	14	128.2100	109.0000	143.0000
Dissolved Oxygen, mg/L	46	9.6000	6.2000	13.4000	14	8.0100	7.0000	9.1000
Dissolved Oxygen, % Saturation	46	99.7400	73.8000	122.2000	14	101.3600	86.4000	116.7000
Biochemical Oxygen Demand, mg/L	39	1.6000	0.4000	2.8000	12	1.6100	1.0000	2.8000
pH, Standard Units	46	7.8700	6.2000	9.0000	14	8.3200	7.6000	8.9000
Carbon Dioxide, mg/L	3	2.7700	0.9000	3.8000				
Total Alkalinity, mg/L (as CaCO3)	40	68.0500	31.0000	240.0000	12	54.8300	42.0000	91.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	99.5000	59.0000	140.0000				
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0100	0.0100	0.0100				
Total Kjeldahl Nitrogen, mg/L (as N)	1	0.8000	0.8000	0.8000				
Nitrate Nitrogen, mg/L (as N)	19	0.5700	0.0200	1.4000	6	0.0800	0.0200	0.1000
Total Phosphorous, mg/L (as P)	19	0.0300	0.0100	0.0900	6	0.0200	0.0100	0.0300
Total Hardness, mg/L (as CaCO3)	32	69.8100	19.0000	128.0000	9	59.7800	50.0000	75.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	19.3600	0.0000	73.0000	2	10.0000	2.0000	18.0000
Calcium, mg/l (as CaCO3)	26	60.5000	11.0000	120.0000	7	53.5700	45.0000	68.0000
Dissolved Calcium, mg/L (as Ca)	29	24.5000	4.5000	51.0000	8	21.0000	18.0000	27.0000
Dissolved Magnesium, mg/L (as Mg)	29	1.6300	1.1000	2.3000	8	1.6800	1.2000	2.1000
Chloride, mg/L	4	6.5000	4.0000	14.0000	1	4.0000	4.0000	4.0000
Fecal Coliform (Colonies/100 ml)	3	1.0000	0.0000	3.0000	1	0.0000	0.0000	0.0000
Fecal Coliform (Colonies/100 ml)	39	9.0800	0.0000	95.0000	9	11.5600	0.0000	83.0000
Calcium Hardness, mg/L (as CaCO3)	29	67.9300	19.0000	135.0000	8	59.5000	50.0000	75.0000
Orthophosphate, mg/L (as P)	19	0.0200	0.0100	0.0300	6	0.0200	0.0100	0.0300
Chlorophyll A, ug/L	22	4.1100	0.1000	14.0000	6	4.9800	2.2000	14.0000
Chlorophyll B, ug/L	22	0.3400	0.1000	1.7000	6	0.4500	0.1000	1.7000
Total Phosphorous, mg/L (as PO4)	2	0.0900	0.0900	0.0900	1	0.0900	0.0900	0.0900
Depth of Reservoir, Feet	104	7.4100	4.0000	16.0000	26	6.6900	4.0000	13.0000

Table XVII. Water Quality Data for the Prairie Creek Site: Period of Record and Winter Season.

STATION 3 PRAIRIE CREEK	N	PERIOD OF RECORD MEAN	MIN	MAX	N	WINTER SEASON MEAN	MIN	MAX
Temperature, Celsius	46	18.7500	1.5000	31.0000	11	8.4900	5.5000	10.0000
Turbidity, FTU	38	4.8200	0.1000	22.0000	10	2.8400	0.6000	10.0000
Transparency, Inches	42	45.4000	12.0000	84.0000	11	45.7300	22.0000	71.0000
Color, Units	45	9.8400	0.0000	80.0000	11	4.2700	0.0000	10.0000
Conductivity, Micromhos/cm	46	156.9300	101.0000	307.0000	11	214.6400	134.0000	307.0000
Dissolved Oxygen, mg/L	46	9.6000	6.2000	13.4000	11	10.8400	9.6000	13.4000
Dissolved Oxygen, % Saturation	46	99.7400	73.8000	122.2000	11	91.6300	82.4000	104.7000
Biochemical Oxygen Demand, mg/L	39	1.6000	0.4000	2.8000	10	1.1700	0.4000	2.3000
pH, Standard Units	46	7.8700	6.2000	9.0000	11	7.3100	6.2000	8.1000
Carbon Dioxide, mg/L	3	2.7700	0.9000	3.8000				
Total Alkalinity, mg/L (as CaCO3)	40	68.0500	31.0000	240.0000	9	113.0000	44.0000	240.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	99.5000	59.0000	140.0000				
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0100	0.0100	0.0100				
Total Kjeldahl Nitrogen, mg/L (as N)	1	0.8000	0.8000	0.8000				
Nitrate Nitrogen, mg/L (as N)	19	0.5700	0.0200	1.4000	6	1.0700	0.3200	1.4000
Total Phosphorous, mg/L (as P)	19	0.0300	0.0100	0.0900	6	0.0200	0.0100	0.0300
Total Hardness, mg/L (as CaCO3)	32	69.8100	19.0000	128.0000	7	91.8600	64.0000	128.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	19.3600	0.0000	73.0000	2	39.5000	6.0000	73.0000
Calcium, mg/l (as CaCO3)	26	60.5000	11.0000	120.0000	5	70.0000	55.0000	114.0000
Dissolved Calcium, mg/L (as Ca)	29	24.5000	4.5000	51.0000	7	31.1400	22.0000	51.0000
Dissolved Magnesium, mg/L (as Mg)	29	1.6300	1.1000	2.3000	7	1.8100	1.5000	2.3000
Chloride, mg/L	4	6.5000	4.0000	14.0000	1	14.0000	14.0000	14.0000
Fecal Coliform (Colonies/100 ml)	3	1.0000	0.0000	3.0000	1	3.0000	3.0000	3.0000
Fecal Coliform (Colonies/100 ml)	39	9.0800	0.0000	95.0000	10	16.2000	0.0000	95.0000
Calcium Hardness, mg/L (as CaCO3)	29	67.9300	19.0000	135.0000	7	85.1400	62.0000	135.0000
Orthophosphate, mg/L (as P)	19	0.0200	0.0100	0.0300	6	0.0200	0.0100	0.0200
Chlorophyll A, ug/L	22	4.1100	0.1000	14.0000	7	2.9900	0.7000	6.7000
Chlorophyll B, ug/L	22	0.3400	0.1000	1.7000	7	0.3900	0.1000	1.3000
Total Phosphorous, mg/L (as PO4)	2	0.0900	0.0900	0.0900	1	0.0900	0.0900	0.0900
Depth of Reservoir, Feet	104	7.4100	4.0000	16.0000	25	5.9200	4.0000	12.0000

Table XVIII. Water Quality Data for the Hwy12 Site: Period of Record and Spring Season.

STATION 4 HWY12	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	91	13.0600	2.5000	29.0000	28	12.5800	6.9000	19.5000
Flow, CFS	9	476.4400	32.0000	1600.0000	1	1540.0000	1540.0000	1540.0000
Turbidity, FTU	74	7.9700	0.5000	60.0000	26	9.7000	0.5000	59.0000
Transparency, Inches	45	71.2400	10.0000	194.0000	14	56.4300	10.0000	120.0000
Color, Units	90	18.7700	0.0000	180.0000	29	29.2400	0.0000	180.0000
Conductivity, Micromhos/cm	107	135.0600	90.0000	323.0000	29	123.9000	95.0000	175.0000
Dissolved Oxygen, mg/L	90	6.6100	0.1000	13.8000	28	7.4100	3.9000	9.3000
Dissolved Oxygen, % Saturation	90	61.6100	0.9000	104.0000	28	69.4900	40.2000	96.8000
Biochemical Oxygen Demand, mg/L	92	1.1900	0.0000	4.2000	28	1.1600	0.3000	2.4000
pH, Standard Units	99	7.4500	6.0000	8.5000	29	7.3600	7.0000	8.0000
Carbon Dioxide, mg/L	12	4.5700	1.0000	11.0000	4	6.0300	4.1000	7.2000
Total Alkalinity, mg/L (as $CaCO_3$)	87	54.9400	30.0000	112.0000	25	45.5600	30.0000	79.0000
Bicarbonate Alkalinity, mg/L (as HCO_3)	21	73.2900	41.0000	136.0000	5	53.2000	41.0000	65.0000
Carbonate Alkalinity, mg/L (as CO_3)	21	0.0000	0.0000	0.0000	5	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	44	0.8600	0.1600	2.5000	14	1.0600	0.7200	1.8000
Organic Nitrogen, mg/L (as N)	45	0.4900	0.0000	4.7000	14	0.4000	0.0400	1.2000
Ammonia Nitrogen, mg/L (as N)	53	0.0800	0.0000	0.4500	16	0.0500	0.0100	0.1200
Un-ionized Ammonia Nitrogen, mg/L (as N)	39	0.0013	0.0000	0.0200	14	0.0006	0.0000	0.0030
Total Kjeldahl Nitrogen, mg/L (as N)	53	0.5200	0.0200	4.7000	16	0.4600	0.0600	1.2000
Nitrate Nitrogen, mg/L (as N)	87	0.4200	0.0000	1.6000	28	0.6200	0.2500	1.6000
Total Phosphate, mg/L (as PO_4)	16	0.0600	0.0000	0.1800	6	0.1000	0.0300	0.1800
Total Phosphorous, mg/L (as P)	87	0.0400	0.0100	0.6100	28	0.0400	0.0100	0.1700
Total Hardness, mg/L (as $CaCO_3$)	71	61.7000	37.0000	112.0000	19	53.7900	37.0000	79.0000
Noncarbonate Hardness, mg/L (as$CaCO_3$)	31	10.5200	0.0000	36.0000	7	16.8600	4.0000	33.0000
Calcium, mg/l (as $CaCO_3$)	50	52.4200	30.0000	88.0000	14	47.6400	30.0000	72.0000
Dissolved Calcium, mg/L (as Ca)	61	20.8500	12.0000	36.0000	21	18.6700	12.0000	29.0000
Dissolved Magnesium, mg/L (as Mg)	61	1.7000	1.2000	2.4000	21	1.5900	1.2000	2.0000
Potassium, mg/L	52	1.4600	1.0000	2.4000	14	1.4900	1.0000	2.0000
Chloride, mg/L	60	4.4200	2.0000	36.0000	15	3.5300	3.0000	5.0000
Sulfate, mg/L	60	6.7200	1.0000	11.0000	15	7.6000	5.0000	11.0000
Arsenic, ug/L	87	1.0200	0.0000	2.0000	28	0.9300	0.0000	2.0000
Chromium, ug/L	87	8.7400	0.0000	40.0000	28	9.6400	0.0000	20.0000
Copper, ug/L	72	3.6000	1.0000	20.0000	27	4.2600	1.0000	20.0000
Iron, ug/L	87	431.3800	10.0000	4000.0000	28	494.2900	50.0000	2300.0000
Lead, ug/L	71	3.7900	0.0000	23.0000	26	3.4200	0.0000	11.0000
Manganese, ug/L	87	405.5200	10.0000	4000.0000	28	56.4300	10.0000	140.0000
Nickel, ug/L	71	3.2800	0.0000	11.0000	26	3.0000	0.0000	11.0000
Zinc, ug/L	73	42.7400	0.0000	870.0000	26	16.1500	10.0000	60.0000
Aluminum, ug/L	85	254.9400	0.0000	4200.0000	28	286.7900	40.0000	1100.0000
Fecal Coliform (Colonies/100 ml)	4	0.7500	0.0000	2.0000				
Fecal Coliform (Colonies/100 ml)	39	2.2600	0.0000	20.0000	14	2.7100	0.0000	20.0000
Calcium Hardness, mg/L (as $CaCO_3$)	61	59.0300	35.0000	100.0000	21	53.1400	35.0000	79.0000
Orthophosphate, mg/L (as P)	87	0.0200	0.0000	0.0900	28	0.0200	0.0100	0.0900
Chlorophyll A, ug/L	22	2.5900	0.4000	7.7000	8	3.3800	0.7000	7.7000
Chlorophyll B, ug/L	22	0.1800	0.1000	0.7000	8	0.1600	0.1000	0.3000
Ammonia Nitrogen, mg/L (as NH_4)	12	0.1000	0.0000	0.3000	4	0.0500	0.0100	0.1000
Total Phosphorous, mg/L (as PO_4)	32	0.1400	0.0300	1.9000	10	0.0900	0.0300	0.1800
Total Nitrogen, mg/L (as NO_3)	44	3.8100	0.7000	11.0000	14	4.6400	3.2000	8.0000
Mercury, ug/L	87	0.1800	0.0000	1.3000	28	0.1300	0.0000	0.6000
Depth of Reservoir, Feet	176	109.2800	50.0000	135.0000	53	112.7900	70.0000	125.0000

Table XIX. Water Quality Data for the Hwy12 Site: Period of Record and Summer Season.

