LONG TERM BOD ANALYSIS OF THE BIG EAU PLEINE RESERVOIR, WISCONSIN, AS RELATED TO BOD SOURCE

By

Louie J. Swalby

A Thesis
submitted in partial fulfillment
of the requirements for the degree
MASTER OF SCIENCE

College of Natural Resources

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ABSTRACT

Long term BOD data were collected from the Big Eau Pleine Reservoir, Wisconsin to: 1) determine the source and composition of the BOD; 2) determine the role winter BOD plays in low oxygen levels and 3) provide deoxygenation coefficients and "ultimate BOD" values for the calibration of a limnological model. These studies and related water chemistry were measured in the fall of 1974 through the spring of 1976.

BOD was initially characterized by its carbonaceous, nitrogenous and filtrable fractions. Further characterization involved differentiating and quantifying the suspended solids into living biomass and detrital fractions.

The highest reservoir BOD was found in the summer. This is attributable to algal blooms and subsequent decay. Within the reservoir, on a yearly basis, filtrable BOD comprised 84% of the total BOD; nitrogenous BOD comprised 31% of the total BOD. Nitrogenous BOD from inflowing waters comprised 31% of the total BOD while the filtrable fraction was approximately 87% of the total BOD. On the average, 90% of the nitrogenous BOD for both inflow and reservoir waters was filtrable.

Under nondrawdown conditions, the typical fall and winter BOD is insufficient to cause the extreme low oxygen conditions in the reservoir. Winter reservoir deoxygenation

appears to be induced by decreasing water depths and resultant resuspension of organics and reduced chemical compounds.

Deoxygenation coefficients are generally low (0.05) suggesting complex organics. Only in the spring inflow waters does this rate exceed 0.1. This was found to be characteristic of agricultural runoff.

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Sincere gratitude is also expressed to the other members of the study projects who have at one time or another occupied the graduate student office involved in the Big Eau Pleine study. Their continuous encouragement and ideas have aided my study. Similar gratitude is expressed to the numerous lab personnel of the Environmental Task Force, who helped prepare this data.

Special thanks are due to Roger Clay, Gary Kohler, Bill Learn, Pat Schmieder, Ken Schrieber, Tim Scullin, Dick Stevens, Tony Suchaneck and John Sullivan, who have at one time or another provided unsolicited field help in sample collection. Mike Meyer, Rick Martens and Steve Bartelt guided me in my first encounters with water chemistry.

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INTRODUCTION

During the last decade, there has been an increased use of our water resources for recreation. This has resulted in greater citizen awareness and involvement in maintaining and improving this resource. Accordingly, citizens have questioned the causes of nuisance macrophytes, algal blooms and fish kills that occur in some waters. One of these water bodies experiencing such problems is the Big Eau Pleine Reservoir.

Basin Description

The Big Eau Pleine Watershed (945 km^2), located primarily in Marathon County, Wisconsin, contains one of the highest concentrations of dairy farms in the country (Hansen, 1979). Approximately 60% of the land is in a corn, oats and hay rotation; 15% in pasture; 17% in woodland and 8% in other land uses (Kaminski 1977 and Shaw 1978). The watershed is characterized by gentle rolling hills and by fine textured soils. Both characteristics account for fairly high surface runoff during periods of heavy rain and spring snow melt (Kaminski 1977).

The Big Eau Pleine Reservoir, primarily fed by surface runoff rather than ground water, is located in southern Marathon County in north central Wisconsin (Figure 1). The Wisconsin Valley Improvement Corporation (WVIC) created the

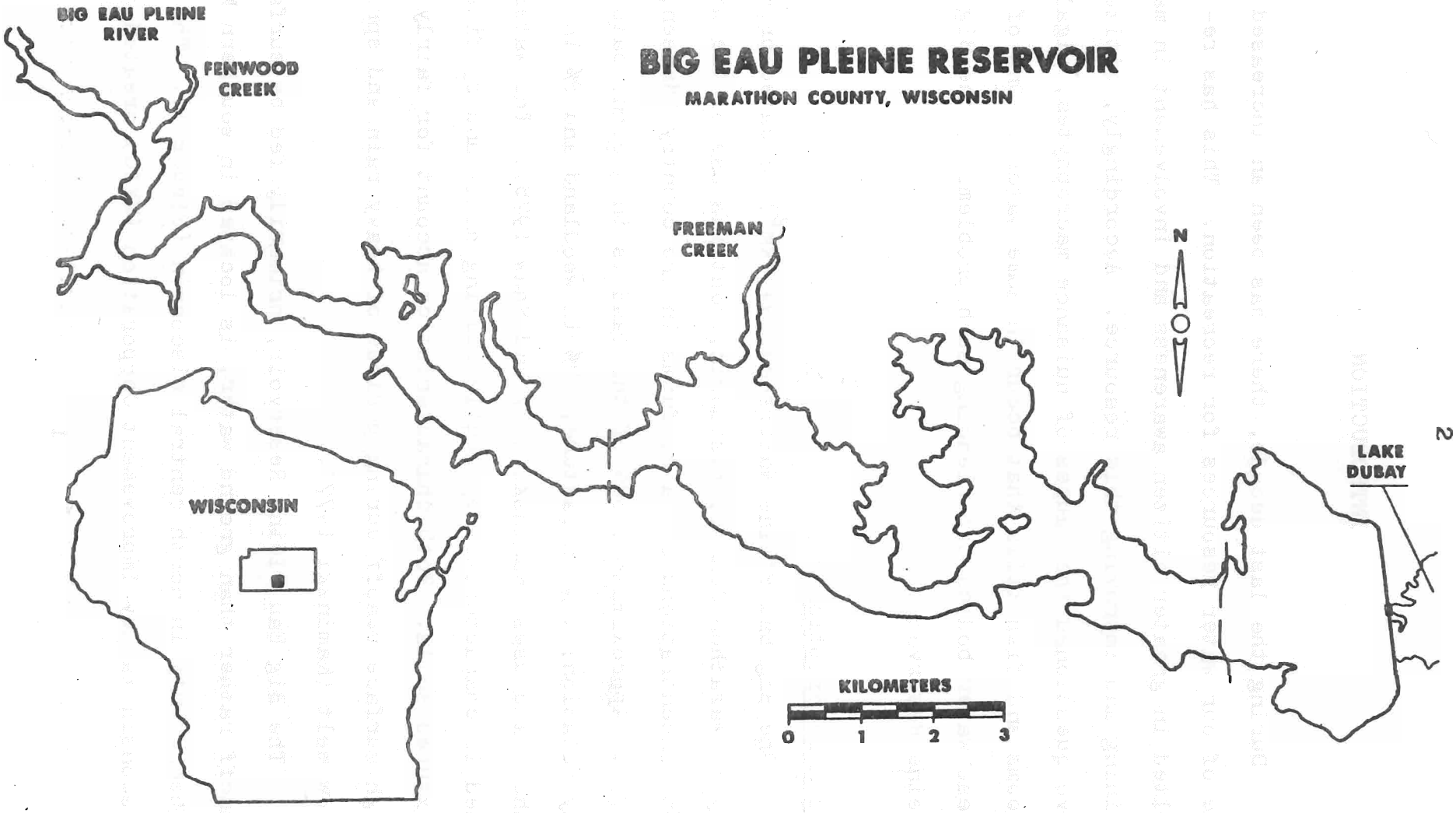


Figure 1. Location of the Big Eau Pleine Reservoir.

reservoir in 1937 by impounding the Big Eau Pleine River (Martin and Hanson 1966). The 2830 ha. reservoir operates to augment the flow for the hydro-electric plants downstream on the Wisconsin River (U.S. Environmental Protection Agency (EPA) 1974).

After its impoundment, the reservoir became a popular recreation site. Unfortunately, the reservoir has been plagued with low dissolved oxygen (DO) lending to persistent winter fish kills. In the last 15 years at least five major fish kills have occurred (1963, 1971, 1974, 1975 and 1976) (Kloppenberg 1974 and Shaw 1976). The reservoir's recreational and economic potential are further diminished by dense algal blooms which occur during the warmer months.

Previous and Ongoing Studies

The Big Eau Pleine Reservoir has been the focus of several research projects within the last several years. In 1972 the reservoir was studied by the National Eutrophication Survey to determine the factors responsible for its trophic state (U.S. EPA 1974). Additional baseline data collected by Student-Originated Studies Program (National Science Foundation) at the University of Wisconsin - Stevens Point (Schmidt 1972 and Nichols 1973) suggest that the reservoir is highly eutrophic with frequent bluegreen algal blooms.

More recently, the impact of the water level manipulation on the aquatic macroinvertebrates and zooplankton

communities have been investigated by Kaster (1976 and Buchanan (1976). Buchanan found little effect of drawdown on the zooplankton populations. However, Kaster found a generally poor diversity of macroinvertebrates primarily due to the large regulated shoreline area and its effect on restricting macrophyte development.

These studies led to the present studies at the University of Wisconsin - Stevens Point. The present investigations are being accomplished by a team of graduate students who are working to determine the causes and possible management alternatives to correct the reservoir and watershed problems.

Within the reservoir, these studies include a characterization of primary production and its limiting factors, sediment oxygen demand (SOD), biochemical oxygen demand (BOD), light penetration through snow and ice and snowmelt phenomenon. The reservoir is also being hydrologically modeled to produce a water and nutrient budget and limnologically modeled to determine methods of improving water quality. Within the watershed, methods of land disposal of cheese factory wastes and its contribution to nutrient and BOD loading are being investigated.

With increasing concern to eliminate sources of water pollution, attention has been turned to land use and local management practices. Agricultural practices, particularly fertilizer and manure applications and their subsequent

displacement through soil erosion, may significantly contribute nutrients to the receiving waters.

In cooperation with the area Soil Conservation Service, Hansen (1979) has developed a cost analysis for conservation practices required to bring the present land use in the watershed to allowable soil loss values. The watershed is also being modeled to determine the frequency, quantity and mechanisms of erosion and to localize the source of nutrients.

Hamann Creek (66.7 km^2), a sub-basin within the Big Eau Pleine Watershed (Figure 2), has been completely inventoried by Kaminski and Elbert (1977) for land use and management. In addition, flow and water quality are being monitored in the sub-basin by the Wisconsin Department of Natural Resources.

These land use study recommendations, as well as characterizations of organics originating from the watershed, will serve as a scheme to decelerate the reservoir eutrophication. One cause of the eutrophication is the introduction of oxygen demanding material, measured as BOD. An accurate characterization and understanding of sources and extent of BOD is a necessary step in the development of this scheme.

Purpose of Research

The primary goal of my research is to determine, on a seasonal basis, the composition of the BOD and its rate of breakdown. This includes a separation of the total long term

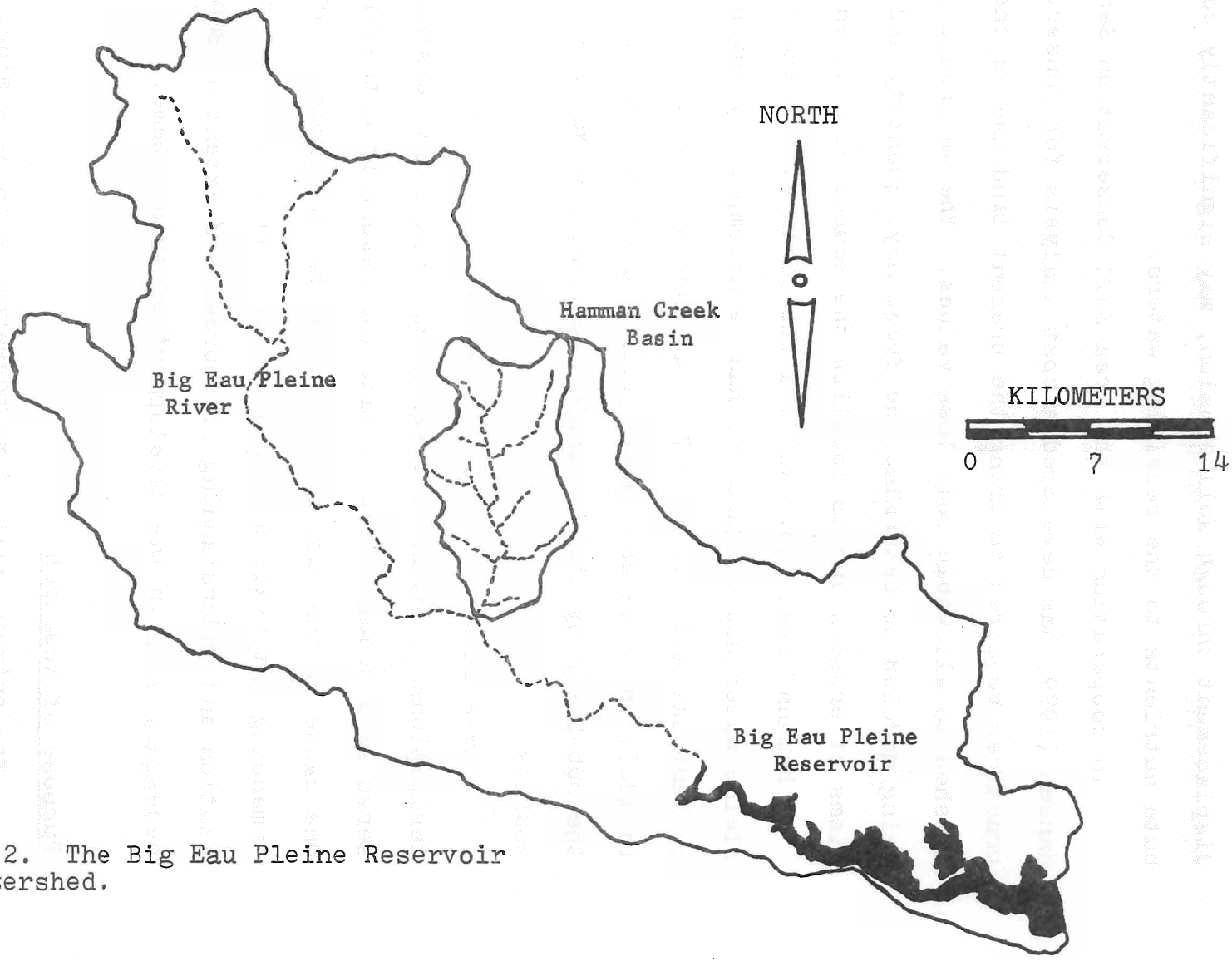


Figure 2. The Big Eau Pleine Reservoir and Watershed.

BOD into its carbonaceous, nitrogenous and filtrable fractions from the inflow and reservoir. Also, the total BOD's suspended solids fraction is divided into detrital and living biomass composition. Finally, the seasonal long term BOD is described by numerical coefficients which may be used in water quality modeling.

Regulation of the Reservoir

The Big Eau Pleine River has a mean annual flow of 4.81 m^3/s at Stratford, Wisconsin (United States Geological Survey (USGS) 1976). The largest recorded flow is 1,160 m^3/s (USGS 1976). Two smaller tributaries, Freeman and Fenwood Creeks, contribute approximately 16% of the flow to the Big Eau Pleine Reservoir (U.S. EPA 1974).

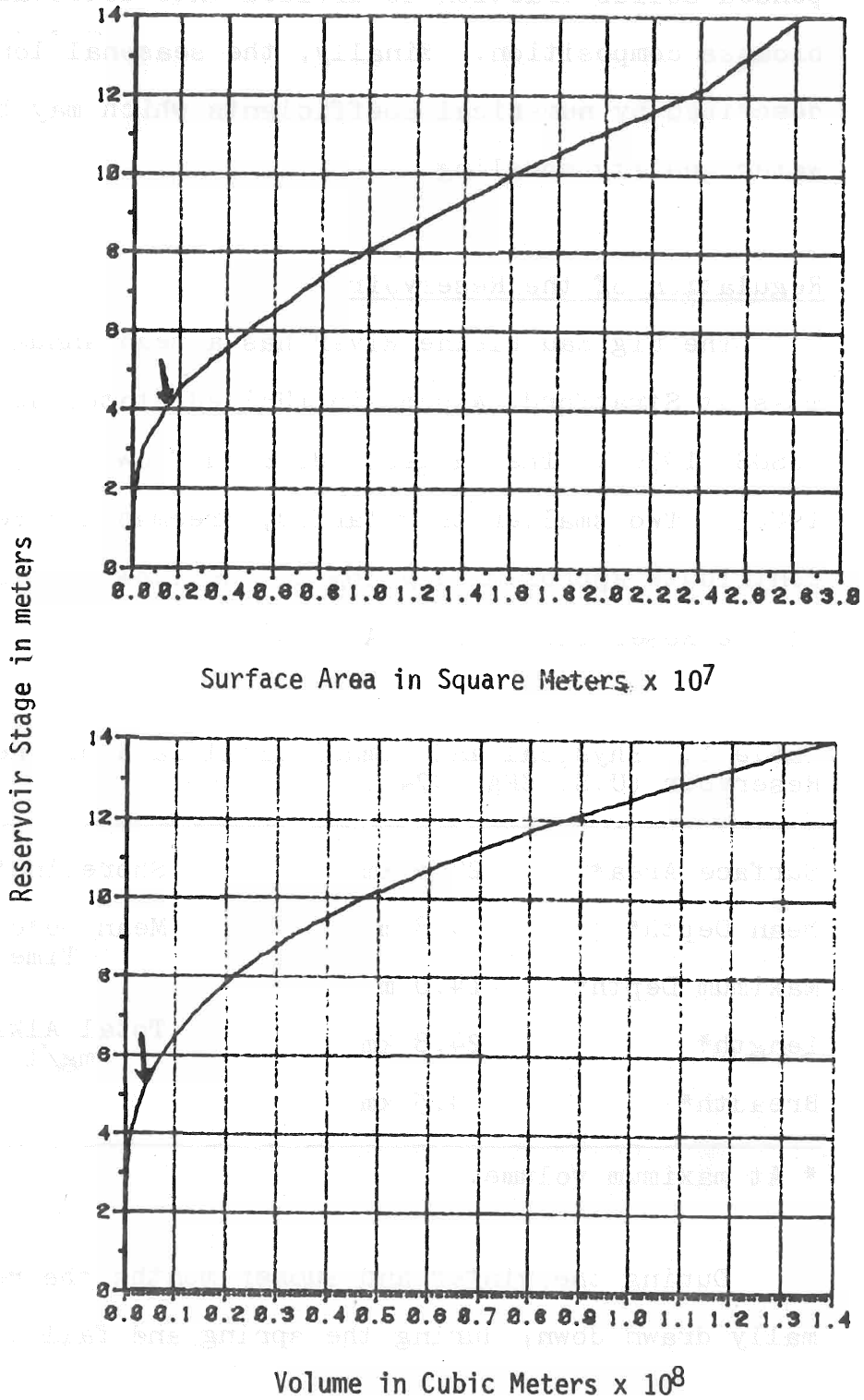
Table 1. Physical and Limnological Data of the Big Eau Pleine Reservoir (U.S. EPA 1974).