STATION 4 HWY12	PERIOD OF RECORD				SUMMER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	91	13.0600	2.5000	29.0000	26	18.7500	8.5000	29.0000
Flow, CFS	9	476.4400	32.0000	1600.0000	3	76.3300	32.0000	161.0000
Turbidity, FTU	74	7.9700	0.5000	60.0000	20	3.3200	0.7000	20.0000
Transparency, Inches	45	71.2400	10.0000	194.0000	11	105.3600	56.0000	162.0000
Color, Units	90	18.7700	0.0000	180.0000	23	10.3000	0.0000	40.0000
Conductivity, Micromhos/cm	107	135.0600	90.0000	323.0000	33	143.5200	90.0000	323.0000
Dissolved Oxygen, mg/L	90	6.6100	0.1000	13.8000	26	3.2500	0.1000	8.4000
Dissolved Oxygen, % Saturation	90	61.6100	0.9000	104.0000	26	38.9900	0.9000	103.7000
Biochemical Oxygen Demand, mg/L	92	1.1900	0.0000	4.2000	28	1.0600	0.0000	3.6000
pH, Standard Units	99	7.4500	6.0000	8.5000	29	7.6200	6.4000	8.5000
Carbon Dioxide, mg/L	12	4.5700	1.0000	11.0000	2	4.1000	1.0000	7.2000
Total Alkalinity, mg/L (as CaCO3)	87	54.9400	30.0000	112.0000	25	56.4800	36.0000	99.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	21	73.2900	41.0000	136.0000	5	91.6000	52.0000	121.0000
Carbonate Alkalinity, mg/L (as CO3)	21	0.0000	0.0000	0.0000	5	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	44	0.8600	0.1600	2.5000	11	0.7800	0.2900	1.6000
Organic Nitrogen, mg/L (as N)	45	0.4900	0.0000	4.7000	12	0.7800	0.1100	4.7000
Ammonia Nitrogen, mg/L (as N)	53	0.0800	0.0000	0.4500	14	0.0800	0.0000	0.3300
Un-ionized Ammonia Nitrogen, mg/L (as N)	39	0.0013	0.0000	0.0200	10	0.0037	0.0000	0.0200
Total Kjeldahl Nitrogen, mg/L (as N)	53	0.5200	0.0200	4.7000	14	0.7500	0.1000	4.7000
Nitrate Nitrogen, mg/L (as N)	87	0.4200	0.0000	1.6000	24	0.3300	0.0000	0.9000
Total Phosphate, mg/L (as PO4)	16	0.0600	0.0000	0.1800	6	0.0500	0.0000	0.1500
Total Phosphorous, mg/L (as P)	87	0.0400	0.0100	0.6100	24	0.0500	0.0100	0.6100
Total Hardness, mg/L (as CaCO3)	71	61.7000	37.0000	112.0000	19	67.6800	48.0000	110.0000
Noncarbonate Hardness, mg/L (asCaCO3)	31	10.5200	0.0000	36.0000	7	10.2900	0.0000	20.0000
Calcium, mg/l (as CaCO3)	50	52.4200	30.0000	88.0000	12	54.1700	42.0000	68.0000
Dissolved Calcium, mg/L (as Ca)	61	20.8500	12.0000	36.0000	16	23.0000	17.0000	35.0000
Dissolved Magnesium, mg/L (as Mg)	61	1.7000	1.2000	2.4000	16	1.7700	1.2000	2.2000
Potassium, mg/L	52	1.4600	1.0000	2.4000	15	1.3200	1.0000	1.7000
Chloride, mg/L	60	4.4200	2.0000	38.0000	17	6.1200	2.0000	38.0000
Sulfate, mg/L	60	6.7200	1.0000	11.0000	17	5.9400	1.0000	10.0000
Arsenic, ug/L	87	1.0200	0.0000	2.0000	24	1.0400	0.0000	2.0000
Chromium, ug/L	87	8.7400	0.0000	40.0000	24	9.1700	0.0000	40.0000
Copper, ug/L	72	3.6000	1.0000	20.0000	18	3.0000	1.0000	13.0000
Iron, ug/L	87	431.3800	10.0000	4000.0000	24	162.5000	10.0000	1000.0000
Lead, ug/L	71	3.7900	0.0000	23.0000	18	4.4400	0.0000	23.0000
Manganese, ug/L	87	405.5200	10.0000	4000.0000	24	569.1700	10.0000	2100.0000
Nickel, ug/L	71	3.2800	0.0000	11.0000	18	2.7200	0.0000	10.0000
Zinc, ug/L	73	42.7400	0.0000	870.0000	20	105.5000	0.0000	870.0000
Aluminum, ug/L	85	254.9400	0.0000	4200.0000	22	162.7300	10.0000	1500.0000
Fecal Coliform (Colonies/100 ml)	4	0.7500	0.0000	2.0000	2	0.0000	0.0000	0.0000
Fecal Coliform (Colonies/100 ml)	39	2.2600	0.0000	20.0000	9	1.1100	0.0000	6.0000
Calcium Hardness, mg/L (as CaCO3)	61	59.0300	35.0000	100.0000	16	64.6300	49.0000	95.0000
Orthophosphate, mg/L (as P)	87	0.0200	0.0000	0.0900	24	0.0100	0.0000	0.0500
Chlorophyll A, ug/L	22	2.5900	0.4000	7.7000	6	2.8700	1.8000	6.8000
Chlorophyll B, ug/L	22	0.1800	0.1000	0.7000	6	0.2700	0.1000	0.7000
Ammonia Nitrogen, mg/L (as NH4)	12	0.1000	0.0000	0.3000	4	0.0600	0.0000	0.2000
Total Phosphorous, mg/L (as PO4)	32	0.1400	0.0300	1.9000	10	0.2700	0.0300	1.9000
Total Nitrogen, mg/L (as NO3)	44	3.8100	0.7000	11.0000	11	3.4700	1.3000	7.1000
Mercury, ug/L	87	0.1800	0.0000	1.3000	24	0.1800	0.0000	0.6000
Depth of Reservoir, Feet	176	109.2800	50.0000	135.0000	49	108.6700	95.0000	120.0000

Table XX. Water Quality Data for the Hwy12 Site: Period of Record and Winter Season.

STATION 4 HWY12	PERIOD OF RECORD N	MEAN	MIN	MAX	WINTER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	91	13.0600	2.5000	29.0000	22	8.8700	5.0000	11.5000
Flow, CFS	9	476.4400	32.0000	1600.0000				
Turbidity, FTU	74	7.9700	0.5000	60.0000	20	9.7100	1.7000	60.0000
Transparency, Inches	45	71.2400	10.0000	194.0000	13	62.6200	34.0000	194.0000
Color, Units	90	18.7700	0.0000	180.0000	22	12.4100	0.0000	70.0000
Conductivity, Micromhos/cm	107	135.0600	90.0000	323.0000	24	137.0000	93.0000	165.0000
Dissolved Oxygen, mg/L	90	6.6100	0.1000	13.8000	22	8.3400	0.2000	12.4000
Dissolved Oxygen, % Saturation	90	61.6100	0.9000	104.0000	22	70.9000	1.7000	97.4000
Biochemical Oxygen Demand, mg/L	92	1.1900	0.0000	4.2000	22	0.9700	0.2000	2.1000
pH, Standard Units	99	7.4500	6.0000	8.5000	22	7.3300	6.1000	8.1000
Carbon Dioxide, mg/L	12	4.5700	1.0000	11.0000				
Total Alkalinity, mg/L (as CaCO3)	87	54.9400	30.0000	112.0000	18	62.6100	44.0000	106.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	21	73.2900	41.0000	136.0000				
Carbonate Alkalinity, mg/L (as CO3)	21	0.0000	0.0000	0.0000				
Total Nitrogen, mg/L (as N)	44	0.8600	0.1600	2.5000	7	0.6500	0.4300	0.8500
Organic Nitrogen, mg/L (as N)	45	0.4900	0.0000	4.7000	7	0.3800	0.0900	0.5600
Ammonia Nitrogen, mg/L (as N)	53	0.0800	0.0000	0.4500	10	0.0800	0.0000	0.2400
Un-ionized Ammonia Nitrogen, mg/L (as N)	39	0.0013	0.0000	0.0200	8	0.0005	0.0000	0.0010
Total Kjeldahl Nitrogen, mg/L (as N)	53	0.5200	0.0200	4.7000	10	0.3800	0.1000	0.8000
Nitrate Nitrogen, mg/L (as N)	87	0.4200	0.0000	1.6000	22	0.2800	0.0000	0.9000
Total Phosphate, mg/L (as PO4)	16	0.0600	0.0000	0.1800	4	0.0300	0.0000	0.1200
Total Phosphorous, mg/L (as P)	87	0.0400	0.0100	0.6100	22	0.0300	0.0100	0.1000
Total Hardness, mg/L (as CaCO3)	71	61.7000	37.0000	112.0000	14	58.0700	40.0000	72.0000
Noncarbonate Hardness, mg/L (asCaCO3)	31	10.5200	0.0000	36.0000	4	7.2500	2.0000	18.0000
Calcium, mg/l (as CaCO3)	50	52.4200	30.0000	88.0000	10	54.5000	32.0000	70.0000
Dissolved Calcium, mg/L (as Ca)	61	20.8500	12.0000	36.0000	14	20.5700	13.0000	25.0000
Dissolved Magnesium, mg/L (as Mg)	61	1.7000	1.2000	2.4000	14	1.7400	1.4000	2.1000
Potassium, mg/L	52	1.4600	1.0000	2.4000	10	1.4400	1.3000	1.8000
Chloride, mg/L	60	4.4200	2.0000	38.0000	10	4.1000	3.0000	6.0000
Sulfate, mg/L	60	6.7200	1.0000	11.0000	10	6.8000	4.0000	10.0000
Arsenic, ug/L	87	1.0200	0.0000	2.0000	22	0.9500	0.0000	1.0000
Chromium, ug/L	87	8.7400	0.0000	40.0000	22	7.7300	0.0000	10.0000
Copper, ug/L	72	3.6000	1.0000	20.0000	20	3.0500	1.0000	7.0000
Iron, ug/L	87	431.3800	10.0000	4000.0000	22	590.4500	130.0000	4000.0000
Lead, ug/L	71	3.7900	0.0000	23.0000	20	2.9500	1.0000	8.0000
Manganese, ug/L	87	405.5200	10.0000	4000.0000	22	602.7300	30.0000	4000.0000
Nickel, ug/L	71	3.2800	0.0000	11.0000	20	3.2500	0.0000	8.0000
Zinc, ug/L	73	42.7400	0.0000	870.0000	20	23.0000	0.0000	70.0000
Aluminum, ug/L	85	254.9400	0.0000	4200.0000	22	321.3600	0.0000	4200.0000
Fecal Coliform (Colonies/100 ml)	4	0.7500	0.0000	2.0000	1	2.0000	2.0000	2.0000
Fecal Coliform (Colonies/100 ml)	39	2.2600	0.0000	20.0000	10	3.5000	0.0000	19.0000
Calcium Hardness, mg/L (as CaCO3)	61	59.0300	35.0000	100.0000	14	58.6400	40.0000	71.0000
Orthophosphate, mg/L (as P)	87	0.0200	0.0000	0.0900	22	0.0200	0.0000	0.0600
Chlorophyll A, ug/L	22	2.5900	0.4000	7.7000	7	1.7600	0.4000	2.7000
Chlorophyll B, ug/L	22	0.1800	0.1000	0.7000	7	0.1400	0.1000	0.4000
Ammonia Nitrogen, mg/L (as NH4)	12	0.1000	0.0000	0.3000	4	0.2000	0.0000	0.3000
Total Phosphorous, mg/L (as PO4)	32	0.1400	0.0300	1.9000	10	0.0800	0.0300	0.1800
Total Nitrogen, mg/L (as NO3)	44	3.8100	0.7000	11.0000	7	2.9000	1.9000	3.8000
Mercury, ug/L	87	0.1800	0.0000	1.3000	22	0.1800	0.0000	1.3000
Depth of Reservoir, Feet	176	109.2800	50.0000	135.0000	43	114.0700	100.0000	135.0000

Table XXI. Water Quality Data for the Monte Ne Site: Period of Record and Spring Season.

STATION 5 MONTE NE	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	45	18.4200	5.5000	30.5000	15	20.0900	17.3000	24.5000
Turbidity, FTU	37	8.2300	0.9000	84.0000	13	11.9200	2.6000	84.0000
Transparency, Inches	42	44.3300	6.0000	74.0000	14	36.6400	6.0000	66.0000
Color, Units	43	16.8800	0.0000	240.0000	14	33.5700	1.0000	240.0000
Conductivity, Micromhos/cm	45	158.9100	101.0000	260.0000	15	141.1300	101.0000	203.0000
Dissolved Oxygen, mg/L	45	9.5200	5.9000	12.5000	15	9.5300	5.9000	12.0000
Dissolved Oxygen, % Saturation	45	98.8400	69.4000	141.2000	15	103.4100	69.4000	141.2000
Biochemical Oxygen Demand, mg/L	20	1.5900	0.5000	3.0000	8	1.8600	0.7000	3.0000
pH, Standard Units	45	7.8000	6.3000	8.9700	15	7.8900	7.2800	8.9700
Carbon Dioxide, mg/L	3	7.0000	4.4000	11.0000	1	4.4000	4.4000	4.4000
Total Alkalinity, mg/L (as CaCO3)	40	66.2500	32.0000	130.0000	13	50.1500	32.0000	88.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	97.5000	55.0000	140.0000	1	55.0000	55.0000	55.0000
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500	1	0.0500	0.0500	0.0500
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0040	0.0040	0.0040	1	0.0040	0.0040	0.0040
Total Kjeldahl Nitrogen, mg/L (as N)	1	2.7000	2.7000	2.7000	1	2.7000	2.7000	2.7000
Nitrate Nitrogen, mg/L (as N)	18	0.6000	0.0400	1.6000	7	0.5700	0.4000	0.9000
Total Phosphorous, mg/L (as P)	18	0.0400	0.0100	0.1800	7	0.0500	0.0100	0.1800
Total Hardness, mg/L (as CaCO3)	31	74.0300	18.0000	132.0000	9	66.3300	18.0000	130.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	21.2700	2.0000	88.0000	3	41.0000	12.0000	88.0000
Calcium, mg/l (as CaCO3)	25	70.0800	12.0000	120.0000	7	61.1400	12.0000	120.0000
Dissolved Calcium, mg/L (as Ca)	28	26.5600	4.7000	49.0000	10	22.4700	4.7000	48.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.5600	1.1000	1.9000	10	1.4400	1.1000	1.6000
Chloride, mg/L	4	5.2500	3.0000	9.0000	1	3.0000	3.0000	3.0000
Fecal Coliform (Colonies/100 ml)	3	6.6700	0.0000	11.0000				
Fecal Coliform (Colonies/100 ml)	40	23.6300	0.0000	370.0000	14	15.5700	0.0000	140.0000
Calcium Hardness, mg/L (as CaCO3)	28	72.7100	18.0000	127.0000	10	62.0000	18.0000	125.0000
Orthophosphate, mg/L (as P)	18	0.0200	0.0100	0.1000	7	0.0300	0.0100	0.1000
Chlorophyll A, ug/L	22	5.3400	1.2000	24.0000	8	5.8100	1.2000	24.0000
Chlorophyll B, ug/L	22	0.4600	0.1000	2.3000	8	0.5500	0.1000	2.2000
Total Phosphorous, mg/L (as PO4)	1	0.1800	0.1800	0.1800				
Depth of Reservoir, Feet	107	8.3600	2.0000	20.0000	37	10.4300	2.0000	20.0000

Table XXII. Water Quality Data for the Monte Ne Site: Period of Record and Summer Season.

STATION 5 MONTE NE	PERIOD OF RECORD				SUMMER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	45	18.4200	5.5000	30.5000	12	29.3300	27.0000	30.5000
Turbidity, FTU	37	8.2300	0.9000	84.0000	10	3.5700	0.9000	15.0000
Transparency, Inches	42	44.3300	6.0000	74.0000	12	57.9200	36.0000	72.0000
Color, Units	43	16.8800	0.0000	240.0000	11	5.0900	0.0000	10.0000
Conductivity, Micromhos/cm	45	158.9100	101.0000	260.0000	12	137.6700	116.0000	190.0000
Dissolved Oxygen, mg/L	45	9.5200	5.9000	12.5000	12	8.3700	7.4000	9.2000
Dissolved Oxygen, % Saturation	45	96.8400	69.4000	141.2000	12	105.7000	93.7000	116.5000
Biochemical Oxygen Demand, mg/L	20	1.5900	0.5000	3.0000	6	1.7200	1.2000	2.6000
pH, Standard Units	45	7.8000	6.3000	8.9700	12	8.2900	7.6000	8.7000
Carbon Dioxide, mg/L	3	7.0000	4.4000	11.0000				
Total Alkalinity, mg/L (as CaCO3)	40	66.2500	32.0000	130.0000	11	57.5500	47.0000	94.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	97.5000	55.0000	140.0000				
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0040	0.0040	0.0040				
Total Kjeldahl Nitrogen, mg/L (as N)	1	2.7000	2.7000	2.7000				
Nitrate Nitrogen, mg/L (as N)	18	0.6000	0.0400	1.6000	5	0.0900	0.0400	0.1000
Total Phosphorous, mg/L (as P)	18	0.0400	0.0100	0.1800	5	0.0300	0.0100	0.0400
Total Hardness, mg/L (as CaCO3)	31	74.0300	18.0000	132.0000	8	63.3800	52.0000	77.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	21.2700	2.0000	88.0000	2	24.0000	18.0000	30.0000
Calcium, mg/l (as CaCO3)	25	70.0800	12.0000	120.0000	6	62.3300	50.0000	82.0000
Dissolved Calcium, mg/L (as Ca)	28	25.5600	4.7000	48.0000	7	24.2900	19.0000	33.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.5600	1.1000	1.9000	7	1.7000	1.4000	1.9000
Chloride, mg/L	4	5.2500	3.0000	9.0000	1	5.0000	5.0000	5.0000
Fecal Coliform (Colonies/100 ml)	3	6.6700	0.0000	11.0000	1	0.0000	0.0000	0.0000
Fecal Coliform (Colonies/100 ml)	40	23.6300	0.0000	370.0000	10	21.1000	0.0000	150.0000
Calcium Hardness, mg/L (as CaCO3)	29	72.7100	18.0000	127.0000	7	67.5700	53.0000	89.0000
Orthophosphate, mg/L (as P)	18	0.0200	0.0100	0.1000	5	0.0100	0.0100	0.0200
Chlorophyll A, ug/L	22	5.3400	1.2000	24.0000	6	6.2800	1.9000	16.0000
Chlorophyll B, ug/L	22	0.4600	0.1000	2.3000	6	0.6700	0.1000	2.3000
Total Phosphorous, mg/L (as PO4)	1	0.1800	0.1800	0.1800				
Depth of Reservoir, Feet	107	8.3600	2.0000	20.0000	27	6.8900	4.0000	12.0000

Table XXIII. Water Quality Data for the Monte Ne Site: Period of Record and Winter Season.

STATION 5 MONTE NE	PERIOD OF RECORD				WINTER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	45	18.4200	5.5000	30.5000	11	8.5000	6.0000	10.5000
Turbidity, FTU	37	8.2300	0.9000	84.0000	10	7.8300	1.0000	59.0000
Transparency, Inches	42	44.3300	6.0000	74.0000	11	43.4500	12.0000	74.0000
Color, Units	43	16.8800	0.0000	240.0000	11	10.5500	0.0000	70.0000
Conductivity, Micromhos/cm	45	158.9100	101.0000	260.0000	11	193.7300	133.0000	245.0000
Dissolved Oxygen, mg/L	45	9.5200	5.9000	12.5000	11	10.3400	8.9000	12.5000
Dissolved Oxygen, % Saturation	45	98.8400	69.4000	141.2000	11	87.3200	75.2000	104.8000
Biochemical Oxygen Demand, mg/L	20	1.5900	0.5000	3.0000	6	1.0800	0.5000	1.6000
pH, Standard Units	45	7.8000	6.3000	8.9700	11	7.4200	6.3000	7.8900
Carbon Dioxide, mg/L	3	7.0000	4.4000	11.0000				
Total Alkalinity, mg/L (as CaCO3)	40	66.2500	32.0000	130.0000	9	95.2200	58.0000	130.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	97.5000	55.0000	140.0000				
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0040	0.0040	0.0040				
Total Kjeldahl Nitrogen, mg/L (as N)	1	2.7000	2.7000	2.7000				
Nitrate Nitrogen, mg/L (as N)	18	0.6000	0.0400	1.6000	6	1.0800	0.2600	1.6000
Total Phosphorous, mg/L (as P)	18	0.0400	0.0100	0.1800	6	0.0300	0.0100	0.0600
Total Hardness, mg/L (as CaCO3)	31	74.0300	18.0000	132.0000	7	83.8600	59.0000	132.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	21.2700	2.0000	88.0000	2	10.0000	9.0000	11.0000
Calcium, mg/l (as CaCO3)	25	70.0800	12.0000	120.0000	5	84.0000	52.0000	120.0000
Dissolved Calcium, mg/L (as Ca)	28	26.5600	4.7000	49.0000	7	31.0000	21.0000	41.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.5600	1.1000	1.9000	7	1.7000	1.6000	1.9000
Chloride, mg/L	4	5.2500	3.0000	9.0000	1	9.0000	9.0000	9.0000
Fecal Coliform (Colonies/100 ml)	3	6.6700	0.0000	11.0000	1	9.0000	9.0000	9.0000
Fecal Coliform (Colonies/100 ml)	40	23.6300	0.0000	370.0000	10	49.5000	0.0000	370.0000
Calcium Hardness, mg/L (as CaCO3)	28	72.7100	18.0000	127.0000	7	84.4300	59.0000	109.0000
Orthophosphate, mg/L (as P)	18	0.0200	0.0100	0.1000	6	0.0200	0.0100	0.0200
Chlorophyll A, ug/L	22	5.3400	-1.2000	24.0000	7	4.5100	2.7000	8.0000
Chlorophyll B, ug/L	22	0.4600	0.1000	2.3000	7	0.2300	0.1000	0.4000
Total Phosphorous, mg/L (as PO4)	1	0.1800	0.1800	0.1800	1	0.1800	0.1800	0.1800
Depth of Reservoir, Feet	107	8.3600	2.0000	20.0000	26	7.7300	4.0000	16.0000

Table XXIV. Water Quality Data for the War Eagle Site: Period of Record and Spring Season.

STATION 6 WAR EAGLE	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	44	16.6700	4.0000	29.0000	14	18.6500	16.0000	21.0000
Turbidity, FTU	37	8.2000	1.1000	60.0000	13	8.2900	1.1000	30.0000
Transparency, Inches	38	27.8900	0.0000	72.0000	14	31.7100	10.0000	72.0000
Color, Units	43	9.8800	0.0000	55.0000	14	7.7900	0.0000	40.0000
Conductivity, Micromhos/cm	44	181.2000	100.0000	293.0000	14	157.8600	102.0000	212.0000
Dissolved Oxygen, mg/L	44	9.4900	6.0000	14.6000	14	8.7100	7.7000	9.7000
Dissolved Oxygen, % Saturation	44	93.9100	74.1000	116.8000	14	91.8400	81.9000	103.0000
Biochemical Oxygen Demand, mg/L	37	1.4500	0.2000	5.7000	12	1.3900	0.7000	2.4000
pH, Standard Units	44	7.6100	6.1000	8.1400	14	7.6000	7.1000	8.0200
Carbon Dioxide, mg/L	3	2.0000	1.5000	2.8000	1	2.8000	2.8000	2.8000
Total Alkalinity, mg/L (as CaCO3)	38	79.2400	39.0000	124.0000	12	69.9200	53.0000	94.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	67.5000	47.0000	88.0000	1	88.0000	88.0000	88.0000
Ammonia Nitrogen, mg/L (as N)	1	0.0600	0.0600	0.0600	1	0.0600	0.0600	0.0600
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0020	0.0020	0.0020	1	0.0020	0.0020	0.0020
Total Kjeidahl Nitrogen, mg/L (as N)	1	2.0000	2.0000	2.0000	1	2.0000	2.0000	2.0000
Nitrate Nitrogen, mg/L (as N)	18	0.8800	0.3000	1.7000	7	0.7200	0.5000	0.9000
Total Phosphorous, mg/L (as P)	18	0.0500	0.0100	0.2500	7	0.0400	0.0100	0.1600
Total Hardness, mg/L (as CaCO3)	31	81.0300	14.0000	132.0000	9	64.2200	14.0000	86.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	11.4500	0.0000	25.0000	3	9.3300	1.0000	19.0000
Calcium, mg/l (as CaCO3)	25	76.0400	8.0000	124.0000	7	54.8600	8.0000	80.0000
Dissolved Calcium, mg/L (as Ca)	28	30.2200	3.1000	47.0000	10	24.9100	3.1000	36.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.7300	1.4000	2.6000	10	1.5500	1.4000	1.7000
Chloride, mg/L	4	5.7500	3.0000	7.0000	1	3.0000	3.0000	3.0000
Fecal Coliform (Colonies/100 ml)	3	68.6700	36.0000	110.0000				
Fecal Coliform (Colonies/100 ml)	39	130.5900	3.0000	1500.0000	14	110.7100	28.0000	400.0000
Calcium Hardness, mg/L (as CaCO3)	28	82.5700	14.0000	126.0000	10	68.6000	14.0000	97.0000
Orthophosphate, mg/L (as P)	18	0.0200	0.0100	0.2100	7	0.0100	0.0100	0.0100
Chlorophyll A, ug/L	21	3.3900	0.1000	11.0000	8	2.9300	0.7000	8.7000
Chlorophyll B, ug/L	21	0.2400	0.1000	1.2000	8	0.2500	0.1000	1.1000
Total Phosphorous, mg/L (as PO4)	2	0.4200	0.0600	0.7700				
Depth of Reservoir, Feet	89	2.9100	1.0000	6.0000	29	3.7200	2.0000	6.0000

Table XXV. Water Quality Data for the War Eagle Site: Period of Record and Summer Season.

STATION 6	PERIOD OF RECORD				SUMMER SEASON			
WAR EAGLE	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	44	16.6700	4.0000	29.0000	12	25.7900	22.5000	29.0000
Turbidity, FTU	37	8.2000	1.1000	60.0000	10	9.4300	1.1000	60.0000
Transparency, Inches	38	27.8900	0.0000	72.0000	10	21.6000	0.0000	48.0000
Color, Units	43	9.8800	0.0000	55.0000	11	8.0900	0.0000	35.0000
Conductivity, Micromhos/cm	44	181.2000	100.0000	293.0000	12	218.5800	160.0000	276.0000
Dissolved Oxygen, mg/L	44	9.4900	6.0000	14.6000	12	7.6800	6.0000	8.5000
Dissolved Oxygen, % Saturation	44	93.9100	74.1000	116.8000	12	92.7700	74.1000	103.8000
Biochemical Oxygen Demand, mg/L	37	1.4500	0.2000	5.7000	11	2.0200	0.3000	5.7000
pH, Standard Units	44	7.6100	6.1000	8.1400	12	7.7100	7.2500	8.1400
Carbon Dioxide, mg/L	3	2.0000	1.5000	2.8000				
Total Alkalinity, mg/L (as CaCO3)	38	79.2400	39.0000	124.0000	10	93.0000	56.0000	120.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	67.5000	47.0000	88.0000				
Ammonia Nitrogen, mg/L (as N)	1	0.0600	0.0600	0.0600				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0020	0.0020	0.0020				
Total Kjeldahl Nitrogen, mg/L (as N)	1	2.0000	2.0000	2.0000				
Nitrate Nitrogen, mg/L (as N)	18	0.8800	0.3000	1.7000	5	0.6900	0.3000	1.1000
Total Phosphorous, mg/L (as P)	18	0.0500	0.0100	0.2500	5	0.0800	0.0200	0.2500
Total Hardness, mg/L (as CaCO3)	31	81.0300	14.0000	132.0000	8	96.0000	71.0000	130.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	11.4500	0.0000	25.0000	2	8.0000	0.0000	16.0000
Calcium, mg/l (as CaCO3)	25	76.0400	8.0000	124.0000	6	92.6700	70.0000	118.0000
Dissolved Calcium, mg/L (as Ca)	28	30.2200	3.1000	47.0000	7	37.5700	28.0000	47.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.7300	1.4000	2.6000	7	1.9100	1.7000	2.2000
Chloride, mg/L	4	5.7500	3.0000	7.0000	1	7.0000	7.0000	7.0000
Fecal Coliform (Colonies/100 ml)	3	68.6700	36.0000	110.0000	1	60.0000	60.0000	60.0000
Fecal Coliform (Colonies/100 ml)	39	130.5900	3.0000	1500.0000	9	243.1100	10.0000	1500.0000
Calcium Hardness, mg/L (as CaCO3)	28	82.5700	14.0000	126.0000	7	101.5700	77.0000	126.0000
Orthophosphate, mg/L (as P)	18	0.0200	0.0100	0.2100	5	0.0500	0.0100	0.2100
Chlorophyll A, ug/L	21	3.3900	0.1000	11.0000	5	7.1600	3.5000	11.0000
Chlorophyll B, ug/L	21	0.2400	0.1000	1.2000	5	0.4600	0.1000	1.2000
Total Phosphorous, mg/L (as PO4)	2	0.4200	0.0600	0.7700	1	0.7700	0.7700	0.7700
Depth of Reservoir, Feet	89	2.9100	1.0000	6.0000	23	2.4800	1.0000	6.0000

Table XXVI. Water Quality Data for the War Eagle Site: Period of Record and Winter Season.

STATION 6 WAR EAGLE	PERIOD OF RECORD				WINTER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	44	16.6700	4.0000	29.0000	11	7.0800	4.0000	10.0000
Turbidity, FTU	37	8.2000	1.1000	60.0000	10	5.0700	1.5000	11.0000
Transparency, Inches	38	27.8900	0.0000	72.0000	10	31.6000	4.0000	72.0000
Color, Units	43	9.8800	0.0000	55.0000	11	12.2700	4.0000	35.0000
Conductivity, Micromhos/cm	44	181.2000	100.0000	293.0000	11	171.6400	106.0000	293.0000
Dissolved Oxygen, mg/L	44	9.4900	6.0000	14.6000	11	11.4800	9.8000	13.1000
Dissolved Oxygen, % Saturation	44	93.9100	74.1000	116.8000	11	93.6400	78.4000	102.7000
Biochemical Oxygen Demand, mg/L	37	1.4500	0.2000	5.7000	10	0.9900	0.2000	2.5000
pH, Standard Units	44	7.6100	6.1000	8.1400	11	7.5000	6.1000	8.1000
Carbon Dioxide, mg/L	3	2.0000	1.5000	2.8000				
Total Alkalinity, mg/L (as CaCO3)	38	79.2400	39.0000	124.0000	9	73.8900	40.0000	118.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	2	67.5000	47.0000	88.0000				
Ammonia Nitrogen, mg/L (as N)	1	0.0600	0.0600	0.0600				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0020	0.0020	0.0020				
Total Kjeldahl Nitrogen, mg/L (as N)	1	2.0000	2.0000	2.0000				
Nitrate Nitrogen, mg/L (as N)	18	0.8800	0.3000	1.7000	6	1.2100	0.9600	1.7000
Total Phosphorous, mg/L (as P)	18	0.0500	0.0100	0.2500	6	0.0300	0.0100	0.0500
Total Hardness, mg/L (as CaCO3)	31	81.0300	14.0000	132.0000	7	72.5700	50.0000	99.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	11.4500	0.0000	25.0000	2	13.0000	11.0000	15.0000
Calcium, mg/l (as CaCO3)	25	76.0400	8.0000	124.0000	5	72.2000	50.0000	90.0000
Dissolved Calcium, mg/L (as Ca)	28	30.2200	3.1000	47.0000	7	30.1400	20.0000	46.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.7300	1.4000	2.6000	7	1.9300	1.6000	2.6000
Chloride, mg/L	4	5.7500	3.0000	7.0000	1	7.0000	7.0000	7.0000
Fecal Coliform (Colonies/100 ml)	3	68.6700	36.0000	110.0000	1	110.0000	110.0000	110.0000
Fecal Coliform (Colonies/100 ml)	39	130.5900	3.0000	1500.0000	10	110.0000	4.0000	450.0000
Calcium Hardness, mg/L (as CaCO3)	28	82.5700	14.0000	126.0000	7	83.2900	57.0000	122.0000
Orthophosphate, mg/L (as P)	18	0.0200	0.0100	0.2100	6	0.0200	0.0100	0.0300
Chlorophyll A, ug/L	21	3.3900	0.1000	11.0000	7	0.7400	0.1000	2.2000
Chlorophyll B, ug/L	21	0.2400	0.1000	1.2000	7	0.1000	0.1000	0.1000
Total Phosphorous, mg/L (as PO4)	2	0.4200	0.0600	0.7700	1	0.0600	0.0600	0.0600
Depth of Reservoir, Feet	89	2.9100	1.0000	6.0000	22	2.9100	1.0000	6.0000

Table XXVII. Water Quality Data for the Goshen Site: Period of Record and Spring Season.