Surface Area*	27.6 km^2	Shoreline*	106.2 km
Mean Depth*	4.8 m	Mean Detention Time	0.4 yr
Maximum Depth*	14.0 m		
Length*	24.8 km	Total Alkalinity (mg/l $CaCO_3$)	35 - 60
Breadth*	4.5 km		

* At maximum volume.

During the winter and summer months the reservoir is normally drawn down; during the spring and fall it is refilled to

Figure 3. Morphometric Description of the Big Eau Pleine Reservoir.



the extent that water is available. Physical and limnological data on the reservoir are summarized in Table 1 and Figure 3. Water level fluctuations of up to 9 meters are common during a normal year of regulation (Figure 11). This fluctuating stage has an immense impact on the reservoir surface area considering the reservoir's maximum depth is about 14 meters and the mean depth only about 5 meters. After spring runoff in April, the reservoir reaches its maximum volume of 134 million cubic meters (MCM). At maximum drawdown the reservoir volume is 1.7 MCM (Vennie 1978). This is a reduction of approximately 98%.

General BOD Characterization - Introduction

The BOD test is an empirical test in that it does not measure the presence of a tangible entity, but rather the consumption of oxygen with respect to time (Clark 1974). Generally, the BOD of a water system is defined as unit oxygen demanded per unit time period (normally expressed in mg/l/5 days at 20° C). The test is an attempt to simulate the natural decomposition of organic matter through aerobic microbiol action.

Whereas the significance of the BOD in rivers and sewage treatment processes has been studied for 80 years, its significance in lakes and impoundments is a relatively recent concern. BOD measurements on a river or sewage treatment process are generally confined to a 5 day test period.

Because lakes generally have more resistant organics and longer retention times than rivers, this 5 day test period is too short to estimate the ultimate BOD. The importance of long term BOD studies (20 days or longer) must be emphasized when long retention times predominate. The organics found within a lake differ in composition and degradation in comparison to rivers and sewage related systems in that there is a decreased ratio of particulate to dissolved organic matter and the greater autotrophic activity in lakes (Wetzel 1975).

Mathematical Description of BOD

Primarily out of convenience, BOD kinetics have been considered as a single first order decreasing rate reaction (Gaudy 1972). The BOD process is a first order reaction in the sense that the rate of biochemical oxidation is proportional to the concentration of remaining organic matter. In mathematical terms:

$$dL/dt = -k_1/L \qquad \text{Equation 1}$$

where L is the oxidizable organic matter remaining after t days and k_1 is the constant of proportionality, or the rate constant (Tsivoglou 1975).

The units of L are mg/l and k_1 has similar units of reciprical time, usually days. The solution to the above differential equation is:

$$L = L_a \, e^{-k_1 t} \qquad \text{Equation 2}$$

where L_a is the initial amount of oxidizable organic matter in mg/l, L_a is thus the amount of BOD that will be exerted after a very long time, the "ultimate" first stage BOD (Tsivoglou 1975). BOD is the cummulative amount of L that has been exerted in any period of time, such that:

$$y = L_a - L = L_a - L_a e^{-k_1 t} = L_a (1 - e^{-k_1 t}) \qquad \text{Equation 3}$$

where y is the BOD in mg/l.

While equation 3 generally describes many river systems with point source input, it poorly describes many systems over long time periods (20 - 100 days). With respect to time, the organics break down at different rates based upon their complexity. Initially there is a rapid breakdown of the organic material. However, the reaction slows down considerably because the remaining organic matter is more resistant to decomposition. Tsivoglou (1958) recognized this when he theorized that different components in the waste effluent are oxidized at different rates. He proposed two simultaneous operating first order equations.

The above approach was carried a step further in a study modeling the Fox River and Green Bay system (Paterson 1975). He suggested that the typical BOD curve consists of 3 separate sub-curves, each having a unique reaction rate. Initially, the first curve should have the highest reaction

rate while the subsequent curves should have progressively lower reaction rates. Thus, as the overall reaction neared completion, the rate of the reaction should approach zero. Using this approach, each curve is defined by an equation, therefore, the total curve is determined by solving the three equations simultaneously. This procedures was used in the characterization of the BOD curves for this study.

Mathematically, this procedure may be represented by the following differential equations:

$$-dL_1/dt = k_1L_1; \quad -dL_2/dt = k_2L_2 \quad \text{and} \quad -dL_3/dt = k_3L_3$$

Equation 4

which when integrated and added together yield:

$$Y_t = L_1(1 - e^{-k_1t}) + L_2(1 - e^{-k_2t}) + L_3(1 - e^{-k_3t})$$

Equation 5

The variables are the same as previously described; the numbers 1, 2 and 3 refer to the three different reactions.

MATERIALS AND METHODS

Sampling Periodicity, Location and Techniques

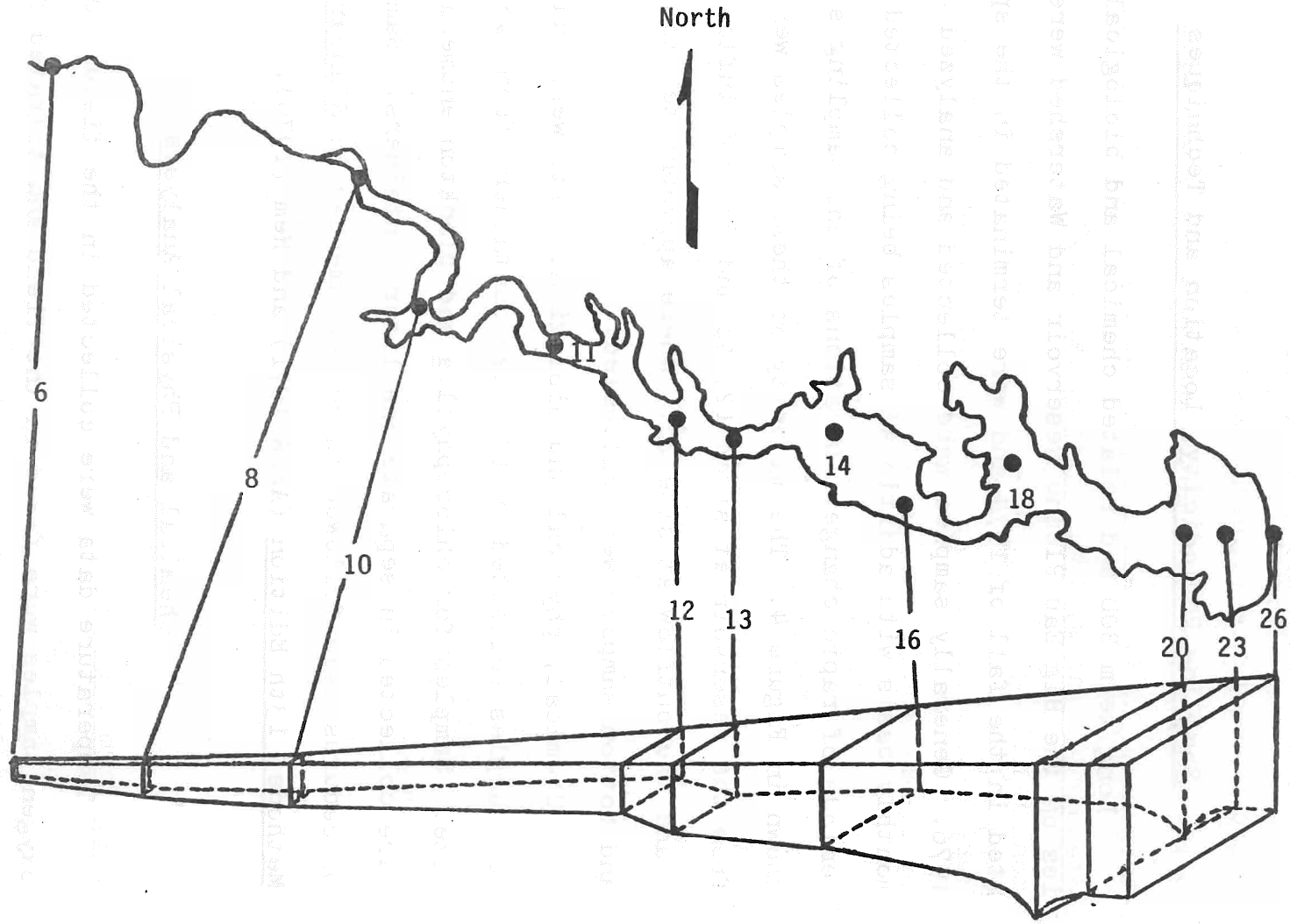
Long term BOD and related chemical and biological studies on the Big Eau Pleine Reservoir and Watershed were initiated in the fall of 1974 and were terminated in the spring of 1976. Generally samples were collected and analyzed on a monthly basis with additional samples being collected during periods of rapid change. Locations of the sampling sites are shown in Figure 4. The majority of these samples were taken from the reservoir at sites 12, 16 and 23, the inflow at site 6 and the outflow at site 26. Where appropriate, top, middle and bottom samples were collected.

Chemical, physical and biological tests were run on water samples collected in 19 liter containers from each sample site. Samples for chlorophyll a and plankton enumeration were collected in separate one liter containers. Sampling procedures used followed those recommended in Standard Methods, 13th Edition (APHA 1971) and Hem (1970).

Chemical and Physical Analysis

Temperature data were collected in the field. Dissolved oxygen samples were fixed in the field and titrated following the azide modification of the Winkler method. The following tests were run on each sample within 24 hours: reactive

Figure 4. Aerial View and Approximate 3 Dimensional View of the Reservoir



Note: 1 cm equals 6 meters (approx) vertical distance for 3 dimensional model.
1 cm equals 3 kilometers (approx) horizontal distance for aerial view.

phosphorus (react P), total phosphorus (total P), pH, specific conductance (cond), chemical oxygen demand (COD), non-filtrable residue (suspended solids or SS), and Kjeldahl nitrogen (Kjld N). All analysis were performed as suggested in Standard Methods, 13th Edition (APHA 1971). In addition, ammonium-nitrogen (NH_4) and nitrate plus nitrite nitrogen (N+N) were determined using a steam distillation method developed by Bremner and Keeney (1965).

At the end of the BOD incubation period (50 to 100 days), the following tests were run on the samples: pH, specific conductance, react P, NH_4, N+N, Kjeldahl N and COD. This post chemistry was performed on the total and the total filtrable BOD samples.

In this report, organic phosphorus (Org P) is defined as the difference between the total P and the reactive P. Similarly, organic nitrogen (Org N) is defined as the difference between Kjeldahl N and the NH_4-N. Total nitrogen (Tot N) is the sum of the Kjeldahl N and the nitrate plus nitrite nitrogen.

Biological Procedures

Long Term BOD Test

Long term BOD samples were set up without dilution or the addition of buffering and nutrient reagents in 2.5 liter bottles. The samples were capped with a modified rubber stopper which allowed all air bubbles to be removed (Figure 5).

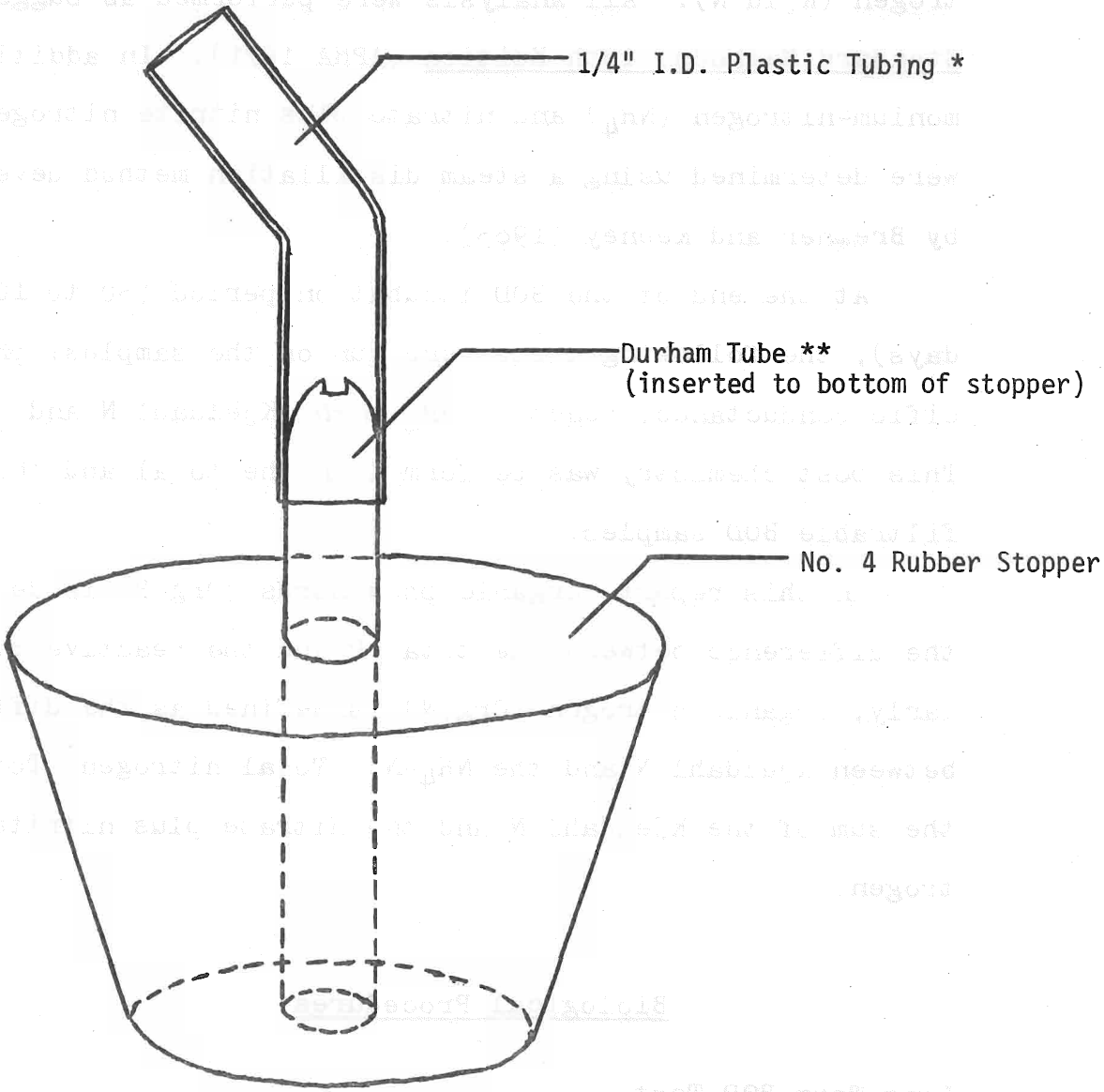


Figure 5. Modified Rubber Stopper Used to Seal the 2.5 liter BOD bottle

* After the stopper is inserted into the BOD bottle, the plastic tubing is bent over and held with a rubber band. This seals the bottle.

** Ordinary ¼ inch glass tubing may be substituted for this. When using the Durham tube, a hole is made at the top of the tube.

Generally, a sample was analyzed to determine the following BOD components: 1) unaltered, giving the total BOD; 2) filtrable BOD, using a #300 soil sieve (300 openings/inch U.S. Standard) which is designed to retain materials in excess of 50 microns; 3) total carbonaceous BOD, inhibited with methylene blue; and 4) filtrable carbonaceous BOD. To obtain total and filtrable carbonaceous BOD, 3 mg/l of methylene blue powder were used as a nitrification inhibitor (Abbott 1948). When necessary, as when the inhibitor was absorbed to the organics, more inhibitor was added. Samples obtained between May and October were incubated at 20° C, those collected from November through April were incubated at both 4° and 20° C.