STATION 7 GOSHEN	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	250	16.4700	0.0000	30.0000	53	19.9600	11.0000	27.0000
Flow, CFS	18	206.3900	0.0000	853.0000	2	821.5000	790.0000	853.0000
Turbidity, FTU	142	22.9700	1.5000	120.0000	32	18.4200	1.5000	90.0000
Transparency, Inches	44	26.4800	4.0000	216.0000	14	21.0700	6.0000	42.0000
Color, Units	108	30.6900	0.0000	240.0000	27	35.3700	4.0000	240.0000
Conductivity, Micromhos/cm	159	165.2600	44.0000	598.0000	36	111.3300	65.0000	353.0000
Dissolved Oxygen, mg/L	244	7.8400	0.5000	14.6000	51	7.5000	4.3000	10.0000
Dissolved Oxygen, % Saturation	243	75.6900	1.0000	154.3000	51	80.2600	49.0000	104.3000
Biochemical Oxygen Demand, mg/L	219	3.4000	0.2000	19.0000	44	2.8100	1.0000	5.4000
pH, Standard Units	265	7.3800	5.8000	8.8300	54	7.3200	6.4000	7.8100
Carbon Dioxide, mg/L	25	7.7200	1.5000	91.0000	6	5.2300	2.0000	8.6000
Total Alkalinity, mg/L (as CaCO3)	101	52.6600	12.0000	144.0000	22	37.7700	25.0000	62.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	60	65.6000	15.0000	176.0000	12	47.6700	30.0000	76.0000
Carbonate Alkalinity, mg/L (as CO3)	59	0.0000	0.0000	0.0000	11	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	49	2.5300	0.4600	12.0000	9	1.4700	0.7100	4.9000
Organic Nitrogen, mg/L (as N)	47	0.8400	0.0000	7.0000	9	0.3600	0.0300	0.7400
Ammonia Nitrogen, mg/L (as N)	164	0.6800	0.0000	8.7000	32	0.2100	0.0100	0.6800
Un-ionized Ammonia Nitrogen, mg/L (as N)	150	0.0100	0.0000	0.2700	31	0.0020	0.0002	0.0100
Total Kjeldahl Nitrogen, mg/L (as N)	67	1.4800	0.1000	12.0000	13	0.9900	0.3800	4.4000
Nitrate Nitrogen, mg/L (as N)	162	0.7800	0.0200	4.3000	35	0.5300	0.2100	0.9900
Total Phosphate, mg/L (as PO4)	13	3.4100	0.1800	14.0000	3	0.3600	0.2100	0.6400
Total Phosphorous, mg/L (as P)	232	0.6500	0.0100	6.8000	46	0.2800	0.0700	2.7000
Total Hardness, mg/L (as CaCO3)	153	61.2400	6.0000	140.0000	26	41.9200	6.0000	78.0000
Noncarbonate Hardness, mg/L (asCaCO3)	45	9.8400	0.0000	45.0000	7	9.4300	4.0000	18.0000
Calcium, mg/l (as CaCO3)	35	46.0000	4.0000	100.0000	8	31.0000	4.0000	44.0000
Dissolved Calcium, mg/L (as Ca)	40	18.7300	1.6000	40.0000	11	12.8500	1.6000	19.0000
Dissolved Magnesium, mg/L (as Mg)	40	2.4200	1.0000	9.0000	11	1.7600	1.2000	3.0000
Potassium, mg/L	47	2.4500	0.8000	8.0000	9	1.9000	0.9000	5.9000
Chloride, mg/L	205	11.7000	2.0000	62.0000	37	5.6800	2.0000	28.0000
Sulfate, mg/L	198	14.7100	1.0000	51.0000	37	9.4300	1.0000	23.0000
Arsenic, ug/L	97	3.2800	1.0000	15.0000	22	2.1400	1.0000	6.0000
Chromium, ug/L	173	4.5500	0.0000	40.0000	35	5.3400	0.0000	20.0000
Copper, ug/L	168	16.0400	0.0000	80.0000	40	12.9000	0.0000	60.0000
Iron, ug/L	91	1283.8700	180.0000	4600.0000	23	986.7800	280.0000	2600.0000
Lead, ug/L	138	6.0600	0.0000	70.0000	32	3.0600	0.0000	16.0000
Manganese, ug/L	92	308.0500	10.0000	1800.0000	23	150.0400	60.0000	330.0000
Nickel, ug/L	38	6.8700	1.0000	50.0000	13	3.7700	1.0000	11.0000
Zinc, ug/L	189	50.2300	0.0000	650.0000	39	27.2600	0.0000	110.0000
Aluminum, ug/L	45	476.6700	70.0000	2100.0000	14	330.7100	100.0000	740.0000
Fecal Coliform (Colonies/100 ml)	156	338.9200	0.0000	8400.0000	24	369.1700	4.0000	2600.0000
Fecal Coliform (Colonies/100 ml)	39	310.5400	0.0000	5200.0000	14	221.7900	9.0000	1400.0000
Calcium Hardness, mg/L (as CaCO3)	51	55.3300	10.0000	137.0000	12	40.4200	10.0000	56.0000
Orthophosphate, mg/L (as P)	153	0.5200	0.0100	4.9000	31	0.1300	0.0100	0.4900
Chlorophyll A, ug/L	23	7.7200	0.2000	34.4000	8	3.1300	0.6000	13.0000
Chlorophyll B, ug/L	23	1.5700	0.1000	10.6000	8	0.2800	0.1000	0.9000
Ammonia Nitrogen, mg/L (as NH4)	10	1.4800	0.0000	6.1000	2	0.3000	0.2000	0.4000
Total Phosphorous, mg/L (as PO4)	21	3.6300	0.2100	21.0000	5	0.3700	0.2500	0.6400
Total Nitrogen, mg/L (as NO3)	49	11.2700	2.0000	54.0000	9	6.5900	3.1000	22.0000
Mercury, ug/L	52	0.2300	0.0000	1.0000	14	0.1400	0.0000	0.5000
Depth of Reservoir, Feet	123	9.0500	2.0000	16.0000	38	10.6300	6.0000	16.0000

Table XXVIII. Water Quality Data for the Goshen Site: Period of Record and Summer Season.

STATION 7 GOSHEN	PERIOD OF RECORD N	MEAN	MIN	MAX	SUMMER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	250	16.4700	0.0000	30.0000	51	26.5700	21.0000	30.0000
Flow, CFS	18	206.3900	0.0000	853.0000	7	9.7100	0.0000	36.0000
Turbidity, FTU	142	22.9700	1.5000	120.0000	31	19.6000	3.5000	60.0000
Transparency, Inches	44	26.4800	4.0000	216.0000	12	23.6700	12.0000	38.0000
Color, Units	108	30.6900	0.0000	240.0000	25	14.7600	5.0000	35.0000
Conductivity, Micromhos/cm	159	165.2600	44.0000	598.0000	34	266.5600	119.0000	458.0000
Dissolved Oxygen, mg/L	244	7.8400	0.5000	14.6000	50	5.1900	2.0000	9.5000
Dissolved Oxygen, % Saturation	243	75.6900	1.0000	154.3000	50	63.9100	22.0000	117.3000
Biochemical Oxygen Demand, mg/L	219	3.4000	0.2000	19.0000	49	4.6400	0.5000	19.0000
pH, Standard Units	265	7.3800	5.8000	8.8300	55	7.4800	6.5000	8.2400
Carbon Dioxide, mg/L	25	7.7200	1.5000	91.0000	5	4.9400	1.6000	7.0000
Total Alkalinity, mg/L (as CaCO3)	101	52.6600	12.0000	144.0000	23	84.6500	53.0000	144.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	60	65.6000	15.0000	176.0000	13	112.0800	64.0000	176.0000
Carbonate Alkalinity, mg/L (as CO3)	59	0.0000	0.0000	0.0000	13	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	49	2.5300	0.4600	12.0000	10	3.2700	2.0000	7.0000
Organic Nitrogen, mg/L (as N)	47	0.8400	0.0000	7.0000	8	1.0800	0.1000	1.8000
Ammonia Nitrogen, mg/L (as N)	164	0.6800	0.0000	8.7000	32	0.9400	0.0000	6.0000
Un-ionized Ammonia Nitrogen, mg/L (as N)	150	0.0100	0.0000	0.2700	29	0.0200	0.0000	0.1100
Total Kjeldahl Nitrogen, mg/L (as N)	67	1.4800	0.1000	12.0000	13	2.0000	0.5800	6.7000
Nitrate Nitrogen, mg/L (as N)	162	0.7800	0.0200	4.3000	32	0.9900	0.1100	2.2000
Total Phosphate, mg/L (as PO4)	13	3.4100	0.1800	14.0000	3	2.2300	1.2000	3.4000
Total Phosphorous, mg/L (as P)	232	0.6500	0.0100	6.8000	48	1.1300	0.0500	2.6000
Total Hardness, mg/L (as CaCO3)	153	61.2400	6.0000	140.0000	32	91.2200	42.0000	140.0000
Noncarbonate Hardness, mg/L (asCaCO3)	45	9.9400	0.0000	45.0000	12	7.9200	0.0000	29.0000
Calcium, mg/l (as CaCO3)	35	46.0000	4.0000	100.0000	10	63.8000	44.0000	100.0000
Dissolved Calcium, mg/L (as Ca)	40	18.7300	1.6000	40.0000	12	28.8300	18.0000	40.0000
Dissolved Magnesium, mg/L (as Mg)	40	2.4200	1.0000	9.0000	12	3.5800	2.3000	9.0000
Potassium, mg/L	47	2.4500	0.8000	8.0000	11	3.5800	2.0000	6.8000
Chloride, mg/L	205	11.7000	2.0000	62.0000	43	20.4700	5.0000	46.0000
Sulfate, mg/L	198	14.7100	1.0000	51.0000	42	19.1700	3.0000	51.0000
Arsenic, ug/L	97	3.2800	1.0000	15.0000	22	3.8600	1.0000	14.0000
Chromium, ug/L	173	4.5500	0.0000	40.0000	37	4.4100	0.0000	40.0000
Copper, ug/L	168	16.0400	0.0000	80.0000	36	16.7200	0.0000	63.0000
Iron, ug/L	91	1283.8700	180.0000	4600.0000	21	1113.3300	180.0000	4100.0000
Lead, ug/L	138	6.0600	0.0000	70.0000	27	4.6700	0.0000	20.0000
Manganese, ug/L	92	308.0500	10.0000	1800.0000	22	661.9100	10.0000	1800.0000
Nickel, ug/L	38	6.8700	1.0000	50.0000	10	6.8000	2.0000	12.0000
Zinc, ug/L	189	50.2300	0.0000	650.0000	39	37.0800	0.0000	170.0000
Aluminum, ug/L	45	476.6700	70.0000	2100.0000	12	366.6700	160.0000	980.0000
Fecal Coliform (Colonies/100 ml)	156	338.9200	0.0000	8400.0000	34	104.2100	4.0000	600.0000
Fecal Coliform (Colonies/100 ml)	39	310.5400	0.0000	5200.0000	9	674.1100	0.0000	5200.0000
Calcium Hardness, mg/L (as CaCO3)	51	55.3300	10.0000	137.0000	14	81.0700	41.0000	137.0000
Orthophosphate, mg/L (as P)	153	0.5200	0.0100	4.9000	32	0.9000	0.0100	2.2000
Chlorophyll A, ug/L	23	7.7200	0.2000	34.4000	4	13.8800	7.5000	18.0000
Chlorophyll B, ug/L	23	1.5700	0.1000	10.6000	4	2.0500	0.1000	4.4000
Ammonia Nitrogen, mg/L (as NH4)	10	1.4800	0.0000	6.1000	2	0.8500	0.0000	1.7000
Total Phosphorous, mg/L (as PO4)	21	3.6300	0.2100	21.0000	6	3.1700	1.4000	6.4000
Total Nitrogen, mg/L (as NO3)	49	11.2700	2.0000	54.0000	10	14.4600	8.9000	31.0000
Mercury, ug/L	52	0.2300	0.0000	1.0000	13	0.1800	0.0000	0.5000
Depth of Reservoir, Feet	123	9.0500	2.0000	16.0000	29	8.0000	2.0000	12.0000

Table XXIX. Water Quality Data for the Goshen Site: Period of Record and Winter Season.

STATION 7 GOSHEN	PERIOD OF RECORD N	PERIOD OF RECORD MEAN	PERIOD OF RECORD MIN	PERIOD OF RECORD MAX	WINTER SEASON N	WINTER SEASON MEAN	WINTER SEASON MIN	WINTER SEASON MAX
Temperature, Celsius	250	16.4700	0.0000	30.0000	36	6.8500	1.0000	14.0000
Flow, CFS	18	206.3900	0.0000	853.0000	2	121.0000	0.0000	242.0000
Turbidity, FTU	142	22.9700	1.5000	120.0000	24	32.6800	3.0000	120.0000
Transparency, Inches	44	26.4800	4.0000	216.0000	11	40.0000	4.0000	216.0000
Color, Units	108	30.6900	0.0000	240.0000	19	32.4700	0.0000	110.0000
Conductivity, Micromhos/cm	159	165.2600	44.0000	598.0000	26	120.6200	68.0000	265.0000
Dissolved Oxygen, mg/L	244	7.8400	0.5000	14.6000	37	10.1700	3.6000	13.4000
Dissolved Oxygen, % Saturation	243	75.6900	1.0000	154.3000	35	81.8400	30.0000	102.3000
Biochemical Oxygen Demand, mg/L	219	3.4000	0.2000	19.0000	35	2.6800	0.2000	8.4000
pH, Standard Units	265	7.3800	5.8000	8.8300	39	7.4200	6.7000	8.1200
Carbon Dioxide, mg/L	25	7.7200	1.5000	91.0000	3	5.3700	2.4000	11.0000
Total Alkalinity, mg/L (as CaCO3)	101	52.6600	12.0000	144.0000	16	36.1300	28.0000	49.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	60	65.6000	15.0000	176.0000	6	43.5000	34.0000	56.0000
Carbonate Alkalinity, mg/L (as CO3)	59	0.0000	0.0000	0.0000	6	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	49	2.5300	0.4600	12.0000	7	1.5900	0.7500	2.9000
Organic Nitrogen, mg/L (as N)	47	0.8400	0.0000	7.0000	7	0.5400	0.0000	1.4000
Ammonia Nitrogen, mg/L (as N)	164	0.6800	0.0000	8.7000	23	0.5100	0.0600	2.7000
Un-ionized Ammonia Nitrogen, mg/L (as N)	150	0.0100	0.0000	0.2700	22	0.0023	0.0003	0.0100
Total Kjeldahl Nitrogen, mg/L (as N)	67	1.4800	0.1000	12.0000	10	0.8400	0.1000	1.7000
Nitrate Nitrogen, mg/L (as N)	162	0.7800	0.0200	4.3000	25	0.8000	0.3800	1.8000
Total Phosphate, mg/L (as PO4)	13	3.4100	0.1800	14.0000	2	1.1400	0.6700	1.6000
Total Phosphorous, mg/L (as P)	232	0.6500	0.0100	6.8000	36	0.3300	0.0500	1.5000
Total Hardness, mg/L (as CaCO3)	153	61.2400	6.0000	140.0000	25	51.0800	30.0000	100.0000
Noncarbonate Hardness, mg/L (asCaCO3)	45	9.8400	0.0000	45.0000	7	11.4300	0.0000	34.0000
Calcium, mg/l (as CaCO3)	35	46.0000	4.0000	100.0000	6	42.1700	25.0000	68.0000
Dissolved Calcium, mg/L (as Ca)	40	18.7300	1.6000	40.0000	9	16.2200	10.0000	27.0000
Dissolved Magnesium, mg/L (as Mg)	40	2.4200	1.0000	9.0000	9	2.1900	1.0000	4.0000
Potassium, mg/L	47	2.4500	0.8000	8.0000	8	1.6500	1.0000	2.6000
Chloride, mg/L	205	11.7000	2.0000	62.0000	29	7.1400	2.0000	28.0000
Sulfate, mg/L	198	14.7100	1.0000	51.0000	30	14.8700	3.0000	41.0000
Arsenic, ug/L	97	3.2800	1.0000	15.0000	19	2.5300	1.0000	6.0000
Chromium, ug/L	173	4.5500	0.0000	40.0000	29	5.2800	0.0000	20.0000
Copper, ug/L	168	16.0400	0.0000	80.0000	26	13.0400	1.0000	26.0000
Iron, ug/L	91	1283.8700	180.0000	4600.0000	17	1184.5900	470.0000	3100.0000
Lead, ug/L	138	6.0600	0.0000	70.0000	23	4.3000	1.0000	20.0000
Manganese, ug/L	92	308.0500	10.0000	1800.0000	17	128.7600	50.0000	260.0000
Nickel, ug/L	38	6.8700	1.0000	50.0000	10	6.3000	4.0000	10.0000
Zinc, ug/L	189	50.2300	0.0000	650.0000	31	40.6800	0.0000	200.0000
Aluminum, ug/L	45	476.6700	70.0000	2100.0000	11	495.4500	200.0000	1600.0000
Fecal Coliform (Colonies/100 ml)	156	338.9200	0.0000	8400.0000	20	365.2000	4.0000	2600.0000
Fecal Coliform (Colonies/100 ml)	39	310.5400	0.0000	5200.0000	10	20.7000	0.0000	160.0000
Calcium Hardness, mg/L (as CaCO3)	51	55.3300	10.0000	137.0000	10	48.3000	31.0000	84.0000
Orthophosphate, mg/L (as P)	153	0.5200	0.0100	4.9000	25	0.2000	0.0200	1.0000
Chlorophyll A, ug/L	23	7.7200	0.2000	34.4000	6	3.0800	0.2000	16.0000
Chlorophyll B, ug/L	23	1.5700	0.1000	10.6000	6	0.2300	0.1000	0.9000
Ammonia Nitrogen, mg/L (as NH4)	10	1.4800	0.0000	6.1000	2	0.7000	0.4000	1.0000
Total Phosphorous, mg/L (as PO4)	21	3.6300	0.2100	21.0000	5	0.8700	0.2100	1.7000
Total Nitrogen, mg/L (as NO3)	49	11.2700	2.0000	54.0000	7	7.0900	3.3000	13.0000
Mercury, ug/L	52	0.2300	0.0000	1.0000	14	0.2600	0.0000	1.0000
Depth of Reservoir, Feet	123	9.0500	2.0000	16.0000	29	9.0200	6.0000	15.0000

Table XXX. Water Quality Data for the Avoca Site: Period of Record and Spring Season.

STATION 8 AVOCA	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	45	18.7100	3.0000	31.5000	14	20.4300	17.0000	26.0000
Turbidity, FTU	38	5.3700	0.0000	30.0000	13	8.8300	1.7000	30.0000
Transparency, Inches	43	48.7700	6.0000	85.0000	14	40.7900	6.0000	68.0000
Color, Units	44	10.5200	0.0000	70.0000	14	19.8600	1.0000	70.0000
Conductivity, Micromhos/cm	48	141.2100	102.0000	244.0000	14	128.7900	102.0000	168.0000
Dissolved Oxygen, mg/L	45	9.5000	6.7000	14.0000	14	9.3400	6.7000	11.0000
Dissolved Oxygen, % Saturation	45	98.3900	70.5000	121.8000	14	102.3000	70.5000	118.2000
Biochemical Oxygen Demand, mg/L	46	1.7800	0.4000	7.0000	14	2.2900	0.9000	5.7000
pH, Standard Units	45	7.9800	6.6000	9.3000	14	8.0100	7.3000	8.7000
Carbon Dioxide, mg/L	6	1.4200	0.7000	2.7000	2	0.9000	0.7000	1.1000
Total Alkalinity, mg/L (as CaCO3)	39	57.5900	36.0000	128.0000	12	47.2500	36.0000	60.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	6	64.3300	44.0000	84.0000	2	49.0000	44.0000	54.0000
Carbonate Alkalinity, mg/L (as CO3)	6	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	20	0.7300	0.1500	1.8000	6	0.9600	0.6100	1.2000
Organic Nitrogen, mg/L (as N)	21	0.5100	0.0100	1.6000	6	0.5200	0.3600	0.6700
Ammonia Nitrogen, mg/L (as N)	27	0.0800	0.0000	0.3900	8	0.1200	0.0200	0.3900
Un-ionized Ammonia Nitrogen, mg/L (as N)	20	0.0042	0.0000	0.0400	7	0.0100	0.0007	0.0400
Total Kjeldahl Nitrogen, mg/L (as N)	27	0.5600	0.0400	2.2000	8	0.7800	0.4000	2.2000
Nitrate Nitrogen, mg/L (as N)	44	0.3200	0.0000	1.3000	14	0.5000	0.1900	1.0000
Total Phosphate, mg/L (as PO4)	8	0.0600	0.0000	0.1200	3	0.0900	0.0300	0.1200
Total Phosphorous, mg/L (as P)	44	0.0400	0.0100	0.1800	14	0.0400	0.0100	0.0900
Total Hardness, mg/L (as CaCO3)	31	64.5800	44.0000	130.0000	9	57.5600	44.0000	69.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	15.1800	3.0000	65.0000	3	12.3300	9.0000	18.0000
Calcium, mg/l (as CaCO3)	24	57.9200	38.0000	128.0000	6	51.3300	48.0000	62.0000
Dissolved Calcium, mg/L (as Ca)	28	23.0700	15.0000	51.0000	10	19.5000	16.0000	25.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.6600	1.2000	2.1000	10	1.5600	1.2000	1.8000
Potassium, mg/L	26	1.3100	0.1000	2.0000	7	1.3900	0.9000	1.7000
Chloride, mg/L	26	4.0400	3.0000	7.0000	7	3.7100	3.0000	5.0000
Sulfate, mg/L	26	7.4200	1.0000	11.0000	7	8.4300	6.0000	11.0000
Arsenic, ug/L	45	0.9800	0.0000	2.0000	14	1.0000	1.0000	1.0000
Chromium, ug/L	45	9.1100	0.0000	50.0000	14	9.2900	0.0000	20.0000
Copper, ug/L	40	9.3500	0.0000	150.0000	14	5.7100	1.0000	30.0000
Iron, ug/L	45	301.3300	0.0000	2300.0000	14	484.2900	70.0000	2300.0000
Lead, ug/L	38	3.8200	0.0000	24.0000	13	3.3800	1.0000	9.0000
Manganese, ug/L	45	55.1100	0.0000	230.0000	14	55.0000	20.0000	230.0000
Nickel, ug/L	38	2.6100	0.0000	9.0000	13	3.0800	0.0000	9.0000
Zinc, ug/L	38	22.6300	0.0000	140.0000	13	17.6900	10.0000	40.0000
Aluminum, ug/L	45	180.4400	0.0000	1000.0000	14	292.8600	50.0000	960.0000
Fecal Coliform (Colonies/100 ml)	4	1.0000	0.0000	3.0000				
Fecal Coliform (Colonies/100 ml)	40	9.6300	0.0000	108.0000	14	12.9300	0.0000	108.0000
Calcium Hardness, mg/L (as CaCO3)	28	64.4300	44.0000	134.0000	10	55.0000	45.0000	69.0000
Orthophosphate, mg/L (as P)	44	0.0200	0.0000	0.1800	14	0.0300	0.0100	0.1800
Chlorophyll A, ug/L	22	5.4500	0.1000	14.0000	8	7.0800	1.8000	14.0000
Chlorophyll B, ug/L	22	0.3300	0.1000	1.3000	8	0.3600	0.1000	1.1000
Ammonia Nitrogen, mg/L (as NH4)	6	0.0400	0.0000	0.0800	2	0.0500	0.0200	0.0700
Total Phosphorous, mg/L (as PO4)	16	0.0900	0.0300	0.1800	5	0.1100	0.0600	0.1800
Total Nitrogen, mg/L (as NO3)	20	3.2400	0.7000	7.7000	6	4.2700	2.7000	5.5000
Mercury, ug/L	45	0.1700	0.0000	1.0000	14	0.1800	0.0000	1.0000
Depth of Reservoir, Feet	119	9.7400	2.0000	141.0000	38	10.3700	2.0000	16.0000

Table XXXI. Water Quality Data for the Avoca Site: Period of Record and Summer Season.

STATION 8 AVOCA	PERIOD OF RECORD				SUMMER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	45	18.7100	3.0000	31.5000	13	28.5800	26.5000	31.5000
Turbidity, FTU	38	5.3700	0.0000	30.0000	10	3.0900	0.5000	16.0000
Transparency, Inches	43	48.7700	6.0000	85.0000	11	57.3600	24.0000	85.0000
Color, Units	44	10.5200	0.0000	70.0000	11	4.7300	0.0000	14.0000
Conductivity, Micromhos/cm	48	141.2100	102.0000	244.0000	14	128.0000	106.0000	151.0000
Dissolved Oxygen, mg/L	45	9.5000	6.7000	14.0000	13	7.8900	6.8000	9.5000
Dissolved Oxygen, % Saturation	45	98.3900	70.5000	121.8000	13	100.2100	86.1000	121.8000
Biochemical Oxygen Demand, mg/L	46	1.7800	0.4000	7.0000	14	1.4600	0.7000	2.7000
pH, Standard Units	45	7.9800	6.6000	9.3000	13	8.5200	7.9000	9.3000
Carbon Dioxide, mg/L	6	1.4200	0.7000	2.7000	1	0.9000	0.9000	0.9000
Total Alkalinity, mg/L (as CaCO3)	39	57.5900	36.0000	128.0000	11	51.5500	42.0000	60.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	6	64.3300	44.0000	84.0000	1	55.0000	55.0000	55.0000
Carbonate Alkalinity, mg/L (as CO3)	6	0.0000	0.0000	0.0000	1	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	20	0.7300	0.1500	1.8000	5	0.4800	0.1500	0.8600
Organic Nitrogen, mg/L (as N)	21	0.5100	0.0100	1.6000	6	0.6200	0.1200	1.6000
Ammonia Nitrogen, mg/L (as N)	27	0.0800	0.0000	0.3900	7	0.0400	0.0100	0.0700
Un-ionized Ammonia Nitrogen, mg/L (as N)	20	0.0042	0.0000	0.0400	5	0.0100	0.0010	0.0200
Total Kjeldahl Nitrogen, mg/L (as N)	27	0.5600	0.0400	2.2000	7	0.5800	0.1000	1.6000
Nitrate Nitrogen, mg/L (as N)	44	0.3200	0.0000	1.3000	12	0.0600	0.0000	0.1000
Total Phosphate, mg/L (as PO4)	8	0.0600	0.0000	0.1200	3	0.0600	0.0000	0.0900
Total Phosphorous, mg/L (as P)	44	0.0400	0.0100	0.1800	12	0.0300	0.0200	0.0500
Total Hardness, mg/L (as CaCO3)	31	64.5800	44.0000	130.0000	8	59.6300	50.0000	75.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	15.1800	3.0000	65.0000	2	13.5000	9.0000	18.0000
Calcium, mg/l (as CaCO3)	24	57.9200	38.0000	128.0000	6	54.0000	48.0000	68.0000
Dissolved Calcium, mg/L (as Ca)	28	23.0700	15.0000	51.0000	7	21.7100	19.0000	27.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.6600	1.2000	2.1000	7	1.7300	1.5000	2.1000
Potassium, mg/L	26	1.3100	0.1000	2.0000	7	1.3900	1.1000	1.8000
Chloride, mg/L	26	4.0400	3.0000	7.0000	7	3.7100	3.0000	4.0000
Sulfate, mg/L	26	7.4200	1.0000	11.0000	7	6.2900	1.0000	9.0000
Arsenic, ug/L	45	0.9800	0.0000	2.0000	12	1.0000	0.0000	2.0000
Chromium, ug/L	45	9.1100	0.0000	50.0000	12	10.8300	0.0000	50.0000
Copper, ug/L	40	9.3500	0.0000	150.0000	11	17.7300	1.0000	150.0000
Iron, ug/L	45	301.3300	0.0000	2300.0000	12	194.1700	20.0000	720.0000
Lead, ug/L	38	3.8200	0.0000	24.0000	10	3.1000	0.0000	8.0000
Manganese, ug/L	45	55.1100	0.0000	230.0000	12	44.1700	20.0000	80.0000
Nickel, ug/L	38	2.6100	0.0000	9.0000	10	1.7000	0.0000	4.0000
Zinc, ug/L	38	22.6300	0.0000	140.0000	10	24.0000	0.0000	70.0000
Aluminum, ug/L	45	180.4400	0.0000	1000.0000	12	115.8300	10.0000	600.0000
Fecal Coliform (Colonies/100 ml)	4	1.0000	0.0000	3.0000	2	2.0000	1.0000	3.0000
Fecal Coliform (Colonies/100 ml)	40	9.6300	0.0000	108.0000	9	10.3300	0.0000	74.0000
Calcium Hardness, mg/L (as CaCO3)	28	64.4300	44.0000	134.0000	7	61.5700	54.0000	75.0000
Orthophosphate, mg/L (as P)	44	0.0200	0.0000	0.1800	12	0.0200	0.0000	0.0400
Chlorophyll A, ug/L	22	5.4500	0.1000	14.0000	6	4.3700	2.3000	6.9000
Chlorophyll B, ug/L	22	0.3300	0.1000	1.3000	6	0.3300	0.1000	1.0000
Ammonia Nitrogen, mg/L (as NH4)	6	0.0400	0.0000	0.0800	2	0.0500	0.0200	0.0800
Total Phosphorous, mg/L (as PO4)	16	0.0900	0.0300	0.1800	6	0.0900	0.0600	0.1200
Total Nitrogen, mg/L (as NO3)	20	3.2400	0.7000	7.7000	5	2.1000	0.7000	3.8000
Mercury, ug/L	45	0.1700	0.0000	1.0000	12	0.1500	0.0000	0.5000
Depth of Reservoir, Feet	119	9.7400	2.0000	141.0000	31	11.7100	2.0000	141.0000

Table XXXII. Water Quality Data for the Avoca Site: Period of Record and Winter Season.