Daily dissolved oxygen measurements were taken during the first 5 to 10 days, and at 2 to 4 day intervals thereafter. Most BOD samples were incubated for 50 days with some up to 100 days. A best fit smooth curve was constructed from the raw data points to obtain the 5, 20 and 50 day BOD values.

To further depict each BOD, a mathematical equation was developed to describe the raw data points. The long term BOD at any time was expressed by three simultaneously operating first order equations (Equation 5).

Biomass and Detritus Estimation

Where biomass, detritus, fixed and volatile solids are related to BOD in this report, the year was divided into four

seasons. They are: winter (December through March), Summer (June through September), Spring (April, May) and Fall (October, November). The biomass and detritus estimates within a BOD sample were made by a direct method or, if necessary, by one of two indirect methods.

Direct Method of Estimating Plankton Biomass

Estimates of the phytoplankton biomass within the reservoir were made at sites 12, 13, 14, 16 and 23 using chlorophyll a, plankton enumeration and cell volume. Biomass is defined as the weight of living plankton in a unit volume at a given time. The trichromatic method was used to determine the chlorophyll a (APHA 1971). These results were obtained from the Environmental Task Force (ETF) at the University of Wisconsin - Stevens Point for this study.

Plankton enumeration and cell volume data were obtained from a study performed by Sullivan (1978). A Palmer counting cell (Palmer and Maloney 1954) was used for phytoplankton enumeration (at 400 X). For cell volume, all counts were transformed into volumetric units by determining the average cell colony or filament size of the particular taxa (Vollenweider 1974).

A conversion of cell volume (mm^3/l) was made to ash free dry weight (AFDW) by multiplying the cell volume by 0.24 (Wright 1974). The ash free dry weight of plankton biomass is preferred to dry weight when comparing mixed assemblages of plankton (AFHA 1976).

In addition, the biomass was increased 10% to include the zooplankton community. The ten percent increase in biomass (to include the zooplankton) is an average estimate and varies both temporally and spatially. For example, it is probably high during the summer months because of the dominant alga, Aphanizomenon flos-aquae (blue-green alga producing toxic substances and therefore not heavily grazed). Odum (1971) states that each level in the food chain decreases the available energy by about one order of magnitude (power of ten). Buchanan (1976) reported a zooplankton species composition of the reservoir as being "typical for lakes of the Great Lakes Region". Because numerous plankton were observed in the BOD bottles during test preparation, a factor of 0.1 times the phytoplankton biomass was added to the phytoplankton to give "total" plankton biomass, herein designated as biomass.

Detritus Determination

Detritus is defined as the fraction of the fixed suspended solids remaining after the biomass fraction has been subtracted. Hence, by knowing two variables, the third can be obtained. The fixed suspended solids rather than the volatile suspended solids were used because the plankton biomass was expressed in AFDW. Generally, fixed or volatile suspended solids were not measured; however, total suspended solids were generally measured.

Approximately 200 observations of total and volatile suspended solids data were obtained from the ETF. The fixed suspended solids were obtained by taking the difference between the total and volatile suspended solids. This data was separated into site location (eg: river sites, surface and bottom depth reservoir sites) and seasons.

Regression equations using ETF data were derived to estimate the fixed suspended solids from the total suspended solids (Table 2). Fixed suspended solids were obtained from the total suspended solids using these equations.

Since both fixed suspended solids and biomass are in ash free dry weight, the detrital fraction can be obtained (fixed suspended solids - biomass (AFDW) = detritus (AFDW)). This constitutes the direct method of delineating the detrital fraction of the suspended solids in the BOD sample.

Biomass and Suspended Solids Determinations: Two Indirect Methods

Two approaches using regression techniques were used to develop synthesized values for either biomass or suspended solids when data were missing. In none of the cases were both values synthesized for the sample.

The first approach was based on developing regression equations for biomass and suspended solids using Kjeldahl N, Org N, total P, Org P, COD and the 5 and 20 day BOD. Either all of these variables or a combination of the "most efficient predictors" were used. Generally, the multiple

Table 2. Seasonal Equations and Relationships of Total and Fixed Suspended Solids in the Big Eau Pleine Reservoir and River

Site	Season	N	Y=fixed SS; X=total SS .....Equation+.....	Correlation Coefficient++
River	Winter	26	Y = -2.85 + .865X	.983**
River	Summer	37	Y = -0.94 + .797X	.957**
River	Fall	33	Y = -0.19 + .653X	.899**
River	Spring	29	Y = -0.98 + .644X	.879**
Reservoir T	Winter	31	Y = -3.08 + .806X	.991**
T	Summer	3	Y = -2.26 + .634X	.999**
T	Fall	7	Y = 3.01 + .374X	.898**
T	Spring	12	Y = -5.62 + .994X	.947**
Reservoir M	Winter	12	Y = -2.38 + .868X	.995**
M	Summer	3	Y = 2.78 + .195X	.467
M	Fall	7	Y = 2.56 + .323X	.741*
M	Spring	15	Y = -3.88 + .813X	.918**
Reservoir B	Winter	27	Y = -1.98 + .756X	.991**
B	Summer	3	Y = 2.78 + .195X	.467
B	Fall	9	Y = 2.56 + .323X	.918**
B	Spring	17	Y = -4.86 + .915X	.969**
Tributaries	Yearly	20	Y = 0.14 + .449X	.751**

\+ Regression equations predicting the fixed suspended solids from the total suspended solids.
++ correlation coefficient of fixed suspended solids to total suspended solids.
* significant at 0.05 level.
** significant at 0.01 level.

correlation coefficient for this method was not as high as that derived from the second method; consequently, its use was restricted to three occurences (Table 3).

The second method was developed for those samples collected from June 1975 through April 1976. These samples were concentrated ten fold by a sedimentation procedure using a 500 ml graduated cylinder (APHA 1971). An estimate of the biomass present was available from work performed by Sullivan (1978) for about 50% of the samples. Phytoplankton biomass and if necessary, suspended solids for the remaining half were estimated through regression equations employing measurements made with a fluorometer and spectrometer. This procedure is possible since chlorophyll a as biomass, will fluoresce under ultraviolet light, and suspended solids will interfere with visible light.

A Baush and Lomb Spectronic 88, set at a wavelength of 750 nm and using a one cm cell, was used to measure turbidity. Fluorescence was measured using a Turner Model 111 Fluorometer at a 30 X sliding window orifice (APHA 1976).

Fluorometric and turbidimetric measurements of each sample were made. A 30 ml sample at room temperature (21 - 23° C) was agitated to produce two - 5 ml aliquots of which one was immediately placed in the spectrometer and the other in the fluorometer. Readings were taken at 0, 30, 60 and 120 seconds from each instrument. The two sets of four readings were used as the independent variables in estimating either

Table 3. Equations Used in Estimating Biomass or Suspended Solids for Various Seasons Based Upon Chemical and Biochemical Measurements.

Overall (yearly) Biomass (mg/l)/10 = 1.83 - 44.80T - .720F - 62.830T + 5.3230F - 309.460T + .4960F + 415.2120T - 4.93120F

Fall/Spring Biomass (mg/l)/10 = -10.0 + 3.74BOD5 - 1.27BOD20 + .53COD + 16.6TP - 4.06OrgP - 7.79KN + 3.90OrgN

Fall/Spring Biomass (mg/l) = .73 + .154Chl a

Summer Biomass (mg/l)/10 = 16.1 - 1.570F - 2.8330F + 10.660F - 5.99120F

Winter Biomass (mg/l)/10 = .372 + .1210F + 2.1330F - 4.2460F + 2.01120F

Overall (yearly) Susp Solid (mg/l)/10 = .853 - 22.90T - .9230F + 11.430T + 4.2230F - 1838.60T + .12960F + 756.8120T - 3.29120F

Summer Susp Solid (mg/l)/10 = 9.46 - 6.300T - .8090F - 829.730T + 9.1630F + 195.960T - 4.2660F + 675.0120T - 3.99120F

Summer Susp Solid (mg/l) = -69.5 - .980COD + 63.2TP + 78.6OrgP + 173.4KN - 129.3OrgN

Winter Susp Solid (mg/l) = 30.8 + 1.49BOD5 - 2.54BOD20 - 1.58COD - 62.0TP + 343.0OrgP + 10.6KN + 23.3OrgN

Fall/Spring Susp Solid (mg/l)/10 = 5.48 + 71.10T - 316.330T + 481.760T - 213.2120T

0, 30, 60, 120T: refers to reading of spectrometer at 750 nm when sample was read at 0 - 120 seconds.
0, 30, 60, 120F: refers to reading of fluorometer when sample was read at 0 - 120 seconds.
BOD5, BOD20: 5 and 20 day BOD.
COD: chemical oxygen demand; TP: total phosphorus; OrgP: organic phosphorus; KN: Kjeldahl nitrogen; OrgN: organic nitrogen; Chl a: chlorophyll a.
All BOD and chemical measurements in mg/l, except chlorophyll a (mg/m^3).
Overall: includes all the months of the year.
Winter: includes December through March.
Summer: includes June through September.
Fall/Spring: includes April, May, October, November.

suspended solids or phytoplankton biomass.

The estimated biomass values (mg/l) were converted to ash free dry weight and an additional 10% of this value was added to produce total plankton biomass (AFDW). Also, as previously discussed, the total suspended solids (mg/l) was converted to fixed suspended solids. Accordingly, by knowing the biomass and the fixed suspended solids fraction, an estimate of the detrital fraction (AFDW) was possible.

Table 3 shows the equations used to determine suspended solids or algal biomass. The correlation coefficients for these equations averaged .9 or better. Approximately 45% of the biomass and approximately 10% of the suspended solids were estimated by the two indirect methods.

Statistical Methods

All of the statistical procedures used in the research were available as statistical packages or single programs on a Burroughs 6700 digital computer. One-way analysis of variance, regression analysis, average and standard deviation routines were available through the use of "Minitab" package (Ryan 1976). The stepwise multiple regression program (1130 Scientific Statistics Package 1968) was used to determine predictive equations for long term BOD. In segmenting the reservoir, the analysis of variance program (Spiker 1960) was used.

The design of the analysis of variance was split plot (within subject design having one within-subject dimensions

and zero to three between subject dimensions). The within subject was assumed to be each site. No between dimensions were used.

Segmentation of the Reservoir by Season and Site

Based upon hundreds of statistical tests comparing individual sites to each other, the Big Eau Pleine Reservoir was divided into segments within which similar water quality exists. An assumption was made that the water quality does vary on a seasonal basis.

As a result of this assumption, four seasons per year were delineated, consisting of the following months: Summer (June through September), Fall (October, November), Winter (December through March) and Spring (April, May). The choice of season length was based upon time of ice cover, thermal stratification and overturn, primary production and hydrologic conditions.

Additional data (Kjld N, COD, total P, BOD_5) for the years 1974 through 1976 were obtained from the ETF to augment the long term BOD data for this study. All three years of data for any specific season were grouped together as one unit for that season.

Analysis of variance (or the matched T-test) was used to separate dissimilar sites. The assumption was made that matched data existed among the sites due to similar sampling techniques and treatments.

Statistically, the test states that at a given confidence level (in this case 95%), the compared data (eg: the BOD_5 at site 16 and site 23) are either different or not different. Therefore, if the data were not statistically different, they were judged to be similar sites. Data for two or more sites for a specific water quality parameter (Kjld N, BOD, etc) for a particular season were tested. For example, the observations of BOD_{50} for site 23 surface during the summer were tested to determine if they were different than the BOD_{50} from the bottom waters of site 23 during the summer period. The sites were stated to have different water quality if the majority of the parameters (BOD, total P, etc) had F values indicating this difference. This procedure was repeated using combinations of various sites and qualities for each season.

Estimation of Season and Segment BOD and Modeling Coefficients

An iterative approach computer program written by Patterson (1975) was used to determine the three decay rates (k) and the three BODs (L) from equation 5, for each long term BOD sample. Average 5, 20 and 50 day BOD values for each reservoir segment, type of BOD (total, filtrable, etc) and season were determined by grouping the BODs into the above mentioned categories. Computer techniques were used to determine average coefficients for each type of BOD and season.

These coefficients were determined seasonally for each reservoir segment. This produced an average BOD curve from individual BOD curves. From these averaged curves, average (k) and (L) values were developed.

Ancillary Studies of the Long Term BOD Test

Effectiveness of Methylene Blue as a Nitrification Inhibitor

An estimate of the long term carbonaceous BOD was obtained by inhibiting the sample with 3 mg of methylene blue powder per liter of sample. The nitrogenous BOD (NBOD) was defined as the difference between the total and carbonaceous BOD.

Because the total BOD samples were analyzed for NO_2+ NO_3-N and Kjeldahl nitrogen before incubation and after the BOD tests were terminated, an estimate of the theoretical NBOD for that time period can be made. The theoretical NBOD for that period of incubation may be calculated by at least two procedures: 1) the difference in the NO_2+NO_3-N (mg/l) before and after incubation times the factor 4.5 to 4.6 (DeMarco et al 1967); and 2) the difference in the Kjeldahl nitrogen (mg/l) before and after incubation times the same factor. Ideally, the increase in NO_2+NO_3-N should equal the decrease in Kjeldahl nitrogen.

An adjustment in the theoretical NBOD was made for BOD samples incubated for periods greater than 50 days. Those samples having had nitrification processes occur for the

longer incubation period required a reduction in their theoretical NBOD. Therefore, it was assumed that over the incubation period, nitrification occured at approximately a constant rate. Accordingly, a sample incubated for 70 days had its theoretical NBOD reduced to about 70-75% of the original theoretical NBOD (50-55 days/70 days = 0.70 - 0.75 x 100 = 70-75%).

Determination of Theta: Relating the Decay Rate of BOD at Different Temperatures

A total of 80 samples having both a total BOD incubated at 4° C and a carbonaceous BOD incubated at 20° C were used to determine the theta value. The samples were separated into four categories based upon location and water type. They are: 1) in-reservoir (n=35); 2) river sections of the reservoir (n=20); 3) various tributaries within the watershed (n=19); and 4) point source, such as waste water and manured field runoff (n=6).

Because minimal nitrification occurs at 4° C, the carbonaceous BOD_{50} was used in the following comparison rather than the total BOD_{50}. Moore (1941) observed that at temperatures lower than 7.5^{o} C, the course of nitrification became irregular. Briggs (1966), in his long term low temperature studies of BOD, found no nitrification occuring for the 100 day test period. Furthermore, the first order kinetics for nitrification would be very slow at 4° C and therefore assumed to be insignificant.

The 20° C decay rates (k_1, k_2 and k_3 from equation 5) were multiplied by a conversion factor such that they would be similar to the observed 4° C 5, 20 and 50 day BOD. A computer program using an iterative routine determined the conversion factor. The assumption was made that the ultimate BODs (L_1, L_2 and L_3) were not affected by temperature (Gotaas 1948). The conversion factor is based upon the equation $k_1/k_2 = \theta^{(T_1-T_2)}$ where T_1 is 4° C, T_2 is 20° C, k_2 is either k_1 or k_2 or k_3 (from equation 5), and theta is iteratively changed to give the least variation between the theoretical and observed 50 day BOD at 4° C. A matched T-test was used to determine the minimum difference between the observed and theoretical BOD.

Determination of Correction Factor for BOD Caused by Rubber Stoppers

The modified number 4 and number 5 rubber stoppers used to seal the 2.5 liter BOD bottles were determined to act as a substrate and consequently contributed measurable BOD (Wisconsin Department of Natural Resources 1977). Although BOD studies were completed, I found it necessary to correct for the BOD exerted from the rubber substrate. Any large correction would significantly alter the BOD values and the conclusions that could be made from them.

A direct method of measuring BOD due to the rubber stoppers was made to determine the extent of this oxygen demand. In this method, duplicate sets of number 4 stoppers were

inserted into the 2.5 liter bottles. The first set contained 4 stoppers and the second set contained 8 stoppers. In addition, bacterial seed and buffered dilution water completed the set-up. After correcting for the added seed, the drop in DO was plotted against time for 30 days. This gives a rate of oxygen consumption per rubber stopper per day. The slope of the line divided by the number of stoppers inserted in each bottle was multiplied by 2.5 (the number of liters in the sample bottle).

RESULTS AND DISCUSSION

Total BOD Relationships

A discussion of the sources of BOD both seasonally and spatially in the Big Eau Pleine Reservoir requires both a qualitative and quantitative approach. Thus, the total BOD for any season and location in the reservoir is characterized by its rate of oxygen consumption, relationship to nutrients and particulate fractions.