STATION 8 AVOCA	PERIOD OF RECORD				WINTER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	45	18.7100	3.0000	31.5000	11	8.4900	6.0000	10.5000
Turbidity, FTU	38	5.3700	0.0000	30.0000	11	3.6900	0.0000	23.0000
Transparency, Inches	43	48.7700	6.0000	85.0000	11	48.8200	24.0000	84.0000
Color, Units	44	10.5200	0.0000	70.0000	12	6.5800	0.0000	40.0000
Conductivity, Micromhos/cm	48	141.2100	102.0000	244.0000	12	162.0800	134.0000	244.0000
Dissolved Oxygen, mg/L	45	9.5000	6.7000	14.0000	11	10.7900	9.5000	13.2000
Dissolved Oxygen, % Saturation	45	98.3900	70.5000	121.8000	11	91.1600	81.9000	105.6000
Biochemical Oxygen Demand, mg/L	46	1.7800	0.4000	7.0000	11	1.0600	0.4000	2.0000
pH, Standard Units	45	7.9800	6.6000	9.3000	11	7.5300	6.6000	8.0600
Carbon-Dioxide, mg/L	6	1.4200	0.7000	2.7000				
Total Alkalinity, mg/L (as CaCO3)	39	57.5900	36.0000	128.0000	9	74.7800	45.0000	128.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	6	64.3300	44.0000	84.0000				
Carbonate Alkalinity, mg/L (as CO3)	6	0.0000	0.0000	0.0000				
Total Nitrogen, mg/L (as N)	20	0.7300	0.1500	1.8000	3	0.6500	0.6000	0.7500
Organic Nitrogen, mg/L (as N)	21	0.5100	0.0100	1.6000	3	0.4700	0.2700	0.6800
Ammonia Nitrogen, mg/L (as N)	27	0.0800	0.0000	0.3900	5	0.0300	0.0000	0.0600
Un-ionized Ammonia Nitrogen, mg/L (as N)	20	0.0042	0.0000	0.0400	4	0.0005	0.0000	0.0010
Total Kjeldahl Nitrogen, mg/L (as N)	27	0.5600	0.0400	2.2000	5	0.3400	0.1000	0.7400
Nitrate Nitrogen, mg/L (as N)	44	0.3200	0.0000	1.3000	11	0.4100	0.0100	1.3000
Total Phosphate, mg/L (as PO4)	8	0.0600	0.0000	0.1200	2	0.0200	0.0000	0.0300
Total Phosphorous, mg/L (as P)	44	0.0400	0.0100	0.1800	11	0.0300	0.0100	0.1300
Total Hardness, mg/L (as CaCO3)	31	64.5800	44.0000	130.0000	7	67.8600	44.0000	82.0000
Noncarbonate Hardness, mg/L (asCaCO3)	11	15.1800	3.0000	65.0000	2	9.0000	5.0000	13.0000
Calcium, mg/l (as CaCO3)	24	57.9200	38.0000	129.0000	5	58.2000	38.0000	66.0000
Dissolved Calcium, mg/L (as Ca)	29	23.0700	15.0000	51.0000	7	25.4300	15.0000	42.0000
Dissolved Magnesium, mg/L (as Mg)	28	1.6600	1.2000	2.1000	7	1.7400	1.5000	2.1000
Potassium, mg/L	26	1.3100	0.1000	2.0000	5	1.3800	1.2000	1.9000
Chloride, mg/L	26	4.0400	3.0000	7.0000	5	4.6000	3.0000	7.0000
Sulfate, mg/L	26	7.4200	1.0000	11.0000	5	7.0000	5.0000	11.0000
Arsenic, ug/L	45	0.9800	0.0000	2.0000	12	0.7500	0.0000	1.0000
Chromium, ug/L	45	9.1100	0.0000	50.0000	12	6.6700	0.0000	20.0000
Copper, ug/L	40	9.3500	0.0000	150.0000	11	7.6400	0.0000	66.0000
Iron, ug/L	45	301.3300	0.0000	2300.0000	12	225.8300	0.0000	1400.0000
Lead, ug/L	38	3.8200	0.0000	24.0000	11	4.5500	0.0000	24.0000
Manganese, ug/L	45	55.1100	0.0000	230.0000	12	66.6700	0.0000	150.0000
Nickel, ug/L	38	2.6100	0.0000	9.0000	11	2.1800	0.0000	6.0000
Zinc, ug/L	38	22.6300	0.0000	140.0000	11	26.1800	0.0000	140.0000
Aluminum, ug/L	45	180.4400	0.0000	1000.0000	12	145.8300	0.0000	1000.0000
Fecal Coliform (Colonies/100 ml)	4	1.0000	0.0000	3.0000	1	0.0000	0.0000	0.0000
Fecal Coliform (Colonies/100 ml)	40	9.6300	0.0000	108.0000	11	9.0000	0.0000	66.0000
Calcium Hardness, mg/L (as CaCO3)	28	64.4300	44.0000	134.0000	7	70.4300	44.0000	111.0000
Orthophosphate, mg/L (as P)	44	0.0200	0.0000	0.1800	11	0.0200	0.0000	0.0900
Chlorophyll A, ug/L	22	5.4500	0.1000	14.0000	7	4.1000	0.1000	7.6000
Chlorophyll B, ug/L	22	0.3300	0.1000	1.3000	7	0.3300	0.1000	1.3000
Ammonia Nitrogen, mg/L (as NH4)	6	0.0400	0.0000	0.0800	2	0.0400	0.0000	0.0700
Total Phosphorous, mg/L (as PO4)	16	0.0900	0.0300	0.1800	4	0.0700	0.0300	0.1200
Total Nitrogen, mg/L (as NO3)	20	3.2400	0.7000	7.7000	3	2.9000	2.7000	3.3000
Mercury, ug/L	45	0.1700	0.0000	1.0000	12	0.1200	0.0000	0.5000
Depth of Reservoir, Feet	119	9.7400	2.0000	141.0000	29	8.6900	4.0000	16.0000

Table XXXIII. Water Quality Data for the Rogers Site: Period of Record and Spring Season

STATION 9 ROGERS	PERIOD OF RECORD				SPRING SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	82	14.0800	3.0000	30.0000	28	14.2300	7.9000	25.5000
Turbidity, FTU	70	12.0600	0.6000	82.0000	24	12.2700	1.3000	82.0000
Transparency, Inches	28	54.4300	10.0000	112.0000	11	34.0000	10.0000	60.0000
Color, Units	78	25.5000	0.0000	400.0000	28	42.5000	2.0000	400.0000
Conductivity, Micromhos/cm	82	130.8500	65.0000	200.0000	28	120.7500	65.0000	190.0000
Dissolved Oxygen, mg/L	81	6.7500	0.1000	13.0000	27	6.3000	0.8000	10.3000
Dissolved Oxygen, % Saturation	81	64.0200	0.9000	106.3000	27	61.5700	9.5000	106.3000
Biochemical Oxygen Demand, mg/L	82	1.3500	0.3000	3.0000	28	1.4400	0.3000	2.8000
pH, Standard Units	82	7.5200	6.4000	9.0000	28	7.4700	6.5500	9.0000
Carbon Dioxide, mg/L	9	5.8200	2.6000	11.0000	4	7.5000	4.4000	11.0000
Total Alkalinity, mg/L (as CaCO3)	76	49.9600	19.0000	80.0000	26	41.6200	21.0000	62.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	11	56.3600	23.0000	98.0000	4	47.7500	35.0000	55.0000
Carbonate Alkalinity, mg/L (as CO3)	11	0.0000	0.0000	0.0000	4	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	31	1.0000	0.0100	2.6000	12	1.0700	0.6700	1.9000
Organic Nitrogen, mg/L (as N)	31	0.4900	0.0000	1.8000	12	0.3800	0.0900	1.2000
Ammonia Nitrogen, mg/L (as N)	42	0.1100	0.0000	0.6100	16	0.0700	0.0200	0.1500
Un-ionized Ammonia Nitrogen, mg/L (as N)	38	0.0024	0.0000	0.0500	14	0.0012	0.0001	0.0100
Total Kjeldahl Nitrogen, mg/L (as N)	43	0.5600	0.1000	2.2000	16	0.4800	0.1100	1.3000
Nitrate Nitrogen, mg/L (as N)	78	0.4600	0.0000	1.1000	28	0.6200	0.3000	1.0000
Total Phosphorous, mg/L (as P)	78	0.0400	0.0100	0.2400	28	0.0500	0.0100	0.2400
Total Hardness, mg/L (as CaCO3)	51	55.9200	27.0000	76.0000	18	50.8300	27.0000	68.0000
Noncarbonate Hardness, mg/L (asCaCO3)	29	9.5900	0.0000	23.0000	10	10.7000	0.0000	23.0000
Calcium, mg/l (as CaCO3)	36	51.4400	20.0000	68.0000	11	44.4500	20.0000	62.0000
Dissolved Calcium, mg/L (as Ca)	54	19.8400	7.6000	27.0000	20	16.7300	7.6000	25.0000
Dissolved Magnesium, mg/L (as Mg)	55	1.6900	0.9000	2.3000	20	1.5000	0.9000	2.1000
Potassium, mg/L	42	1.3500	0.1000	2.0000	14	1.3600	0.8000	2.0000
Chloride, mg/L	41	3.9500	2.0000	7.0000	13	3.6200	2.0000	5.0000
Sulfate, mg/L	41	7.6600	1.0000	13.0000	13	8.7700	6.0000	13.0000
Arsenic, ug/L	78	1.2100	0.0000	6.0000	28	1.1800	0.0000	6.0000
Chromium, ug/L	76	10.5300	0.0000	60.0000	27	11.1100	0.0000	20.0000
Copper, ug/L	76	4.4900	1.0000	24.0000	27	4.3000	1.0000	20.0000
Iron, ug/L	77	761.0400	10.0000	9000.0000	28	907.8600	110.0000	9000.0000
Lead, ug/L	73	4.8100	0.0000	50.0000	26	6.1500	0.0000	50.0000
Manganese, ug/L	77	349.3500	10.0000	2800.0000	28	92.8600	10.0000	570.0000
Nickel, ug/L	78	6.1800	0.0000	50.0000	28	6.4600	1.0000	50.0000
Zinc, ug/L	78	24.8100	0.0000	190.0000	28	24.1100	5.0000	110.0000
Aluminum, ug/L	77	367.9200	10.0000	4400.0000	28	500.0000	40.0000	4400.0000
Fecal Coliform (Colonies/100 ml)	40	3.9000	0.0000	24.0000	15	5.0000	0.0000	23.0000
Calcium Hardness, mg/L (as CaCO3)	54	56.5600	23.0000	76.0000	20	47.8500	23.0000	68.0000
Orthophosphate, mg/L (as P)	78	0.0300	0.0000	0.1800	28	0.0300	0.0000	0.1800
Chlorophyll A, ug/L	23	5.6100	0.2000	32.0000	8	10.2600	1.0000	32.0000
Chlorophyll B, ug/L	23	0.3500	0.1000	2.1000	8	0.5400	0.1000	2.1000
Total Phosphorous, mg/L (as PO4)	33	0.1300	0.0300	0.5200	10	0.1400	0.0600	0.2100
Total Nitrogen, mg/L (as NO3)	31	4.6500	0.8000	12.0000	12	4.7600	3.0000	8.4000
Mercury, ug/L	77	0.1200	0.0000	0.5000	28	0.1300	0.0000	0.5000
Depth of Reservoir, Feet	149	79.0300	44.0000	95.0000	53	80.5700	44.0000	90.0000

Table XXXIV. Water Quality Data for the Rogers Site: Period of Record and Summer Season.

STATION 9 ROGERS	PERIOD OF RECORD				SUMMER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	82	14.0800	3.0000	30.0000	25	20.0000	9.5000	30.0000
Turbidity, FTU	70	12.0600	0.6000	82.0000	21	10.8600	0.6000	41.0000
Transparency, Inches	28	54.4300	10.0000	112.0000	6	97.6700	72.0000	112.0000
Color, Units	78	25.5000	0.0000	400.0000	21	13.5200	0.0000	40.0000
Conductivity, Micromhos/cm	82	130.8500	65.0000	200.0000	25	133.1600	112.0000	170.0000
Dissolved Oxygen, mg/L	81	6.7500	0.1000	13.0000	25	3.6700	0.1000	8.4000
Dissolved Oxygen, % Saturation	81	64.0200	0.9000	106.3000	25	45.0900	0.9000	103.7000
Biochemical Oxygen Demand, mg/L	82	1.3500	0.3000	3.0000	25	1.3600	0.4000	3.0000
pH, Standard Units	82	7.5200	6.4000	9.0000	25	7.6900	6.9800	8.7000
Carbon Dioxide, mg/L	9	5.8200	2.6000	11.0000	2	5.9500	2.6000	9.3000
Total Alkalinity, mg/L (as CaCO3)	76	49.9600	19.0000	80.0000	23	52.7800	41.0000	66.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	11	56.3600	23.0000	98.0000	2	54.5000	51.0000	58.0000
Carbonate Alkalinity, mg/L (as CO3)	11	0.0000	0.0000	0.0000	2	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	31	1.0000	0.0100	2.6000	7	0.9200	0.0100	2.6000
Organic Nitrogen, mg/L (as N)	31	0.4900	0.0000	1.8000	7	0.6700	0.0300	1.8000
Ammonia Nitrogen, mg/L (as N)	42	0.1100	0.0000	0.6100	9	0.2200	0.0200	0.6100
Un-ionized Ammonia Nitrogen, mg/L (as N)	38	0.0024	0.0000	0.0500	9	0.0100	0.0001	0.0500
Total Kjeldahl Nitrogen, mg/L (as N)	43	0.5600	0.1000	2.2000	11	0.7900	0.1000	2.2000
Nitrate Nitrogen, mg/L (as N)	78	0.4600	0.0000	1.1000	21	0.1600	0.0000	0.5900
Total Phosphorous, mg/L (as P)	78	0.0400	0.0100	0.2400	21	0.0500	0.0100	0.1700
Total Hardness, mg/L (as CaCO3)	51	55.9200	27.0000	76.0000	14	59.7100	44.0000	76.0000
Noncarbonate Hardness, mg/L (asCaCO3)	29	9.5900	0.0000	23.0000	8	12.7500	4.0000	21.0000
Calcium, mg/l (as CaCO3)	36	51.4400	20.0000	68.0000	11	54.8200	42.0000	68.0000
Dissolved Calcium, mg/L (as Ca)	54	19.8400	7.6000	27.0000	15	21.6000	17.0000	27.0000
Dissolved Magnesium, mg/L (as Mg)	55	1.6900	0.9000	2.3000	15	1.7900	1.4000	2.3000
Potassium, mg/L	42	1.3500	0.1000	2.0000	11	1.4200	1.1000	1.7000
Chloride, mg/L	41	3.9500	2.0000	7.0000	11	3.5500	2.0000	5.0000
Sulfate, mg/L	41	7.6600	1.0000	13.0000	11	6.2700	1.0000	10.0000
Arsenic, ug/L	78	1.2100	0.0000	6.0000	21	1.3300	0.0000	2.0000
Chromium, ug/L	76	10.5300	0.0000	60.0000	21	12.3800	0.0000	60.0000
Copper, ug/L	76	4.4900	1.0000	24.0000	21	4.8100	1.0000	24.0000
Iron, ug/L	77	761.0400	10.0000	9000.0000	20	792.5000	10.0000	2500.0000
Lead, ug/L	73	4.8100	0.0000	50.0000	21	3.4300	1.0000	8.0000
Manganese, ug/L	77	349.3500	10.0000	2800.0000	20	1003.0000	10.0000	2800.0000
Nickel, ug/L	78	6.1800	0.0000	50.0000	21	4.7600	0.0000	27.0000
Zinc, ug/L	78	24.8100	0.0000	190.0000	21	24.7600	0.0000	90.0000
Aluminum, ug/L	77	367.9200	10.0000	4400.0000	20	282.5000	10.0000	1600.0000
Fecal Coliform (Colonies/100 ml)	40	3.9000	0.0000	24.0000	9	2.0000	0.0000	6.0000
Calcium Hardness, mg/L (as CaCO3)	54	56.5600	23.0000	76.0000	15	61.3300	49.0000	76.0000
Orthophosphate, mg/L (as P)	78	0.0300	0.0000	0.1800	21	0.0200	0.0000	0.1400
Chlorophyll A, ug/L	23	5.6100	0.2000	32.0000	7	3.4600	1.5000	10.0000
Chlorophyll B, ug/L	23	0.3500	0.1000	2.1000	7	0.3000	0.1000	1.1000
Total Phosphorous, mg/L (as PO4)	33	0.1300	0.0300	0.5200	12	0.1500	0.0300	0.5200
Total Nitrogen, mg/L (as NO3)	31	4.6500	0.8000	12.0000	7	5.1100	0.8000	12.0000
Mercury, ug/L	77	0.1200	0.0000	0.5000	20	0.1100	0.0000	0.3000
Depth of Reservoir, Feet	149	79.0300	44.0000	95.0000	41	79.8800	75.0000	90.0000