Few studies have been made on the effects of algal biomass as a sink in the oxygen budget. The BOD produced by algal biomass may be considerable. According to Stumm and Morgan (1970), algal protoplasm is produced by this stoichemistry in the photosynthetic zone.

$$106\ CO_2 + 16\ NO_3^- + HPO_4^{--} + 122\ H_2O + 18\ H^+ + \text{(trace elements)}$$

$$\underset{\text{(algal protoplasm)}}{C_{106}H_{263}N_{16}P} + 138\ O_2$$

P ↓ R ↑

P = photosynthetic production

R = heterotrophic respiration (rate of organic matter destruction)

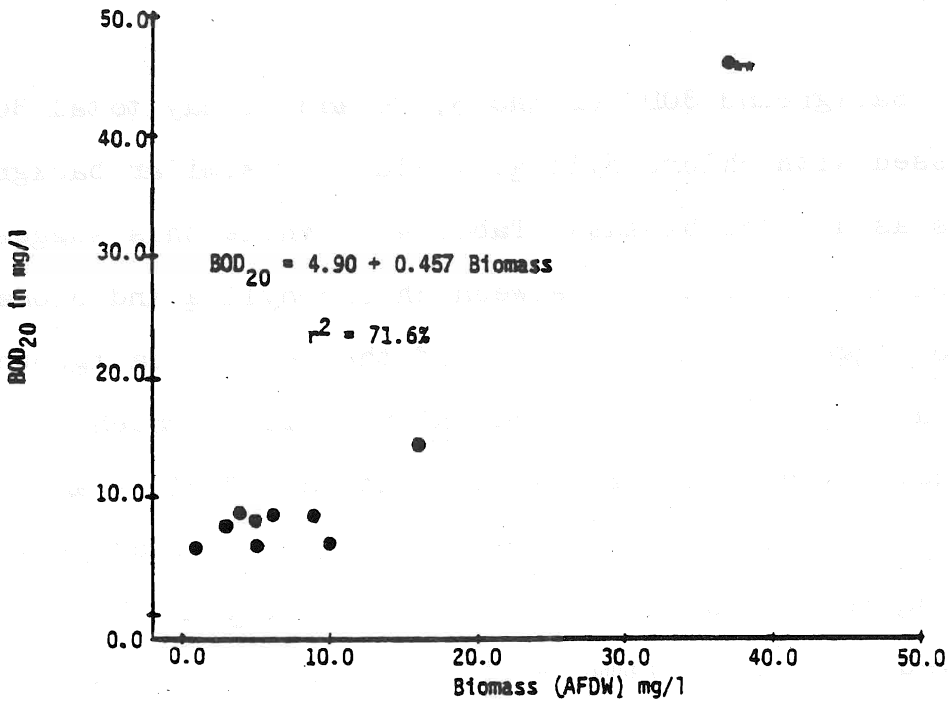
Equation 6

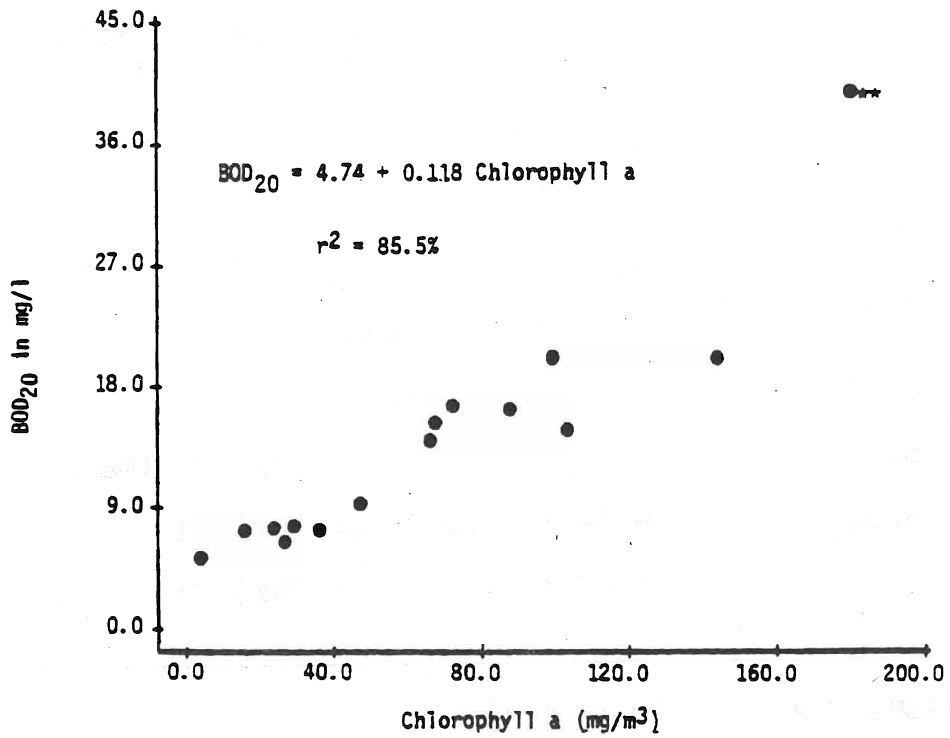
If phosphorus is the limiting factor according to equation 6, 1 mg of phosphorus is able to synthesize approximately 100 mg of algal biomass in a single cycle. After settling to deeper layers, the biomass exerts a BOD of approximately 140 mg for its mineralization (Stumm and Morgan 1970). Thus 1 mg of biomass (or 1 mm^3 of cell volume) mineralization requires

1.4 mg of dissolved oxygen. Furthermore, 0.24 mg of biomass (AFDW) requires 1.4 mg of DO (where 1 mm^3 of algal cell volume = 0.24 mg biomass (AFDW)), and 1 mg of algal biomass (AFDW) requires approximately 6.5 mg of DO to totally oxidize it.

Summer Background BOD and Rates of Decay for Biomass and Chlorophyll a

Regression equations were developed relating available surface biomass and chlorophyll a with the 5, 20 and 50 day BOD for the summer period of 1975 (Table 4 and Figure 6). The intercept of these equations is defined as background BOD; the amount of BOD not directly attributable to biomass. This background BOD includes the detrital and soluble BOD fractions. The equation relating biomass and 5 day BOD suggests a summer background BOD_5 (including detrital and soluble BOD) of about 1.55 mg/l while the 20 day background BOD is approximately 4.9 mg/l. The mean BOD_5, BOD_{20} and biomass for the data used to develop these equations are: 3.0 mg/l, 8,0 mg/l and 6.73 mg/l respectively. By subtracting the background BOD from these mean BODs, it is evident that approximately half of the summer surface BOD is attributable to biomass (phytoplankton and zooplankton). In addition, the slope of the regression equation suggests that 1 mg of biomass (AFDW) consumes 0.21 mg of oxygen in five days and 0.46 mg of oxygen in twenty days compared to the 6.5 mg of oxygen if it all were decomposed.





** This data point has been excluded in the development of the regression equation.

Figure 6. Relationship of Summer Surface BOD_{20} to Chlorophyll a and Biomass in the Big Eau Pleine Reservoir.

Background BOD for the 5, 20 and 50 day total BOD regressed with chlorophyll a, yield very similar background BODs as did the biomass (Table 4). While this suggests an excellent correlation between chlorophyll a and biomass, it also suggests a verification of the derived background BOD. The average BOD_5, BOD_{20} and chlorophyll a concentrations used in developing the regression equations (Table 4 and Figure 6) are: 4.5 mg/l, 11.7 mg/l and 39.7 mg/m^3 respectively. The strong relationship between chlorophyll a and BOD was observed during the summers of 1975 and 1976 (Figure 7).

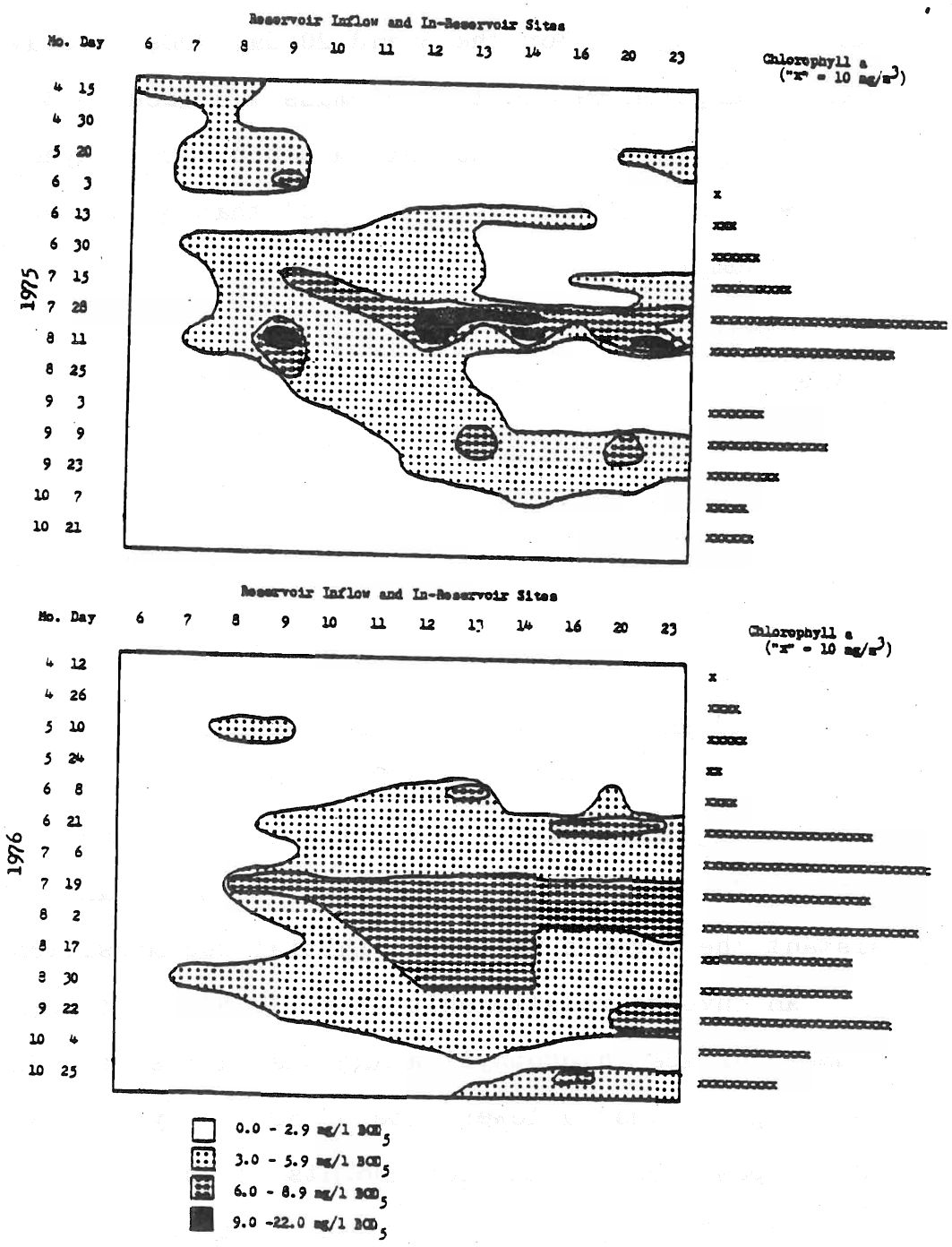
Table 4. BOD in the Big Eau Pleine Reservoir Related to Summer Surface Water Biomass and Chlorophyll a.

	Equation	r
BOD_5 (mg/l)	= 1.55 + .209 Biomass (AFDW) (mg/l)	.876**
BOD_{20}	= 4.90 + .457 Biomass	.846**
BOD_{50}	= 9.10 + .587 Biomass	.775*
BOD_5	= 1.52 + .050 Chlorophyll a (mg/m^3)	.928**
BOD_{20}	= 4.74 + .118 Chlorophyll a	.925**
BOD_{50}	= 8.37 + .150 Chlorophyll a	.960**

* Significant at 0.05 level.

** Significant at 0.01 level.

Figure 7. Big Eau Pleine Reservoir Surface BOD_5 as Viewed through Periods of Primary Production for 1975 and 1976.



Applying similar regression techniques to the summer bottom samples, one obtains a 5 day background BOD of 2.2 mg/l, a 20 day background BOD of 6.3 mg/l and a 50 day background BOD of 9.4 mg/l. For the 5 and 20 day BODs, the average oxygen consumption per unit of biomass was about 35% that of the surface consumption. The bottom depth BOD_{50} oxygen consumption was about 65% - 70% (r = .850) that of the surface oxygen consumption.

Algal biomass decomposition appears responsible for about 50% of the summer surface BOD. The initial rate of breakdown is quite rapid. However, as this organic material settles to deeper waters, the rate of breakdown decreases. This is primarily a function of the resistant organic matter and not of temperature.

Relationships Between BOD Decay Rates and Biomass

The ratio of BOD_{50} to BOD_5 or BOD_{20} to BOD_5 implies a rate of organic matter decay. The lower the ratio, the faster the oxygen is depleted with respect to time, and the less resistant the organic matter to initial decomposition.

An inverse relationship (r = -.458) exists between the summer surface chlorophyll a and the ratios of BOD_{20} to BOD_{50}. This implies that a lower rate of BOD decay occurs when the BOD composition has smaller amounts of chlorophyll a (biomass) present. As shown in Table 5, this same negative relationship was found when comparing summer and winter biomass to their

respective BOD ratios. These values indicate that either biomass breaks down faster than other detrital fractions, or part of this biomass has a rather quick rate of decay within the first five days.

Table 5. Correlation Coefficients of Biomass Correlated to the Ratios of the 5, 20 and 50 Day Total BOD from the Big Eau Pleine Reservoir.

	Summer Surface N = 9	Summer Bottom N = 8	Winter Surface N = 6
Biomass: (BOD_{50}/BOD_5)*	-.650+	-.489	-.116
Biomass: (BOD_{50}/BOD_{20})*	-.842++	-.489	-.346
Ratio of BOD_{50} to BOD_5	4.7	5.1	5.7
Ratio of BOD_{50} to BOD_{20}	1.7	1.8	1.8

* Biomass and BOD expressed in mg/l when correlated.
\+ Significant at 0.05 level.
++ Significant at 0.01 level.

Evidence that suggests algal decomposition is composed of various stages has been reviewed by Otsuki and Hanya (1972) and Jewell and McCarthy (1968). Both postulate that algae and algal-derived organic matter consists of three fractions. The first fraction consists of degraded storage products that disappear within a few hours after the organisms are placed in the dark. In the long term considerations, the oxygen demand

of this fraction is probably insignificant. However, its decomposition may be a significant factor when dealing with diurnal oxygen variations in natural waters. The second fraction is the biodegradable material which represents about 30% - 70% of the mass of the algae and algal-derived organic matter. This second fraction degrades at a fairly constant, but intermediate, first order decay rate (0.01 - 0.06/day), so it will be consumed within a year at normal temperatures. The third fraction is comprised of slowly decomposing organic refractory compounds.

Figure 8 depicts a typical series of curves separating BOD into total, filtrable and carbonaceous fractions. The water sample, taken during an early August algal bloom (Aphanazomenon flos aqua being dominant), had over 80% of the organic nitrogen removed by filtering with a 50 micron filter. A summary of the chemistry and BOD coefficients for these total, filtrable and carbonaceous BODs is presented in Table 6.

The reduction in the organic matter (algal biomass) due to filtration is evident from the total to filtrable BOD curves (Figure 8). Generally these curves have an initially high decay rate, followed by a progressively smaller rate of decay. The decreasing oxygen consumption is, in part, due to the remaining more resistant organic matter.

Golueke and Oswald (1965), Golueke et al (1957), Kleerekoper (1953) and Skopintzen and Brook (1940) have presented evidence indicating a presence of non-biodegradable algal

Figure 8. Summer Surface BOD Curves During an Algal Bloom as Separated into Total, Filterable and Carbonaceous BOD.

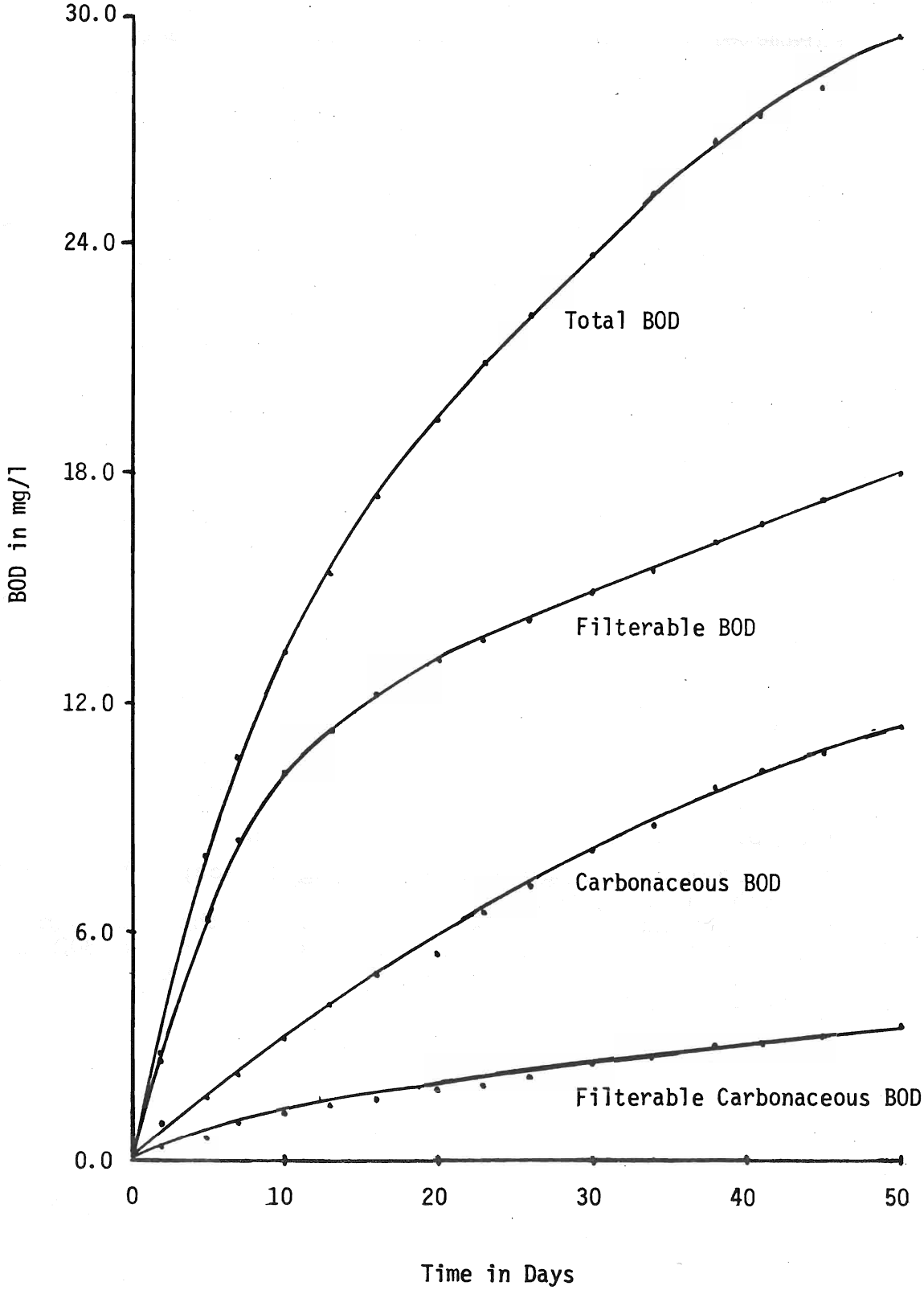


Table 6. Chemical and Curve Coefficient Data from Site 16 Surface Waters from Sample Collected on August 6, 1975.

Parameter*	Total BOD	CBOD	FBOD	F-CBOD
BOD_5	8.0	6.3	1.7	0.6
BOD_{20}	19.4	13.1	5.8	1.8
BOD_{50}	29.5	18.0	11.4	3.6
COD	49.2	49.2	34.6	34.6
PO_4 - P	0.034	0.034	0.034	0.034
Total P	0.175	0.175	0.096	0.096
NH_4 - N	0.04	0.04	0.04	0.04
NO_2-NO_3-N	0.04	0.04	0.04	0.04
Kjeldahl N	5.04	5.04	0.95	0.95
Chlorophyll a	145.59	145.59	---	---
K_1+	0.0788	0.1459	0.0398	0.0429
K_2	0.0442	0.2796	0.0393	0.0416
K_3	0.0062	0.0381	0.0055	0.0055
L_1	10.64	5.03	3.83	1.20
L_2	11.75	1.41	4.13	1.37
L_3	36.68	13.73	14.92	4.60

Total BOD: total unaltered BOD and its chemistry.
CBOD: total carbonaceous BOD and its chemistry.
FBOD: filtrable BOD and its chemistry.
F-CBOD: carbonaceous BOD that is filtrable.

* All chemical parameters are in mg/l except chlorophyll a which is in mg/m^3.

\+ The 3 K and L values would be used in the equation below to construct the curve as it was observed in the BOD analysis.

$$BOD_{t(\text{time-days})} = L_1(1 - e^{-K_1 t}) + L_2(1 - e^{-K_2 t}) + L_3(1 - e^{-K_3 t})$$

portions varying between 33% and 76% of the initially present organic matter. Jewell and McCarthy (1968) found that the average refractory fraction for over 75 different algal cultures was 40%. Studies by Gunnison and Alexander (1975) suggest that many blue-green algae are not very susceptible to microbiol decomposition, but tend to be consumed, lysed or parasitized by a wide range of organisms.

Other studies by Foree and McCarthy (1971) and Otsuki and Hanya (1972) suggest that microbiol decomposition of dead algal cells is accompanied by the production of refractory dissolved organic matter (DOM). This consists mainly of a yellow unknown acidic material and of a proteinaceous substance. The composition of this natural DOM is highly variable and little understood. However, its sources are generally grouped into 1) excretion from phytoplankton, 2) decomposition of phytoplankton, 3) excretion of animals and 4) allothchonous materials. Akiyama (1973) has a rather thorough review of DOM. In summary, he stated that the composition of DOM is 15% pigment materials, 30% lipid and organic acid materials, 26% proteinaceous materials and 8% carbohydrate materials. The molecular weight of the DOM ranges from 700 to more than 50,000.

Both the second and third biomass decomposition fractions (moderately degradable and highly resistant) results in a slowly decreasing BOD with respect to time. On a long term basis, the effect of the DOM on the oxygen budget may be

pronounced, especially in lakes and reservoirs with long retention times. Under anaerobic conditions, DOM may be released from the sediment into the overlying waters and then produce a larger and more widespread volume of anaerobic water.

BOD_{50} Relationships to Various Water Quality Parameters

Strong relationships exist between the long term BOD and various water quality parameters (Table 7). Those parameters strongly correlating with BOD may be used to characterize the BOD origin and composition. Hence, a good positive relationship between phosphorus and BOD in the spring may suggest a BOD caused by organic matter originating from eroded land surfaces. Overall, Kjeldahl nitrogen correlated best with the 50 day BOD ($r = .836$) for the entire study period. Other closely related parameters which correlated well with BOD were: NH_4, COD and total P (Table 7).

Seasonally, the order and significance of the various water quality parameters to BOD change considerably. The fall season has the poorest water quality relationship to BOD. This may be caused by fall precipitation and inflowing waters, succession of plankton communities or resuspension of organics and nutrients due to decreasing reservoir stage.

An estimate of the long term BOD (eg: BOD_{50}) may be made by using more easily measured water quality parameters to predict the BOD. A stepwise multiple regression procedure

Table 7. Correlation Coefficients of Various Water Qualities to BOD_{50} for the Big Eau Pleine Reservoir and River.

Parameters	Summer Top	Summer Bot	Winter Top	Winter Bot ++	Fall Top	Spring Top	Rivers Top
observations	12	11	16	9	12	18	18
BOD_5	.989*	.882*	.919*	.961*	.752*	.959*	.933*
BOD_{20}	.993*	.963*	.978*	.993*	.901*	.987*	.989*
COD	.738*	.509	.595*	.736	.224	.552+	.864*
React P	-.032	-.142	.660*	.444	-.115	.745*	.604+
Total P	.260	.487	.689*	.479	.194	.664*	.561+
NH_4	-.230	-.552	.809*	.707+	.256	.742*	.872*
N+N	-.338	.046	-.186	.190	-.111	.195	.474
Kjld N	.887*	.536	.882*	.909*	.316	.876*	.717*
pH	.298	.883*	-.574+	-.251	-.527	-.248	-.620+
Cond	-.155	.373	.912*	.341	-.539+	.648*	.180
DO	.703*	.449	-.244	.189	-.675*	-.270	.089
Susp S	-.272	.019	.362	.217	-.193	-.064	.583+

+ significant at 0.05 level.
* significant at 0.01 level.
++ includes sites 8, 10 and 11 in the reservoir which become river channels with increased drawdown during the winter.

was used to select those water quality parameters which most accurately estimate the observed BOD. The equations developed from this approach explain 70% - 95% of the BOD_{50} (Table 8).

Excluding the use of the 5 day BOD, Kjeldahl nitrogen is the most closely related parameter to the 50 day BOD (Table 8). This relationship occurs in all seasons, except fall, where the DO concentration is more strongly related to BOD_{50}. On a seasonal basis, it is noteworthy that variables such as pH, specific conductance and DO help explain much of the long term BOD (Table 8).

The regression equations derived from the cumulative data for the first five significant variables in the stepwise regression are given in Table 8. When the BOD_5 is included with the other qualities to predict the BOD_{50}, the r value for the first five independent variables regressed against BOD_{50} is .957. The five variables in the order of importance are: BOD_5, Kjeldahl nitrogen, total P, NH_4 and NO_2+NO_3-N. When the BOD_5 is excluded in the multiple regression, the r value for the first five variables is lower (r = .882). The five variables in order of importance are: Kjeldahl nitrogen, total P, reactive P, DO and COD.

Organic Nitrogen, Organic Phosphorus and Biomass

Reasonable seasonal relationships were obtained when comparing organic nitrogen and phosphorus to both the 20 day BOD and biomass. In general, the organic nitrogen correlated well

Table 8. Results of Stepwise Multiple Regression Using Total BOD_{50} as the Dependent Variable, Using Various Water Qualities as the Independent Variables.

Season	N	r_1*	r_2	r_3	r_4	r_5	Order of first 5 Variables
BOD_5 included as Independent Variable							
Fall	12	.752	.939	.984	.989	.994	BOD_5, DO, Susp S, React P, Kjld N
Spring	18	.956	.969	.977	.987	.990	BOD_5, Cond, Total P, COD, Kjld N
Summer	23	.939	.965	.970	.972	.973	BOD_5, COD, Total P, N+N, NH_4
Winter	25	.916	.941	.945	.953	.961	BOD_5, Kjld N, COD, NH_4, Susp S
All River	13	.933	.981	.993	.995	.998	BOD_5, NH_4, Susp S, COD, pH
All Data	91	.917	.948	.951	.953	.957	BOD_5, Kjld N, Total P, NH_4, N+N
BOD_5 excluded as independent Variable							
Fall	12	.675	.779	.803	.828	.844	DO, Cond, Susp S, N+N, pH
Spring	18	.876	.942	.974	.986	.987	Kjld N, N+N, Total P, COD, Cond
Summer	23	.719	.861	.840	.854	.861	Kjld N, Total P, DO, Susp S, pH
Winter	25	.890	.901	.913	.925	.931	Kjld N, DO, NH_4, COD, pH
All River	13	.917	.956	.969	.976	.980	Kjld N, pH, Cond, N+N, COD
All Data	91	.836	.852	.870	.878	.882	Kjld N, Total P, React P, DO, COD

Including BOD_5, the predictive BOD_{50} regression equation is:

$$BOD_{50} = 2.46 + 2.40\ BOD_5 + 5.72\ \text{Total P} + 2.76\ NH_4 - 2.44\ \text{N+N} + 1.76\ \text{Kjld N}.$$

Excluding BOD_5, the predictive BOD_{50} regression equation is:

$$BOD_{50} = -3.39 + 0.09\ \text{COD} - 24.50\ \text{React P} + 24.83\ \text{Total P} + 5.71\ \text{Kjld N} + 0.27\ \text{DO}.$$

* All values significant at 0.01 level.

with BOD and biomass during the summer, while during the winter both organic phosphorus and nitrogen correlated well with BOD and biomass (Table 9). The strong relationship of organic phosphorus to BOD observed in the winter and spring suggest the interaction of phosphorus, sediment scouring and runoff during winter drawdown and spring snowmelt.

Table 9. Seasonal Relationships of Organic Nitrogen and Phosphorus to BOD_{20} and Biomass in the Big Eau Pleine Reservoir.

			.....Correlation Coefficients.....			
Season	Site+	N	Org P:BOD	Org N:BOD	Org P:Bioms	Org N:Bioms
Summer	T	11	.000	.170	.351	.318
Summer	B	8	.205	.126	.161	.742*
Winter	T	8	.773*	.760*	.356	.370
Spring	T	8	.813*	.441	.165	.177
Fall	T	7	.448	.144	.429	.460
Fall	B	4	.667	.667	.672	.177

+ Top (T) or bottom (B) depth samples for each of the seasons.

Org P, Org N, BOD, Bioms = organic phosphorus, organic nitrogen, BOD_{20} and biomass respectively. All expressed in mg/l when correlated.

* Significant at 0.05 level.

According to the previous equation for protoplasm (equation 6) (assuming this represents organic matter in general), a 16 to 1 ratio exists between nitrogen and phosphorus in organic matter assimulation and decomposition. This 16 to 1

ratio was observed in the summer and fall reservoir waters (Table 10). Furthermore, a slight increase of nitrogen or a decrease in phosphorus is found with depth in the summer and fall seasons. Spring reservoir waters have a large concentration of organic phosphorus relative to organic nitrogen (Table 10); snowmelt runoff from agricultural practices may be responsible for this occurence.

During the summer and early fall, the maintenance of this ratio (approximately 16 to 1) is probably controlled by the ability of the blue-green algae (mainly Aphanizomenon flos aqua) to fix atmospheric nitrogen and the process of luxury uptake of phosphorus. Sullivan (1978) found significant algal growth due to sediment resuspension (from drawdown and subsequent release of phosphorus) in the Big Eau Pleine Reservoir.

Table 10. Seasonal Ratios of Organic Nitrogen to Organic Phosphorus in the Big Eau Pleine Reservoir.

Season	Site	Observations	Org N/Org P
Summer	Top	11	15.4
Summer	Bot	8	19.0
Winter	Top	8	26.9
Winter	Bot	1	7.4
Fall	Top	7	21.0
Fall	Bot	4	21.6
Spring	Top	8	5.1
Spring	Bot	1	1.9

BOD Relationships to Particulate Fractions

Total BOD_{20}

A general characterization of the organic matter producing BOD is possible by analyzing the relationships of the total BOD to its biomass (AFDW), detrital (AFDW) and volatile suspended solids fractions within the BOD sample. These relationships were established by correlating those fractions of organic matter to BOD_{20} for each of the four seasons.

In general, few strong relationships between the BOD_{20} and the various particulate fractions were found. However, the volatile solids did correlate well with BOD_{20} for the summer and winter surface reservoir waters (r = .849 and .551 respectively). Both spring and fall BOD_{20} appear poorly correlated to the above particulate fractions (Table 11).

An increase in the summer surface biomass results in an increase in the BOD, an increase in volatile suspended solids (r = .952), an increase in fixed suspended solids (r = .950), and decrease in the detrital fraction (r = -.559). However, the summer bottom waters' biomass are inversely related to the detritus, the fixed suspended solids and volatile suspended solids (r = -.868 and -.557 respectively). These findings suggest the logical conversion of the sinking biomass to detritus and to DOM.

The reservoir waters in both the spring and fall seasons have very similar BOD composition. Both seasons have similar concentrations of biomass and detritus in the BOD sample

(Table 12). During both seasons, the detrital fraction of the solids in the BOD sample is about four times that of the biomass fraction. The fall season BOD from the bottom depth waters is directly related to the detrital fraction (r = .730). These observations suggests that the fall and spring reservoir BOD is primarily caused by detrital fractions input as spring runoff, fall rains, stream scouring or biomass die-off and resultant increase in the detrital fraction.

Winter reservoir surface BODs correlate well with biomass and detritus (Table 11). However, little biomass is present in the BOD sample (average biomass (AFDW) = 0.12 mg/l). The

Table 11. Seasonal Relationships of BOD_{20} to Volatile and Total Suspended Solids, Detritus and Biomass in the Big Eau Pleine Reservoir and River.

Season	Site*	N	..Correlation Coefficients of BOD_{20} versus			
			Volatile SS	Biomass	Detritus	Total SS
Summer	Res-T	11	.849	-.449	.904**	.850**
Summer	Res-B	8	.386	.137	.164	.337
Winter	Res-T	8	.551	.497	.775**	.556
Winter	River	6	.093	.064	.664	.093
Spring	Res-T	8	.148	.193	-.262	.148
Spring	River	7	-.190	-.147	.460	.191
Fall	Res-T	7	.294	.203	.297	.287
Fall	Res-B	4	.281	.730	-.389	.291

* Res-T or B = reservoir top or bottom depth samples.
** Significant at 0.01 level.

Table 12. Seasonal BOD Characterization for 1975 - 1976 in the Big Eau Pleine Reservoir and River.

Season+	Site*	N	BOD_5++	BOD_{20}	Susp S	Detritus (AFDW)	Biomass (AFDW)	Vol SS	BOD_{20}/BOD_5
Summer	T.	11	4.5±3.9	12.3±11.6	30.4±24.8	4.17±3.18	9.18±10.10	17.0±15.8	2.8±0.4
Summer	B.	8	2.4±1.1	6.6± 2.9	21.0± 5.4	11.50±7.29	2.63± 3.89	6.9± 1.1	2.9±0.3
Summer	Riv.	1	1.2	2.7	4.8	1.31	0.70	2.8	2.3
Winter	T.	8	2.1±1.4	6.4± 4.7	9.0± 3.5	4.71±0.61	0.12± 0.10	4.2± 2.8	3.1±0.5
Winter	B.	1	3.9	12.9	13.3	5.17	0.17	8.1	3.3
Winter	Riv.	6	3.4±2.1	9.0± 5.4	31.2±38.3	6.88±5.01	0.18± 0.24	24.1±33.1	2.7±0.5
Fall	T.	7	2.9±1.0	8.0± 2.5	15.2± 5.2	5.32±6.79	1.14± 0.76	8.7± 3.8	2.8±0.1
Fall	B.	4	2.2±0.3	7.2± 1.4	12.1± 4.2	5.07±0.54	1.21± 0.56	5.8± 3.6	3.2±0.4
Fall	Riv.	2	1.1±0.1	3.1± 1.0	6.5± 5.7	1.67±0.91	1.15± 1.14	3.7± 3.6	2.7±1.0
Spring	T.	8	2.7±1.0	8.1± 0.3	11.8± 6.4	5.04±1.84	0.54± 0.40	6.2± 4.7	3.0±0.4
Spring	B.	1	2.7	8.1	19.7	6.44	0.95	12.3	3.0
Spring	Riv.	7	6.5±4.3	16.6± 9.5	16.8±18.6	6.16±0.55	0.36± 0.55	10.3±12.0	2.8±0.5

* Reservoir surface or bottom depth samples and river samples.
\+ Summer = June through September; Winter = December through March; Fall = October and November; Spring = April and May.
++ All values are in mg/l except the ratio of the 20 to 5 day BOD.

small concentration of winter biomass is significantly lower than the average biomass concentration observed in the summer surface waters (9.2 mg/l). Moreover, the winter surface reservoir ratio of BOD_{20} to biomass (21.9) is ten times greater than that of the summer surface waters (2.3) (Table 12). Hence, the winter BOD is of a different composition than the summer BOD, the latter having an overall larger concentration of particulate matter (Table 12).