Table XXXV. Water Quality Data for the Rogers Site: Period of Record and Winter Season.

STATION 9 ROGERS	PERIOD OF RECORD				WINTER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	82	14.0800	3.0000	30.0000	20	8.0700	5.0000	11.0000
Turbidity, FTU	70	12.0600	0.6000	82.0000	18	8.0900	2.1000	33.0000
Transparency, Inches	28	54.4300	10.0000	112.0000	8	45.7500	18.0000	66.0000
Color, Units	78	25.5000	0.0000	400.0000	20	13.6500	4.0000	70.0000
Conductivity, Micromhos/cm	82	130.8500	65.0000	200.0000	20	142.6000	88.0000	183.0000
Dissolved Oxygen, mg/L	81	6.7500	0.1000	13.0000	20	9.9700	7.6000	12.3000
Dissolved Oxygen, % Saturation	81	64.0200	0.9000	106.3000	20	83.3400	65.5000	106.0000
Biochemical Oxygen Demand, mg/L	82	1.3500	0.3000	3.0000	20	1.1100	0.5000	2.6000
pH, Standard Units	82	7.5200	6.4000	9.0000	20	7.4600	6.7000	8.2000
Carbon Dioxide, mg/L	9	5.8200	2.6000	11.0000				
Total Alkalinity, mg/L (as CaCO3)	76	49.9600	19.0000	80.0000	18	58.0600	35.0000	80.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	11	56.3600	23.0000	98.0000				
Carbonate Alkalinity, mg/L (as CO3)	11	0.0000	0.0000	0.0000				
Total Nitrogen, mg/L (as N)	31	1.0000	0.0100	2.6000	5	0.8300	0.5600	1.4000
Organic Nitrogen, mg/L (as N)	31	0.4900	0.0000	1.8000	5	0.4900	0.0000	1.0000
Ammonia Nitrogen, mg/L (as N)	42	0.1100	0.0000	0.6100	8	0.0800	0.0000	0.1800
Un-ionized Ammonia Nitrogen, mg/L (as N)	38	0.0024	0.0000	0.0500	8	0.0007	0.0000	0.0030
Total Kjeldahl Nitrogen, mg/L (as N)	43	0.5600	0.1000	2.2000	7	0.4900	0.1000	1.2000
Nitrate Nitrogen, mg/L (as N)	78	0.4600	0.0000	1.1000	20	0.4700	0.1900	1.0000
Total Phosphorous, mg/L (as P)	78	0.0400	0.0100	0.2400	20	0.0300	0.0100	0.0600
Total Hardness, mg/L (as CaCO3)	51	55.9200	27.0000	76.0000	12	57.7500	42.0000	71.0000
Noncarbonate Hardness, mg/L (asCaCO3)	29	9.5900	0.0000	23.0000	6	6.1700	0.0000	10.0000
Calcium, mg/l (as CaCO3)	36	51.4400	20.0000	68.0000	7	60.0000	58.0000	62.0000
Dissolved Calcium, mg/L (as Ca)	54	19.8400	7.6000	27.0000	14	23.1400	14.0000	26.0000
Dissolved Magnesium, mg/L (as Mg)	55	1.6900	0.9000	2.3000	14	1.8800	1.6000	2.2000
Potassium, mg/L	42	1.3500	0.1000	2.0000	8	1.4100	1.1000	1.6000
Chloride, mg/L	41	3.9500	2.0000	7.0000	8	5.0000	3.0000	7.0000
Sulfate, mg/L	41	7.6600	1.0000	13.0000	8	7.1300	4.0000	10.0000
Arsenic, ug/L	78	1.2100	0.0000	6.0000	20	1.0000	1.0000	1.0000
Chromium, ug/L	76	10.5300	0.0000	60.0000	20	7.0000	0.0000	10.0000
Copper, ug/L	76	4.4900	1.0000	24.0000	20	2.9000	1.0000	7.0000
Iron, ug/L	77	761.0400	10.0000	9000.0000	20	495.5000	120.0000	2100.0000
Lead, ug/L	73	4.8100	0.0000	50.0000	19	3.2100	1.0000	12.0000
Manganese, ug/L	77	349.3500	10.0000	2800.0000	20	117.5000	30.0000	480.0000
Nickel, ug/L	78	6.1800	0.0000	50.0000	20	3.3500	0.0000	8.0000
Zinc, ug/L	78	24.8100	0.0000	190.0000	20	15.5000	0.0000	50.0000
Aluminum, ug/L	77	367.9200	10.0000	4400.0000	20	262.0000	40.0000	1400.0000
Fecal Coliform (Colonies/100 ml)	40	3.9000	0.0000	24.0000	11	2.7300	0.0000	21.0000
Calcium Hardness, mg/L (as CaCO3)	54	56.5600	23.0000	76.0000	14	65.6400	42.0000	74.0000
Orthophosphate, mg/L (as P)	78	0.0300	0.0000	0.1800	20	0.0200	0.0000	0.0500
Chlorophyll A, ug/L	23	5.6100	0.2000	32.0000	7	3.1300	0.2000	4.8000
Chlorophyll B, ug/L	23	0.3500	0.1000	2.1000	7	0.2300	0.1000	0.7000
Total Phosphorous, mg/L (as PO4)	33	0.1300	0.0300	0.5200	9	0.0800	0.0300	0.1500
Total Nitrogen, mg/L (as NO3)	31	4.6500	0.8000	12.0000	5	3.7200	2.5000	6.3000
Mercury, ug/L	77	0.1200	0.0000	0.5000	20	0.0900	0.0000	0.3000
Depth of Reservoir, Feet	149	79.0300	44.0000	95.0000	37	78.3800	54.0000	95.0000

Table XXXVI. Water Quality Data for the Hwy12 Site: Period of Record and Spring Season.

STATION 10 HWY68	PERIOD OF RECORD N	MEAN	MIN	MAX	SPRING SEASON N	MEAN	MIN	MAX
Temperature, Celsius	18	15.3700	4.0000	28.0000	7	15.8100	14.5000	17.5000
Turbidity, FTU	17	19.2100	2.0000	80.0000	7	16.2700	3.7000	42.0000
Transparency, Inches	19	36.8400	12.0000	86.0000	7	28.1400	12.0000	50.0000
Color, Units	17	52.2400	1.0000	450.0000	7	27.7100	5.0000	70.0000
Conductivity, Micromhos/cm	18	133.5000	83.0000	188.0000	7	127.0000	83.0000	188.0000
Dissolved Oxygen, mg/L	18	6.5600	0.4000	12.8000	7	5.5600	1.3000	10.8000
Dissolved Oxygen, % Saturation	18	58.2900	5.1000	108.0000	7	54.8900	13.4000	108.0000
Biochemical Oxygen Demand, mg/L	18	1.7900	0.2000	6.7000	7	1.3300	1.0000	1.8000
pH, Standard Units	18	7.2500	6.4500	7.9000	7	7.1700	6.7600	7.6000
Total Alkalinity, mg/L (as CaCO3)	17	51.2400	26.0000	84.0000	7	50.0000	26.0000	84.0000
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500	1	0.0500	0.0500	0.0500
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0004	0.0004	0.0004	1	0.0004	0.0004	0.0004
Total Kjeldahl Nitrogen, mg/L (as N)	1	0.4000	0.4000	0.4000	1	0.4000	0.4000	0.4000
Nitrate Nitrogen, mg/L (as N)	17	0.5500	0.1000	1.0000	7	0.6200	0.4000	0.9000
Total Phosphorous, mg/L (as P)	17	0.0700	0.0200	0.3100	7	0.0500	0.0300	0.0800
Total Hardness, mg/L (as CaCO3)	9	51.4400	36.0000	72.0000	3	48.3300	36.0000	56.0000
Dissolved Calcium, mg/L (as Ca)	8	21.1300	13.0000	33.0000	4	22.7500	15.0000	33.0000
Dissolved Magnesium, mg/L (as Mg)	8	1.7900	1.5000	2.0000	4	1.7500	1.5000	2.0000
Fecal Coliform (Colonies/100 ml)	17	58.9400	0.0000	370.0000	7	24.2900	2.0000	74.0000
Calcium Hardness, mg/L (as CaCO3)	8	60.1300	39.0000	91.0000	4	64.0000	44.0000	91.0000
Orthophosphate, mg/L (as P)	17	0.0400	0.0100	0.2600	7	0.0300	0.0100	0.0400
Chlorophyll A, ug/L	17	11.6900	0.1000	46.0000	7	16.5400	0.1000	46.0000
Chlorophyll B, ug/L	17	0.9300	0.1000	5.2000	7	1.5900	0.1000	5.2000
Total Phosphorous, mg/L (as PO4)	2	0.5700	0.1800	0.9500				
Depth of Reservoir, Feet	54	40.9800	20.0000	50.0000	21	43.0000	40.0000	47.0000

Table XXXVII. Water Quality Data for the Hwy12 Site: Period of Record and Summer Season.

STATION 10 HWY68	PERIOD OF RECORD				SUMMER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	18	15.3700	4.0000	28.0000	5	26.5000	24.0000	28.0000
Turbidity, FTU	17	19.2100	2.0000	80.0000	4	22.4300	2.0000	80.0000
Transparency, Inches	19	36.8400	12.0000	86.0000	6	52.1700	28.0000	64.0000
Color, Units	17	52.2400	1.0000	450.0000	4	116.0000	1.0000	450.0000
Conductivity, Micromhos/cm	18	133.5000	83.0000	188.0000	5	165.2000	139.0000	182.0000
Dissolved Oxygen, mg/L	18	6.5600	0.4000	12.8000	5	2.1200	0.4000	6.7000
Dissolved Oxygen, % Saturation	18	58.2900	5.1000	108.0000	5	25.2400	5.1000	78.8000
Biochemical Oxygen Demand, mg/L	18	1.7900	0.2000	6.7000	5	2.9800	1.0000	6.7000
pH, Standard Units	18	7.2500	6.4500	7.9000	5	7.3000	6.9400	7.7000
Total Alkalinity, mg/L (as CaCO3)	17	51.2400	26.0000	84.0000	4	60.7500	54.0000	66.0000
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0004	0.0004	0.0004				
Total Kjeldahl Nitrogen, mg/L (as N)	1	0.4000	0.4000	0.4000				
Nitrate Nitrogen, mg/L (as N)	17	0.5500	0.1000	1.0000	4	0.2500	0.1000	0.7000
Total Phosphorous, mg/L (as P)	17	0.0700	0.0200	0.3100	4	0.1100	0.0300	0.3100
Total Hardness, mg/L (as CaCO3)	9	51.4400	36.0000	72.0000	3	58.6700	48.0000	72.0000
Dissolved Calcium, mg/L (as Ca)	8	21.1300	13.0000	33.0000	1	22.0000	22.0000	22.0000
Dissolved Magnesium, mg/L (as Mg)	8	1.7900	1.5000	2.0000	1	1.9000	1.9000	1.9000
Fecal Coliform (Colonies/100 ml)	17	58.9400	0.0000	370.0000	4	15.5000	0.0000	60.0000
Calcium Hardness, mg/L (as CaCO3)	8	60.1300	39.0000	91.0000	1	63.0000	63.0000	63.0000
Orthophosphate, mg/L (as P)	17	0.0400	0.0100	0.2600	4	0.0800	0.0100	0.2600
Chlorophyll A, ug/L	17	11.6900	0.1000	46.0000	5	15.2400	4.4000	36.0000
Chlorophyll B, ug/L	17	0.9300	0.1000	5.2000	5	0.8400	0.1000	2.3000
Total Phosphorous, mg/L (as PO4)	2	0.5700	0.1800	0.9500	1	0.9500	0.9500	0.9500
Depth of Reservoir, Feet	54	40.9800	20.0000	50.0000	15	40.3300	38.0000	45.0000

Table XXXVIII. Water Quality Data for the Hwy12 Site: Period of Record and Winter Season.