Large Particulate BOD_{50}

Because the biomass (AFDW), detritus (AFDW) and volatile suspended solids correlated well with the total BOD, these fractions of organic matter should also correlate well with the difference between the total BOD_{50} and the filtrable BOD_{50} (hereafter called large particulate BOD or LPBOD). The greatest average LPBOD occurs during the summer (4.4 mg/l for 50 days) while the lowest average LPBOD occurs during the winter (0.1 mg/l for 50 days).

Both the summer and winter surface LPBOD correlated strongly with the detritus and biomass fractions (Table 13). The summer bottom depth LPBOD is strongly correlated to biomass (r = .932). The bottom depth BOD sample may be composed of a higher percentage of DOM or minute algal cells because a negative relationship exists between the LPBOD and detritus (Table 13). Therefore, the summer bottom depth BOD derived from material greater than 50 microns appears to be comprised

primarily of biomass related material.

Table 13. Seasonal Relationships of Large Particulate BOD to Volatile Suspended Solids, Detritus and Biomass in the Big Eau Pleine Reservoir and River.

Season	Site*	N	Correlation Coefficients of LPBOD versus Volatile SS	Detritus	Biomass
Summer	Res-T	9	-.005	-.513	.367
Summer	Res-B	8	-.508	-.819+	.932**
Winter	Res-T	6	.765	.683	.857
Winter	River	5	.114	.011	.090
Spring	Res-T	5	.493	.663	-.895+
Spring	River	7	-.445	-.431	-.030
Fall	Res-T	7	-.351	-.259	-.039
Fall	Res-B	4	-.075	-.257	.022

* Res-T or B = reservoir top or bottom depth samples.

\+ Significant at 0.05 level.

** Significant at 0.01 level.

Few strong relationships exist between the spring and fall LPBOD and the volatile suspended solids, detrital and biomass fractions. The spring surface reservoir LPBOD is negatively correlated with biomass (r = -.895) and positively correlated with detritus (r = .663). Therefore, the spring reservoir surface BOD due to particulate matter greater than 50 microns is largely comprised of detrital matter. However, the river inflow LPBOD is negatively correlated with detritus (Table 13). No strong relationships were found between the

fall reservoir LPBOD and the organic matter fractions. This indicates a change in BOD origin between the river and the reservoir possibly due to sediment disturbance as the reservoir fills and is subject to wind action.

The inflowing waters to the reservoir have a low percentage of LPBOD. Seasonally, the LPBOD ranges from 23.7% of the total BOD (1.4 mg/l for 50 days) to 3.1% of the total BOD (0.4 mg/l for 50 days). In general, no strong relationships are present between the river inflow LPBOD and the biomass and detritus fractions.

The winter reservoir LPBOD correlates positively with the volatile suspended solids, biomass and detrital fractions (Table 13). However, the LPBOD comprises only about 10% of the total BOD_{50}.

Nitrogenous BOD_{50}

Nitrogenous BOD_{50} (NBOD), as did LPBOD, exhibits a dynamic seasonal variation in its relationship to the detrital and biomass fractions (Table 14). During the summer, an increase in surface biomass is related to increases in NBOD and LPBOD. As the summer bottom depth biomass increases, the LPBOD decreases and the NBOD increases. Furthermore, the bottom waters' NBOD is positively related to the detritus. The bottom depth NBOD is primarily due to the proteinaceous material in this detritus. This appears likely because Akiyama (1973) stated that much of the phytoplankton decomposition

products become DOM of which about 26% is proteinaceous material. Therefore, the measured detrital components of the bottom depth waters may be comprised of decomposing plankton biomass.

The NBOD from the surface winter waters correlated positively with the volatile suspended solids, biomass and detritus fractions (Table 14). Biomass correlated best with NBOD (r = .819), despite the small average measured biomass (0.121 mg/l).

Table 14. Seasonal Relationships of Nitrogenous BOD to Volatile Suspended Solids, Detritus and Biomass in the Big Eau Pleine Reservoir and River.

			Correlation Coefficients of NBOD versus		
Season	Site*	N	Volatile SS	Detritus	Biomass
Summer	Res-T	11	-.049	-.878**	.557
Summer	Res-B	9	.455	.526	-.480
Winter	Res-T	8	.523	.455	.819**
Winter	River	6	-.094	-.119	.484
Spring	Res-T	5	.536	.630	.178
Spring	River	7	-.360	-.320	-.362
Fall	Res-T	7	-.254	-.153	-.115
Fall	Res-B	4	.072	.668	-.555

* Res-T or B = reservoir top or bottom depth samples.

** Significant at 0.01 level.

The winter inflowing waters to the reservoir have the highest percentage NBOD (41.4%) of the four seasons. The reservoir inflow NBOD during the spring is the lowest (21.3%). Fall and summer percent of the inflow NBOD are 37.3% and 31.0% respectively. The seasonal variation of percent NBOD in the inflowing waters may be due to the high flows and dilution effect during the spring, and low temperatures and reduced nitrification in situ during the winter.

Surface water NBOD during the spring correlates positively with the organic matter fractions (Table 14). Although the relationship is not strong (r = .630), the detrital fraction correlates best with NBOD. During spring, the Big Eau Pleine River's NBOD correlates negatively with the biomass, detrital and volatile suspended solids fractions. This supports the idea of high soluble BOD input in the reservoir from spring runoff. No strong relationships between NBOD and organic matter fractions were noted for fall surface waters. However, fall bottom depth reservoir waters were positively related to detritus and negatively related to biomass (Table 14). The fall relationships may be explained by scouring of the reservoir or latent effect of summer and fall algal bloom die-off and settling. Also a greater percent of NBOD is present in fall bottom depth waters than in surface waters, suggesting algal biomass decomposition.

Reservoir Segmentation

Criteria and Physical Boundaries

Because the reservoir is oblong, varies in depth and is constricted by bridges, the possibility of varying water quality was evaluated with respect to various sites and depths with respect to time.

An accurate description of the reservoir BOD with respect to time requires numerical coefficients which closely represent the BOD dynamics for various depths and sites. In reservoir modeling it is imperative to have numerical coefficients describe the sites being modeled. It is important to know which sites have similar BOD, such that one series of numbers will characterize the BOD for those sites. This grouping of similar sites is derived through a series of T-tests that determine which sites are different.

In addition to testing each site for similar or dissimilar BOD data, other parameters such as total P, Kjeldahl nitrogen and COD were used. These parameters correlated well with BOD (Table 7) and, therefore, would provide additional support in separating the reservoir into similar water quality segments to characterize the BOD.

Water quality variation from one segment to another may be summarized as a function of the following: stage, biological communities, biological-chemical alteration of the chemical constituents, degree of nutrient inflow quality and its

movement through the reservoir and export, retention time, physical properties of the sites and their area (depth and width), sedimentation composition, temperature, degree of turbulence (water movement), etc..

The results for each season's reservoir segmentation are shown in Figures 9 and 10. This is a lateral view of the reservoir for the four designated seasons. Depending on the depth of the reservoir, top, middle and bottom sites were measured and statistically evaluated. The boundaries separating one water quality area for a particular season from the next water quality area are, for the most part, arbitrarily placed. That is, the total area of any one segment was arbitrarily defined, although still based upon groupings of similar sites. However, sites with similar water quality during one season may be different in another season. The number of water quality segments into which the reservoir has been divided ranges from 3, during the winter, to 6, during the summer (Figure 9).

The effect of the reservoir stage has not been incorporated into Figures 9 and 10 mainly because the average stage level for each season varies with the fluctuating hydrologic cycles. The reservoir during extensive drawdown periods would change drastically over short distances resulting in changes in quality. In summary, these figures are solely to graphically depict the varied reservoir water quality, specifically BOD, from one season to the next.

The need to describe long term BOD in the Big Eau Pleine Reservoir is realized particularly under ice conditions when the reaeration rate is effectively reduced to near zero. Dissolved oxygen input from the river inflow, photosynthetic activity and ground water are reduced to the point of insignificance and may be neglected in the reservoir. As long as this condition exists, any exerted oxygen demand is not counterbalanced.

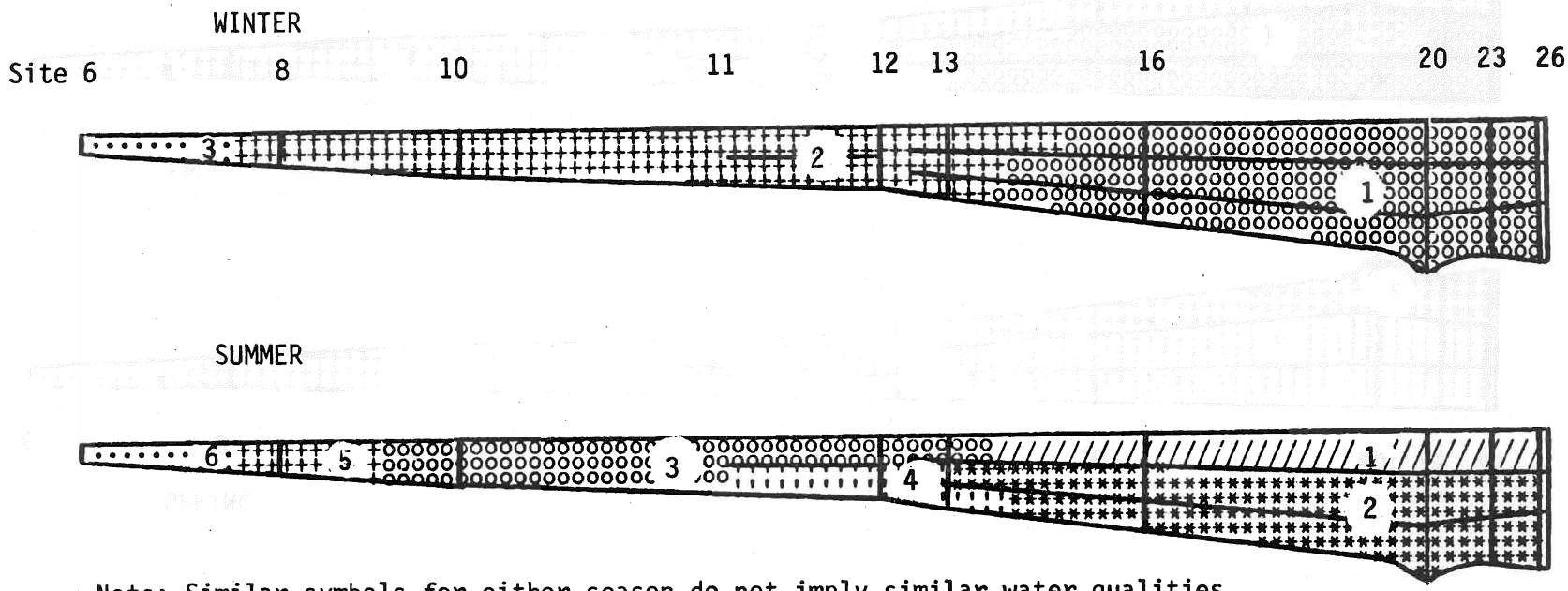
It is possible to describe the oxygen sink (BOD) for each segment over extended time by using equation 5. The reservoir may be further defined by quantitatively describing the total, carbonaceous and filtrable BOD. A summary of the average BOD_{20} and BOD_{50} values along with numerical coefficients for each season and segment is presented in Table 15.

From a modeling viewpoint, the most useful BOD coefficients are those for the filtrable carbonaceous BOD. Generally, water quality models have separate routines to consider oxygen consumption from nitrification and metabolism (eliminating the need for the total BOD), and to consider oxygen consumption due to viable organic matter as algal biomass (eliminating the need for the unfiltered or total BOD).

Seasonal Filtrable and Total BOD Relationships

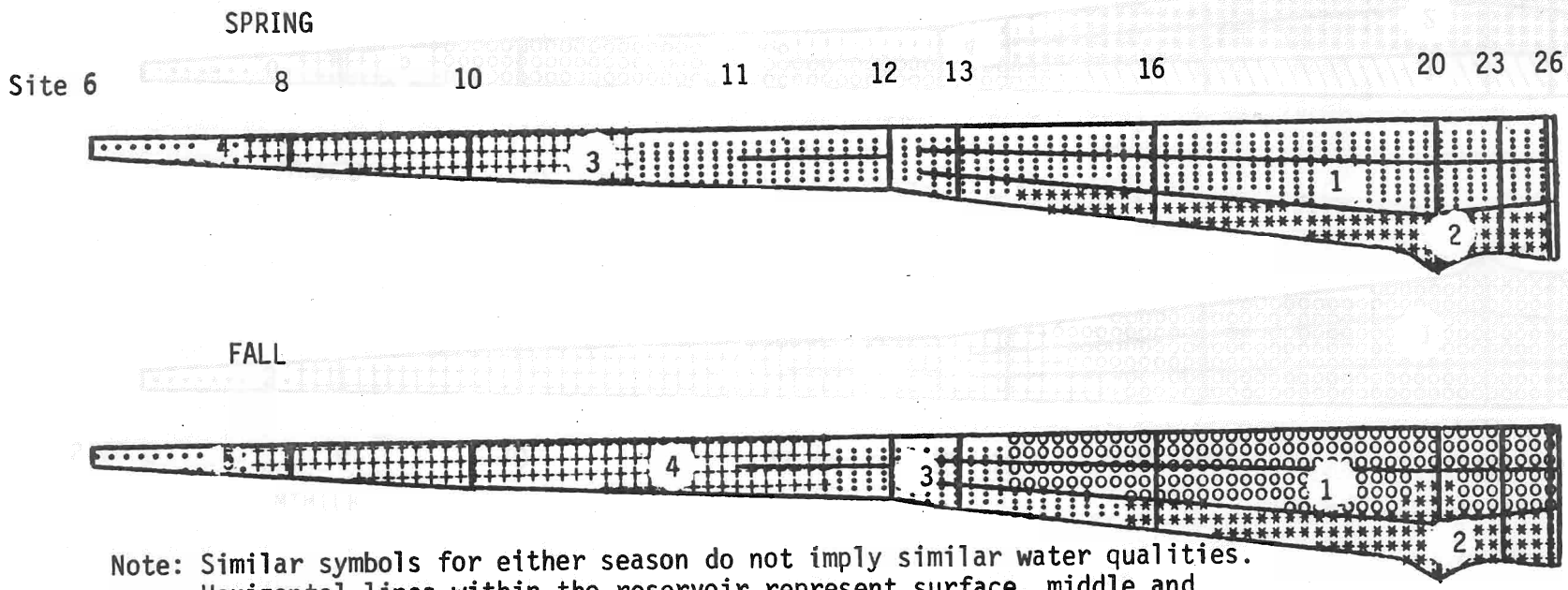
Tables 16 and 17 summarize the seasonal distribution of the total, filtrable, carbonaceous and nitrogenous BOD_{50}. The data represents a summary of the total reservoir BOD based

Figure 9. Approximate Winter and Summer Reservoir Segmented according to Water Quality



Note: Similar symbols for either season do not imply similar water qualities.
Horizontal lines within the reservoir represent surface, middle and bottom depth layers.
The isolated number in each segment is that segment's number.

Figure 10. Approximate Spring and Fall Reservoir Segmented according to Water Quality



Note: Similar symbols for either season do not imply similar water qualities.
Horizontal lines within the reservoir represent surface, middle and bottom depth layers.
The isolated number in each segment is that segment's number.

Table 15.
Mathematical Coefficients Describing the Long Term BOD of the Big Eau Pleine Reservoir

Season	Seg	Type	N	Av BOD_{50}	Min BOD_{50}	Max BOD_{50}	k_1	k_2	k_3	L_1	L_2	L_3
Spring	1	Total	7	15.9	9.5	21.1	.0624	.0505	.0087	5.26	5.61	15.78
		Tot Carb	7	12.9	7.5	17.5	.0437	.0408	.0052	5.61	4.01	14.11
		Filt	6	14.3	9.0	19.5	.0564	.0481	.0075	5.49	4.93	15.35
		Filt Carb	2	10.6	6.7	14.4	.0439	.0441	.0058	4.68	3.22	11.80
Spring	2	Total	3	14.3	12.9	16.6	.0577	.0431	.0059	6.67	4.68	15.10
		Tot Carb	3	10.9	6.0	14.1	.0459	.0445	.0064	3.73	3.86	13,01
		Filt	3	14.0	12.8	15.6	.0553	.0455	.0070	6.41	4.82	13.59
		Filt Carb	0									
Spring	3	Total	9	15.7	7.0	28.1	.0456	.0413	.0069	6.59	5.83	16.74
		Tot Carb	9	12.9	5.6	22.7	.0442	.0423	.0057	5.03	4.50	15.40
		Filt	7	15.5	6.2	28.0	.0443	.0356	.0044	10.01	3.64	16.01
		Filt Carb	4	10.5	5.0	21.8	.0450	.0434	.0060	3.96	3.46	12.00
Spring	4	Total	6	32.3	23.2	37.1	.1416	.0461	.0064	9.40	13.93	40.46
		Tot Carb	6	25.2	19.5	28.4	.1210	.0449	.0059	7.01	9.86	30.92
		Filt	4	31.3	23.4	34.6	.1848	.0484	.0067	8.71	12.89	35.54
		Filt Carb	4	23.9	18.0	27.4	.1441	.0454	.0060	6.69	10.21	28.64

Total: unaltered total BOD_{50} Tot Carb: total carbonaceous BOD_{50}

Filt: filterable BOD_{50} Filt Carb: filterable carbonaceous BOD_{50}

k_1, k_2, k_3: the three decay values for the three ultimate BODs (L_1, L_2, L_3)

Table 15 continued.
Mathematical Coefficients Describing the Long Term BOD of the Big Eau Pleine Reservoir

Season	Seg	Type	N	Av BOD_{50}	Min BOD_{50}	Max BOD_{50}	k_1	k_2	k_3	L_1	L_2	L_3
Summer	1	Total	8	17.2	10.0	29.5	.0824	.0478	.0056	5.73	7.34	19.58
		Tot Carb	8	11.0	6.4	18.0	.0787	.0432	.0062	3.79	4.98	14.22
		Filt	8	9.8	7.3	12.3	.0541	.0463	.0061	3.90	3.08	11.68
		Filt Carb	8	5.3	3.0	9.9	.0452	.0438	.0061	2.03	1.77	6.07
Summer	2	Total	14	13.3	7.4	25.1	.0787	.0409	.0054	4.33	5.58	15.84
		Tot Carb	14	9.1	5.0	19.4	.0500	.0420	.0057	3.46	3.48	10.28
		Filt	14	9.9	6.8	14.3	.0436	.0413	.0054	4.20	3.06	12.94
		Filt Carb	14	5.7	4.0	8.8	.0468	.0463	.0064	2.18	1.75	6.72
Summer	3	Total	4	18.5	10.6	27.4	.0928	.0486	.0076	2.91	6.38	20.81
		Tot Carb	4	13.9	7.9	20.5	.1020	.0443	.0065	3.87	5.40	16.79
		Filt	4	11.1	7.5	16.6	.0460	.0447	.0064	4.11	3.87	13.43
		Filt Carb	4	8.4	5.5	11.5	.0440	.0543	.0059	3.21	2.77	9.58
Summer	4	Total	1	24.8			.0436	.0439	.0062	9.03	10.65	34.05
		Tot Carb	1	23.6			.0337	.0440	.0061	6.85	9.35	31.00
		Filt	1	20.9			.0431	.0445	.0063	6.09	9.08	27.45
		Filt Carb	1	9.9			.0459	.0430	.0059	4.08	3.06	11.66
Summer	6	Total	4	5.8	4.3	7.8	.0460	.0411	.0047	3.38	1.28	6.24
		Tot Carb	4	4.0	2.6	5.2	.0456	.0392	.0043	2.42	0.89	4.07
		Filt	4	4.4	3.6	5.2	.0457	.0376	.0039	2.68	1.00	4.50
		Filt Carb	4	2.9	1.8	4.7	.0451	.0387	.0039	2.04	0.28	3.07

Total: unaltered total BOD_{50} Tot Carb: total carbonaceous BOD_{50}

Filt: filterable BOD_{50} Filt Carb: filterable carbonaceous BOD_{50}

k_1, k_2, k_3: the three decay values for the three ultimate BODs (L_1, L_2, L_3)

Table 15 continued.
Mathematical Coefficients Describing the Long Term BOD of the Big Eau Pleine Reservoir

Season	Seg	Type	N	Av BOD_{50}	Min BOD_{50}	Max BOD_{50}	k_1	k_2	k_3	L_1	L_2	L_3
Fall	1	Total	15	15.7	8.1	23.0	.0574	.0479	.0075	7.27	3.70	17.32
		Tot Carb	5	8.5	5.2	11.1	.0413	.0353	.0037	5.57	2.37	8.79
		Filt	7	9.5	7.0	12.0	.0439	.0371	.0039	6.16	2.41	9.95
		Filt Carb	5	5.8	4.1	8.2	.0440	.0396	.0044	3.50	1.29	5.82
Fall	2	Total	7	14.3	8.7	18.8	.0538	.0451	.0068	4.83	5.77	16.86
		Tot Carb	4	8.1	7.9	8.2	.0442	.0426	.0058	3.03	2.58	9.15
		Filt	5	9.3	6.0	11.2	.0433	.0415	.0054	4.57	3.00	10.53
		Filt Carb	4	5.8	4.5	6.7	.0439	.0426	.0058	2.13	1.84	6.49
Fall	3	Total	4	16.9	10.4	22.9	.0619	.0511	.0091	5.71	6.00	16.70
		Tot Carb	2	10.1	8.5	11.7	.0438	.0387	.0042	6.58	2.50	10.75
		Filt	2	11.7	9.5	13.8	.0458	.0453	.0062	5.06	3.82	14.20
		Filt Carb	2	10.1	8.6	11.6	.0628	.0521	.0095	3.59	3.34	9.03
Fall	4	Total	4	8.1	5.6	11.4	.0653	.0581	.0090	2.71	2.29	9.18
		Tot Carb	1	5.1			.0587	.0489	.0082	1.93	1.67	4.52
		Filt	3	8.5	6.2	10.8	.0472	.0407	.0052	3.53	3.15	9.62
		Filt Carb	1	4.8			.0542	.0463	.0072	4.75	1.58	4.79
Fall	5	Total	2	7.0	4.5	9.4	.0500	.0420	.0057	2.69	2.71	8.04
		Tot Carb	2	4.8	2.1	7.4	.0432	.0381	.0041	2.52	1.09	4.91
		Filt	2	6.6	4.7	8.4	.0442	.0382	.0042	4.01	1.55	6.62
		Filt Carb	2	5.1	2.5	7.8	.0505	.0425	.0059	2.14	1.89	5.32

Total: unaltered total BOD_{50} Tot Carb: total carbonaceous BOD_{50}

Filt: filterable BOD_{50} Filt Carb: filterable carbonaceous BOD_{50}

k_1, k_2, k_3: the three decay values for the three ultimate BODs (L_1, L_2, L_3)

Table 15 continued.
Mathematical Coefficients Describing the Long Term BOD of the Big Eau Pleine Reservoir

Season	Seg	Type	N	Av BOD_{50}	Min BOD_{50}	Max BOD_{50}	k_1	k_2	k_3	L_1	L_2	L_3
Winter	1	Total	25	10.9	3.5	27.6	.0572	.0547	.0083	3.92	3.04	11.95
		Tot Carb	13	7.0	1.3	16.5	.0465	.0443	.0062	2.63	2.26	7.91
		Filt	19	8.8	3.6	28.0	.0558	.0482	.0068	3.41	2.61	10.84
		Filt Carb	11	6.4	0.8	17.9	.0427	.0383	.0042	3.95	1.52	6.48
Winter	2	Total	17	11.9	4.8	27.0	.0689	.0565	.0096	4.27	3.14	11.79
		Tot Carb	9	7.4	2.8	20.9	.0506	.0426	.0059	3.22	2.82	8.04
		Filt	13	8.8	3.3	15.6	.0663	.0542	.0104	2.90	2.94	7.79
		Filt Carb	7	5.1	1.1	7.5	.0499	.0418	.0056	2.47	1.71	4.78
Winter	3	Total	4	10.5	3.9	24.7	.0516	.0452	.0068	3.40	4.04	12.00
		Tot Carb	3	8.1	1.4	18.4	.0947	.0484	.0071	2.58	2.46	9.67
		Filt	3	9.9	4.2	17.6	.0900	.0414	.0034	3.87	3.84	10.66
		Filt Carb	3	6.1	1.8	14.5	.2016	.0529	.0067	1.74	2.39	7.46

Total: unaltered total BOD_{50} Tot Carb: total carbonaceous BOD_{50}

Filt: filterable BOD_{50} Filt Carb: filterable carbonaceous BOD_{50}

k_1, k_2, k_3: the three decay values for the three ultimate BODs (L_1, L_2, L_3)

upon the long term study.

Wide variation exists among the percentage of total BOD that is filtrable. As shown in Table 16, the summer season percentages range from 56.3% to 84.3%. Algal biomass or their remnants appear responsible for the lower percentages because they occur in the surface waters. The fall season also has a wide range of percent filtrable BOD (74.0% to 95.0%). The lowest percentages of the fall BOD occur between sites 16 and 26, which is the main reservoir. This indicates that a major fraction of the fall and forth-coming winter BOD may be from algal biomass (fall bloom) or detrital fractions of significant size. The percent of filtrable BOD upstream is very high (90.4% to 96.7%). This indicates that the total BOD is very low in particulate matter. During the winter, the reservoir also has a large percent of filtrable BOD(90.8% to 93.1%). This suggests minimum biomass production and large concentrations of DOM and/or small sized organic matter.

The percent filtrable BOD is higher in the spring than in the fall for all the reservoir sites. Also, the spring total BOD_{50} is greater than the fall BOD_{50} (Table 16). The larger spring BOD may be due to the highly soluble spring melt BOD, the general scouring of the sediments from the rising spring inflows and the spring bloom of Cyclotella in 1975 and Stephanodiscus and Asterionella in 1976 (Sullivan 1978). The fall period phytoplankton population is comprised of larger sized Crytomonads and Stephanodiscus, and various blue-green algae

Table 16. Seasonal BOD_{50} Characterization Based on Segmentation in the Big Eau Pleine Reservoir.

Season	Seg	N	BOD	FBOD	CBOD	% FBOD	% CBOD	%F-CBOD
Summer	1	8	17.2	9.8	12.1	64.2	70.2	53.5
Summer	2	14	13.3	9.9	9.0	77.4	67.3	58.3
Summer	3	3	20.3	10.9	15.3	56.3	75.5	76.2
Summer	4*	1	24.8	20.9	23.6	84.3	95.2	47.4
Summer	6	4	5.8	4.4	3.8	76.7	69.0	63.9
Winter	1	19	9.8	8.8	6.2	90.8	63.1	67.9
Winter	2	13	9.5	8.8	6.1	93.1	64.5	58.4
Winter	3**	4	12.7	9.9	7.4	82.5	58.6	50.9
Spring	1	7	14.4	13.2	11.6	92.0	80.7	82.2
Spring	2	3	14.3	14.0	10.7	98.2	75.2	----
Spring	3	5	16.9	16.4	13.8	95.6	81.7	76.4
Spring	4	4	32.6	31.3	25.6	96.5	78.7	76.5
Fall	1	7	13.2	9.5	8.8	74.0	66.5	58.4
Fall	2	5	13.2	9.3	8.7	74.4	66.1	58.8
Fall	3	2	9.9	9.0	8.1	90.4	82.1	87.3
Fall	4	3	9.0	8.5	7.2	95.0	79.7	77.4
Fall	5	2	7.0	6.6	4.4	96.9	62.7	73.0

* This sample apparently had some biological inhibiting factor because the filtrable nitrogenous BOD was higher than the total nitrogenous BOD. In the summary (Table 17) for each season this segment's data is excluded.

** This set of data includes one observation during a mid December melt which increased the average BOD_{50} by 40 - 50%.

BOD: total BOD_{50} (mg/l) as measured without alteration.

FBOD: filtrable BOD_{50} (mg/l); that which passes through a #300 soil sieve, or material smaller than 50 microns.

CBOD: carbonaceous BOD_{50} (mg/l); nitrification was inhibited.

% FBOD: the percentage of the total BOD that is filtrable.

% CBOD: the percentage of the total BOD that is carbonaceous.

%F-CBOD: the percentage of the total carbonaceous BOD that is filtrable.

that are removed by filtration (Sullivan 1978).

The average filtrable BOD_{50} concentrations in the main reservoir for all seasons, except spring are similar (8.8 mg/l to 10.9 mg/l). This suggests a common filtrable BOD over time. For example, the average summer surface filtrable BOD_{50} is 9.8 mg/l while that of the winter surface waters is 8.8 mg/l BOD_{50}.

Approximately 96% of the spring and fall inflowing BOD is filtrable (Table 17). This is similar to the 94.4% filtrable BOD observed in the spring throughout the reservoir. During the winter season, segment 3 (inflowing waters) has the lowest percent filtrable BOD (82.7%), yet has the highest average winter segment BOD. A mid December runoff event in 1975 triggered this rise in suspended solids and BOD input (suspended solids of 16.7 mg/l; BOD_{50} of 24.7 mg/l). However, these values would vary from year to year depending on runoff and river flow conditions.

Seasonal Nitrogenous and Total BOD Relationships

In comparing reservoir segments 1 and 2 for the spring, fall and summer seasons, there is a slight decrease in the percent total CBOD in the reservoir with depth. This decrease in CBOD is accompanied by an increase in NBOD. Over two-thirds of the yearly filtrable BOD has a higher ratio of NBOD to total BOD (Tables 16 and 17). This suggests that the degradation products of algae at depth have a higher ratio of

Table 17. Seasonal and Yearly BOD_{50} Averages of the Big Eau Pleine Inflow and Reservoir Waters.

Season	N	BOD	FBOD	NBOD	% FBOD	% NBOD	%F-NBOD	%F-NBOD of NBOD
Reservoir Averages								
Summer	23	15.8	10.0	4.9	70.6	30.8	41.1	94.9
Winter	32	9.7	8.8	3.5	91.7	36.3	35.9	90.8
Spring	15	15.2	14.4	3.0	94.4	20.2	16.2	93.9
Fall	17	12.1	9.2	3.6	79.8	29.6	34.7	90.7
Yearly	89	12.6	11.0	3.9	84.0	30.7	33.8	90.3
Inflow Averages								
Summer	4	5.8	4.4	1.8	76.7	31.0	36.1	89.4
Winter	3	12.7	9.9	5.2	82.5	41.4	49.1	97.8
Spring	4	32.6	31.3	7.0	96.5	21.3	23.5	100.0
Fall	2	7.0	6.6	2.6	96.9	37.3	27.0	70.2
Yearly	13	15.8	14.3	5.0	87.2	31.4	33.8	91.9

BOD: total BOD_{50} (mg/l) as measured without alteration.
FBOD: filtrable BOD_{50} (mg/l); that which passes through a #300 soil sieve, or material smaller than 50 microns.
NBOD: nitrogenous BOD_{50} (mg/l); the difference between the total BOD_{50} and the carbonaceous BOD_{50}.
% FBOD: the percentage of the total BOD_{50} that is filtrable.
% NBOD: the percentage of the total BOD that is nitrogenous.
%F-NBOD: the percentage of the total nitrogenous BOD that is filtrable.
%F-NBOD of NBOD: the percentage of the total nitrogenous BOD that is filtrable nitrogenous BOD.

the amount of NBOD to total BOD over a 50 day period.

Although much of the proteinaceous material (algal biomass) can be filtered out of the summer surface waters (segment 1), the percent NBOD was higher in the filtrable fraction than in the total unfiltered sample. It appears that greater nitrogenous decomposition occurs when "non-viable" organic material is present. Possibly some inhibitor or toxin is released from the algal cells thus supressing deamination and nitrification. In addition, this situation implies that a greater percent of NBOD is derived from NH_4 or organic matter smaller than 50 microns (Table 17). This occured for both the reservoir and inflowing waters of the Big Eau Pleine Reservoir.

On a seasonal basis, the average winter NBOD comprises 36% of the total BOD_{50}. Of course, little of the NBOD is exerted in the reservoir because of the inhibition of nitrifying bacteria by the cold water temperatures. The smallest seasonal average percent NBOD occurs in the spring (20%). This low percentage is probably the result of dilution from snowmelt. The average yearly NBOD is 31% of the total BOD in the reservoir.

During the summer, a negative relationship ($r = -.706$) exists between the percent total filtrable BOD and the filtrable CBOD. That is, as the total filtrable BOD increases, there is an incremental decrease in the CBOD. This indicates that with increasing concentrations of filtrable BOD, a higher

percentage of filtrable BOD is nitrogenous BOD. No conclusive relationships were found for the other seasons.

Winter inflow NBOD averages 41% of the total BOD_{50}, while the spring NBOD averages 21%. However, more NBOD on a mass basis is input during the spring (high discharge from spring runoff). During low flow conditions in winter, the nitrogen loading may come from either local point source discharge or from a natural accumulation of nitrogenous material which was unable to be oxidized in situ because of the low water temperatures.