STATION 10 HWY68	PERIOD OF RECORD				WINTER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	18	15.3700	4.0000	28.0000	6	5.5800	4.0000	8.5000
Turbidity, FTU	17	19.2100	2.0000	80.0000	6	20.5000	2.5000	50.0000
Transparency, Inches	19	36.8400	12.0000	86.0000	6	31.6700	12.0000	86.0000
Color, Units	17	52.2400	1.0000	450.0000	6	38.3300	5.0000	110.0000
Conductivity, Micromhos/cm	18	133.5000	83.0000	188.0000	6	114.6700	96.0000	173.0000
Dissolved Oxygen, mg/L	18	6.5600	0.4000	12.8000	6	11.4300	9.6000	12.8000
Dissolved Oxygen, % Saturation	18	58.2900	5.1000	108.0000	6	89.8200	76.8000	97.7000
Biochemical Oxygen Demand, mg/L	18	1.7900	0.2000	6.7000	6	1.3500	0.2000	2.7000
pH, Standard Units	18	7.2500	6.4500	7.9000	6	7.2900	6.4500	7.9000
Total Alkalinity, mg/L (as CaCO3)	17	51.2400	26.0000	84.0000	6	46.3300	29.0000	66.0000
Ammonia Nitrogen, mg/L (as N)	1	0.0500	0.0500	0.0500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	1	0.0004	0.0004	0.0004				
Total Kjeldahl Nitrogen, mg/L (as N)	1	0.4000	0.4000	0.4000				
Nitrate Nitrogen, mg/L (as N)	17	0.5500	0.1000	1.0000	6	0.6800	0.1800	1.0000
Total Phosphorous, mg/L (as P)	17	0.0700	0.0200	0.3100	6	0.0600	0.0200	0.1200
Total Hardness, mg/L (as CaCO3)	9	51.4400	36.0000	72.0000	3	47.3300	40.0000	52.0000
Dissolved Calcium, mg/L (as Ca)	8	21.1300	13.0000	33.0000	3	18.6700	13.0000	27.0000
Dissolved Magnesium, mg/L (as Mg)	8	1.7900	1.5000	2.0000	3	1.8000	1.6000	2.0000
Fecal Coliform (Colonies/100 ml)	17	58.9400	0.0000	370.0000	6	128.3300	0.0000	370.0000
Calcium Hardness, mg/L (as CaCO3)	8	60.1300	39.0000	91.0000	3	54.0000	39.0000	76.0000
Orthophosphate, mg/L (as P)	17	0.0400	0.0100	0.2600	6	0.0500	0.0100	0.0800
Chlorophyll A, ug/L	17	11.6900	0.1000	46.0000	5	1.3400	0.2000	3.7000
Chlorophyll B, ug/L	17	0.9300	0.1000	5.2000	5	0.1000	0.1000	0.1000
Total Phosphorous, mg/L (as PO4)	2	0.5700	0.1800	0.9500	1	0.1800	0.1800	0.1800
Depth of Reservoir, Feet	54	40.9800	20.0000	50.0000	18	39.1700	20.0000	50.0000

Table XXXIX. Water Quality Data for the Richland Creek Site: Period of Record and Spring Season.

STATION 11 RICHLAND CREEK	PERIOD OF RECORD N	MEAN	MIN	MAX	SPRING SEASON N	MEAN	MIN	MAX
Temperature, Celsius	17	19.2100	6.5000	32.5000	5	18.7000	18.0000	20.5000
Flow, CFS	1	3.0000	3.0000	3.0000				
Turbidity, FTU	13	16.5700	1.0000	95.0000	5	17.8800	1.5000	77.0000
Transparency, Inches	13	26.3800	2.0000	72.0000	5	26.6000	12.0000	72.0000
Color, Units	14	19.0700	2.0000	80.0000	5	20.6000	5.0000	65.0000
Conductivity, Micromhos/cm	18	174.3900	99.0000	250.0000	5	124.0000	99.0000	154.0000
Dissolved Oxygen, mg/L	16	10.0700	6.0000	12.7000	5	9.8400	7.5000	11.5000
Dissolved Oxygen, % Saturation	16	105.7600	69.0000	151.9000	5	104.3600	78.9000	125.0000
Biochemical Oxygen Demand, mg/L	14	1.7000	0.6000	4.2000	5	1.6400	0.8000	4.2000
pH, Standard Units	18	7.5600	7.3000	8.5000	5	7.5200	7.4000	7.7000
Total Alkalinity, mg/L (as CaCO3)	14	61.3600	33.0000	100.0000	5	49.8000	38.0000	66.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	1	122.0000	122.0000	122.0000				
Carbonate Alkalinity, mg/L (as CO3)	1	0.0000	0.0000	0.0000				
Total Nitrogen, mg/L (as N)	4	1.8600	0.9400	2.9000				
Organic Nitrogen, mg/L (as N)	4	0.8000	0.4300	1.2000				
Ammonia Nitrogen, mg/L (as N)	5	0.0900	0.0000	0.2500	1	0.2500	0.2500	0.2500
Un-ionized Ammonia Nitrogen, mg/L (as N)	2	0.0025	0.0010	0.0040	1	0.0040	0.0040	0.0040
Total Kjeldahl Nitrogen, mg/L (as N)	5	0.8200	0.4400	1.3000	1	0.7000	0.7000	0.7000
Nitrate Nitrogen, mg/L (as N)	17	0.7800	0.1000	1.6000	5	0.5100	0.3700	0.6000
Total Phosphate, mg/L (as PO4)	4	0.1900	0.0000	0.7100				
Total Phosphorous, mg/L (as P)	17	0.0700	0.0100	0.3200	5	0.0500	0.0100	0.1700
Total Hardness, mg/L (as CaCO3)	10	65.0000	48.0000	108.0000	3	56.6700	50.0000	66.0000
Noncarbonate Hardness, mg/L (asCaCO3)	1	6.0000	6.0000	6.0000				
Dissolved Calcium, mg/L (as Ca)	5	26.2000	15.0000	39.0000	2	19.0000	15.0000	23.0000
Dissolved Magnesium, mg/L (as Mg)	5	2.1000	1.4000	2.8000	2	1.6000	1.4000	1.8000
Chloride, mg/L	1	4.0000	4.0000	4.0000				
Sulfate, mg/L	1	13.0000	13.0000	13.0000				
Fecal Coliform (Colonies/100 ml)	13	1585.0000	10.0000	14000.0000	5	3024.8000	110.0000	14000.0000
Calcium Hardness, mg/L (as CaCO3)	5	74.0000	43.0000	107.0000	2	54.0000	43.0000	65.0000
Orthophosphate, mg/L (as P)	17	0.0500	0.0000	0.2300	5	0.0200	0.0100	0.0600
Chlorophyll A, ug/L	17	4.5000	0.1000	25.9000	5	1.9400	0.1000	6.0000
Chlorophyll B, ug/L	17	1.6100	0.1000	13.4000	5	0.1600	0.1000	0.4000
Ammonia Nitrogen, mg/L (as NH4)	4	0.0500	0.0000	0.1000				
Total Phosphorous, mg/L (as PO4)	6	0.2100	0.0300	0.4900				
Total Nitrogen, mg/L (as NO3)	4	8.2000	4.2000	13.0000				
Depth of Reservoir, Feet	27	3.7600	0.6000	8.0000	10	4.3000	1.0000	8.0000

Table XL. Water Quality Data for the Richland Creek Site: Period of Record and Summer Season.

STATION 11 RICHLAND CREEK	PERIOD OF RECORD				SUMMER SEASON			
	N	MEAN	MIN	MAX	N	MEAN	MIN	MAX
Temperature, Celsius	17	19.2100	6.5000	32.5000	6	27.5800	23.0000	32.5000
Flow, CFS	1	3.0000	3.0000	3.0000	1	3.0000	3.0000	3.0000
Turbidity, FTU	13	16.5700	1.0000	95.0000	4	25.8300	1.0000	95.0000
Transparency, Inches	13	26.3800	2.0000	72.0000	4	21.5000	2.0000	48.0000
Color, Units	14	19.0700	2.0000	80.0000	5	7.2000	2.0000	20.0000
Conductivity, Micromhos/cm	18	174.3900	99.0000	250.0000	6	219.1700	187.0000	238.0000
Dissolved Oxygen, mg/L	16	10.0700	6.0000	12.7000	5	9.2400	6.0000	12.0000
Dissolved Oxygen, % Saturation	16	105.7600	69.0000	151.9000	5	115.9800	69.0000	151.9000
Biochemical Oxygen Demand, mg/L	14	1.7000	0.6000	4.2000	5	2.1600	1.1000	3.7000
pH, Standard Units	18	7.5600	7.3000	8.5000	6	7.7700	7.3000	8.5000
Total Alkalinity, mg/L (as CaCO3)	14	61.3600	33.0000	100.0000	5	89.2000	58.0000	100.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	1	122.0000	122.0000	122.0000	1	122.0000	122.0000	122.0000
Carbonate Alkalinity, mg/L (as CO3)	1	0.0000	0.0000	0.0000	1	0.0000	0.0000	0.0000
Total Nitrogen, mg/L (as N)	4	1.8600	0.9400	2.9000				
Organic Nitrogen, mg/L (as N)	4	0.8000	0.4300	1.2000				
Ammonia Nitrogen, mg/L (as N)	5	0.0900	0.0000	0.2500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	2	0.0025	0.0010	0.0040				
Total Kjeldahl Nitrogen, mg/L (as N)	5	0.8200	0.4400	1.3000				
Nitrate Nitrogen, mg/L (as N)	17	0.7800	0.1000	1.6000	4	0.5500	0.1000	1.2000
Total Phosphate, mg/L (as PO4)	4	0.1900	0.0000	0.7100				
Total Phosphorous, mg/L (as P)	17	0.0700	0.0100	0.3200	4	0.0600	0.0100	0.1600
Total Hardness, mg/L (as CaCO3)	10	65.0000	48.0000	108.0000	4	80.0000	58.0000	108.0000
Noncarbonate Hardness, mg/L (asCaCO3)	1	6.0000	6.0000	6.0000	1	6.0000	6.0000	6.0000
Dissolved Calcium, mg/L (as Ca)	5	26.2000	15.0000	39.0000	2	36.5000	34.0000	39.0000
Dissolved Magnesium, mg/L (as Mg)	5	2.1000	1.4000	2.8000	2	2.6000	2.4000	2.8000
Chloride, mg/L	1	4.0000	4.0000	4.0000	1	4.0000	4.0000	4.0000
Sulfate, mg/L	1	13.0000	13.0000	13.0000	1	13.0000	13.0000	13.0000
Fecal Coliform (Colonies/100 ml)	13	1585.0000	10.0000	14000.0000	4	49.7500	10.0000	91.0000
Calcium Hardness, mg/L (as CaCO3)	5	74.0000	43.0000	107.0000	2	101.5000	96.0000	107.0000
Orthophosphate, mg/L (as P)	17	0.0500	0.0000	0.2300	4	0.0500	0.0100	0.1500
Chlorophyll A, ug/L	17	4.5000	0.1000	25.9000	4	2.9500	1.5000	4.6000
Chlorophyll B, ug/L	17	1.6100	0.1000	13.4000	4	0.2300	0.1000	0.4000
Ammonia Nitrogen, mg/L (as NH4)	4	0.0500	0.0000	0.1000				
Total Phosphorous, mg/L (as PO4)	6	0.2100	0.0300	0.4900	1	0.4900	0.4900	0.4900
Total Nitrogen, mg/L (as NO3)	4	8.2000	4.2000	13.0000				
Depth of Reservoir, Feet	27	3.7600	0.6000	8.0000	9	2.9600	0.6000	6.0000

Table XLI. Water Quality Data for the Richland Creek Site: Period of Record and Winter Season.

STATION 11 RICHLAND CREEK	PERIOD OF RECORD N	MEAN	MIN	MAX	WINTER SEASON N	MEAN	MIN	MAX
Temperature, Celsius	17	19.2100	6.5000	32.5000	4	7.8800	6.5000	9.5000
Flow, CFS	1	3.0000	3.0000	3.0000				
Turbidity, FTU	13	16.5700	1.0000	95.0000	4	5.6800	2.9000	9.8000
Transparency, Inches	13	26.3800	2.0000	72.0000	4	31.0000	4.0000	72.0000
Color, Units	14	19.0700	2.0000	80.0000	4	32.0000	5.0000	80.0000
Conductivity, Micromhos/cm	18	174.3900	99.0000	250.0000	4	119.7500	100.0000	139.0000
Dissolved Oxygen, mg/L	16	10.0700	6.0000	12.7000	4	11.2800	9.5000	12.7000
Dissolved Oxygen, % Saturation	16	105.7600	69.0000	151.9000	4	93.3500	81.9000	101.6000
Biochemical Oxygen Demand, mg/L	14	1.7000	0.6000	4.2000	4	1.2000	0.6000	2.8000
pH, Standard Units	18	7.5600	7.3000	8.5000	4	7.3600	7.3000	7.5000
Total Alkalinity, mg/L (as CaCO3)	14	61.3600	33.0000	100.0000	4	41.0000	33.0000	48.0000
Bicarbonate Alkalinity, mg/L (as HCO3)	1	122.0000	122.0000	122.0000				
Carbonate Alkalinity, mg/L (as CO3)	1	0.0000	0.0000	0.0000				
Total Nitrogen, mg/L (as N)	4	1.8600	0.9400	2.9000				
Organic Nitrogen, mg/L (as N)	4	0.8000	0.4300	1.2000				
Ammonia Nitrogen, mg/L (as N)	5	0.0900	0.0000	0.2500				
Un-ionized Ammonia Nitrogen, mg/L (as N)	2	0.0025	0.0010	0.0040				
Total Kjeldahl Nitrogen, mg/L (as N)	5	0.8200	0.4400	1.3000				
Nitrate Nitrogen, mg/L (as N)	17	0.7800	0.1000	1.6000	4	1.1300	0.9000	1.3000
Total Phosphate, mg/L (as PO4)	4	0.1900	0.0000	0.7100				
Total Phosphorous, mg/L (as P)	17	0.0700	0.0100	0.3200	4	0.1000	0.0100	0.3200
Total Hardness, mg/L (as CaCO3)	10	65.0000	48.0000	108.0000	3	53.3300	48.0000	60.0000
Noncarbonate Hardness, mg/L (asCaCO3)	1	6.0000	6.0000	6.0000				
Dissolved Calcium, mg/L (as Ca)	5	26.2000	15.0000	39.0000	1	20.0000	20.0000	20.0000
Dissolved Magnesium, mg/L (as Mg)	5	2.1000	1.4000	2.8000	1	2.1000	2.1000	2.1000
Chloride, mg/L	1	4.0000	4.0000	4.0000				
Sulfate, mg/L	1	13.0000	13.0000	13.0000				
Fecal Coliform (Colonies/100 ml)	13	1585.0000	10.0000	14000.0000	4	1320.5000	24.0000	5100.0000
Calcium Hardness, mg/L (as CaCO3)	5	74.0000	43.0000	107.0000	1	59.0000	59.0000	59.0000
Orthophosphate, mg/L (as P)	17	0.0500	0.0000	0.2300	4	0.0700	0.0100	0.2200
Chlorophyll A, ug/L	17	4.5000	0.1000	25.9000	4	0.2500	0.1000	0.6000
Chlorophyll B, ug/L	17	1.6100	0.1000	13.4000	4	0.1000	0.1000	0.1000
Ammonia Nitrogen, mg/L (as NH4)	4	0.0500	0.0000	0.1000				
Total Phosphorous, mg/L (as PO4)	6	0.2100	0.0300	0.4900	1	0.0300	0.0300	0.0300
Total Nitrogen, mg/L (as NO3)	4	8.2000	4.2000	13.0000				
Depth of Reservoir, Feet	27	3.7600	0.6000	8.0000	8	4.0000	2.0000	6.0000