Reservoir Volume, Organic Nitrogen and BOD in Water Years 1975 and 1976

Hydrologic Considerations and Impact on the Reservoir

Considerable variation occured in reservoir stage between the years of 1975 and 1976 (Figure 11). In the fall of 1974, the reservoir was much lower than in the fall of 1975. As a result, the reservoir experienced a very rapid and prolonged drop in stage in the 1974-75 winter relative to the 1975-76 winter. Furthermore, the rate of reservoir filling in the spring of 1976, from the snowmelt and rain runoff, was six to eight times faster than that of 1975 (Figure 11). During the 1975 water year, the watershed received a normal amount of precipitation. However, precipitation for the 1976 water year was considerably below normal (National Oceanic and Atmospheric Administration 1977). As a result of the 1976

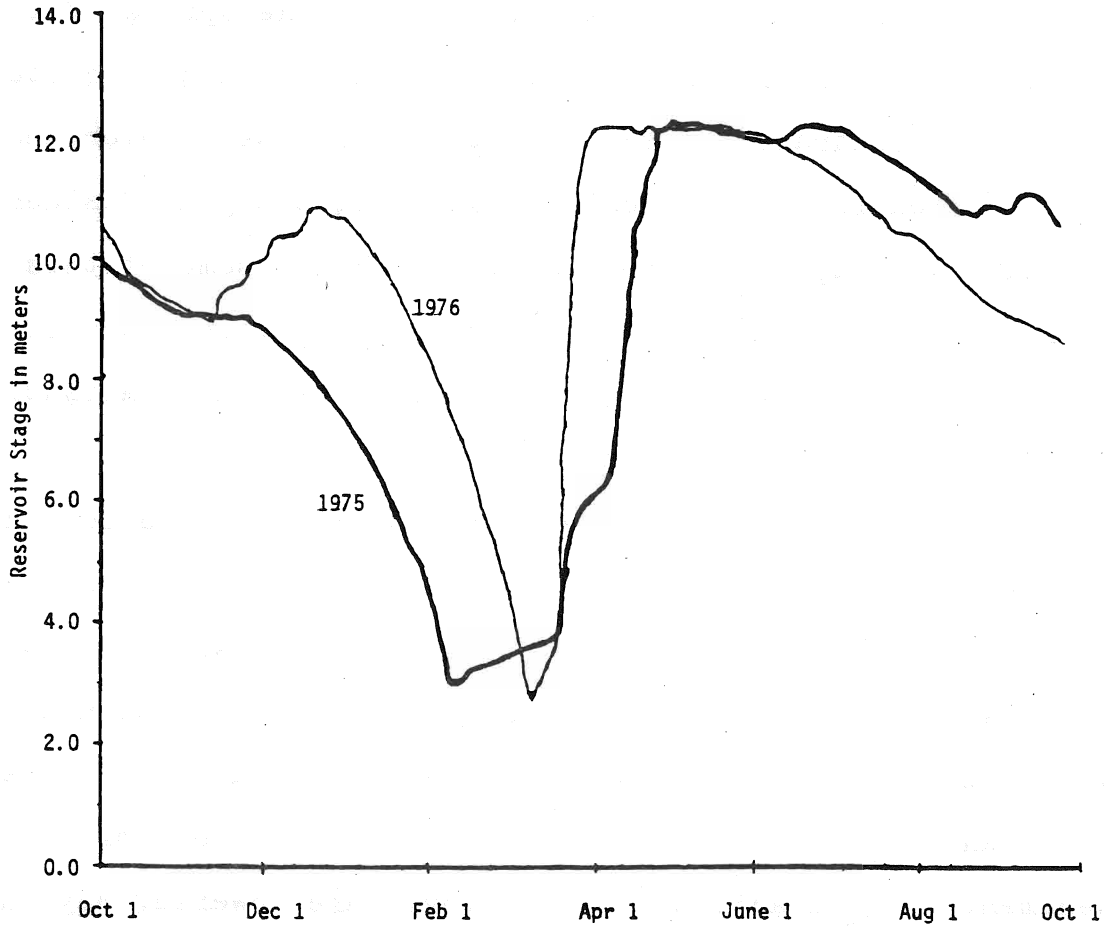


Figure 11. The Big Eau Pleine Reservoir Stage for Water Years 1975 and 1976.

summer drought and below normal precipitation, the late fall reservoir volume was low. Accordingly, the reservoir was drawn down earlier in the 1974-75 winter and for a longer duration than that of the 1975-76 winter.

The intense runoff from the basin in the spring of 1976 suggests low loss rates (little infiltration) and a shortened time of concentration. The resultant increase in overland flow, caused increased erosion and consequently a considerable nutrient import to the reservoir. While some of this runoff was flushed through the reservoir in 1976, much of it settled out and became a nutrient source (via mineralization) for further biomass production.

Late summer and fall precipitation in 1976 induced numerous changes in the reservoir limnology. With little rain, increased sunlight could produce greater biomass. Also with a decreased stage level (and decreased volume), both nutrients and biomass were concentrated into a smaller area. Furthermore, easier mixing of the bottom waters and scouring of the sediment by wave action as water levls are lowered, may have resulted in resuspension of nutrients.

The preceding factors combined to produce a larger plankton biomass (Sullivan 1978) and one of a longer duration (Figures 7 and 11) in the summer and early fall of 1976. The larger biomass concentrations appear responsible for the high in situ BOD loading observed in the summer and fall reservoir waters.

Reservoir BOD_5 and Organic Nitrogen

Between the two water years, numerous similarities are evident when comparing seasonal BOD_5 and organic nitrogen throughout the reservoir. The reservoir surface and bottom BOD_5 and organic nitrogen over a two year period are depicted in Figures 12 and 13. Each data point is based upon three to eight observations for that day throughout the main reservoir (sites 12 to 25). BOD_5 and Organic nitrogen data were obtained from the Environmental Task Force.

The highest BOD concentrations occur during the summer months in both years. Assuming the summer surface BOD is primarily affected by algal biomass, it appears that a larger sustained algal bloom and more gradual succession of these populations occured in 1976 relative to 1975 (Figure 12). Furthermore, the greater surface biomass resulted in an increased bottom depth BOD in 1976 relative to 1975.

In both years, increases in bottom depth BOD lag behind increases in surface BOD (Figure 12). This lag also appears in the surface and bottom depth organic nitrogen (Figure 13). In early summer, the mid depth BOD parallels the bottom depth BOD. However, as summer progresses and greater production and mixing occur, the mid depth becomes a medium point for the surface and bottom depth BOD. Hence, as the spent biomass sinks through the system, the BOD at each depth is affected.

Generally, organic nitrogen concentrations parallel the BOD (Figures 12 and 13). However, during the summer months,

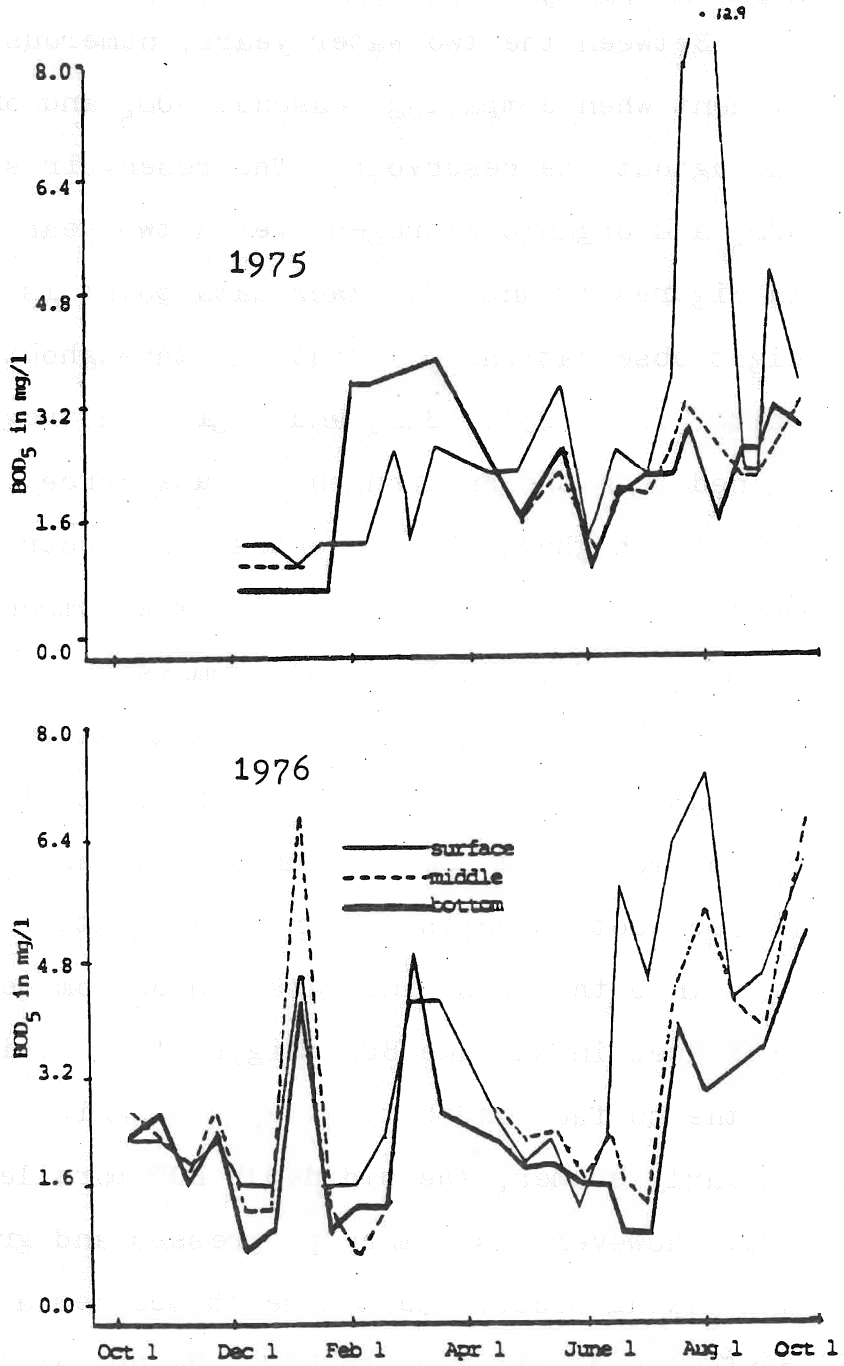


Figure 12. Top, Middle and Bottom Depth BOD_5 Values for the Big Eau Pleine Reservoir through Water Years 1975 and 1976. Each point represents an average of 3 to 8 reservoir sites.

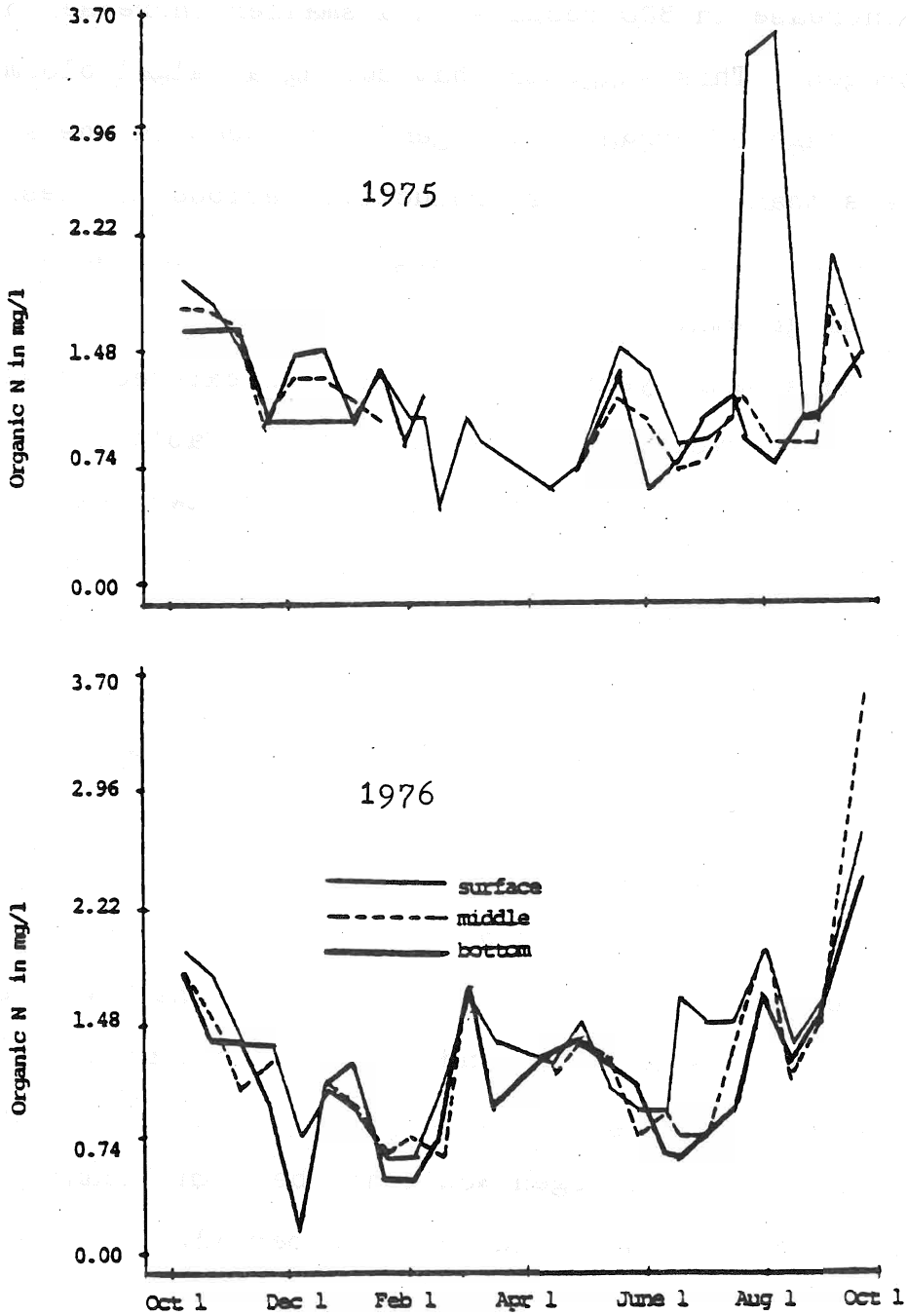


Figure 13. Top, Middle and Bottom Depth Organic Nitrogen Values for the Big Eau Pleine Reservoir through Water Years 1975 and 1976. Each point represents an average of 3 to 8 reservoir points.

an increase in BOD results in a smaller increase in organic nitrogen. This suggests that during an algal bloom a smaller percentage of organic nitrogen is present in the surrounding waters than during less productive periods, or less organic nitrogen is present in the algal protoplasm during periods of maximum growth.

On a water year basis, more BOD existed at all depths in the reservoir in 1976 than in 1975 (Table 18). However, when comparing organic nitrogen for the two years, no apparent variation exists. In both years, organic nitrogen concentrations decreased with respect to increasing depth.

The high winter BOD in January 1976 (Figure 12) was in part due to a thaw and resultant scouring due to drawdown and transport of organics into the reservoir. This caused a slight increase in organic nitrogen (Figure 13). Organic nitrogen and bottom depth BOD were higher in the winter of 1974-75 than in 1975-76. This may be due to the lower reservoir stages in 1974 and 1975 and resultant scouring of the sediments by inflowing water. Also, any significant inflowing BOD or organic nitrogen would not be significantly diluted by the reservoir's water during this period.

Table 18. Yearly Average Surface, Mid and Bottom Depth BOD_5 and Organic Nitrogen in the Big Eau Pleine Reservoir.

	Water Year	.....Depth.....			Ratio of Depths.		
		Top	Mid	Bot	Top/ Mid	Top/ Bot	Mid/ Bot
BOD_5	1975	2.9±2.6	2.0±1.2	2.2±1.0	1.45	1.31	0.91
(mg/l)	1976	3.3±2.7	2.7±1.7	2.3±1.2	1.18	1.43	1.17
Org N	1975	1.33±.74	1.16±.22	1.15±.31	1.15	1.16	1.00
(mg/l)	1976	1.32±.48	1.21±.65	1.08±.48	1.09	1.22	1.22

BOD_5: five day BOD in mg/l.

Org N: organic nitrogen in mg/l.

Top, Mid, Bot: depth location of yearly average.

Important Factors Affecting Dissolved Oxygen BOD and Nutrient Levels

Spring Inflow Waters and Land Use

Water quality originating from the Big Eau Pleine Watershed is a function of its land use and hydrologic characteristics. The spring snow-melt water quality is especially important because of the heavy soils and frozen ground (Kaminski 1977). Because agriculture is the primary land use in the Big Eau Pleine Watershed, a sampling of spring runoff from pastured and tilled land was made to determine the BOD, suspended solids and nutrient concentrations of the runoff. The tilled land was divided into areas which had winter manure spreading and those which did not. Considerable quantities of manure are produced on the farms as evidenced by the livestock numbers (Table 19). The pasture area is typified by semi-wooded areas that lie on lower slopes near stream channels.

Representative snow-melt runoff samples were obtained for the two land uses in the Hamann Creek sub-basin (Figure 3). Most of the high BOD and nutrient concentrations apparently originate from filtrable organic matter (smaller than 50 microns) or soluble compounds (Table 20). By far, the greatest BOD and nutrients originate from the fields spread with manure (Table 20).

Data from the Hamann Creek watershed suggest a 5 to 8 fold increase in nitrogen and phosphorus from manured fields relative to the non-manured fields (Table 20). Hensler et al

Table 19. Summary of Livestock, Manure and Fertilizer Usage on the Big Eau Pleine Watershed. (Modified from Shaw)

Livestock Averages (43 farms)

70 head of dairy livestock per farm
33 dairy cows per farm
32 heifers per farm

Manure Handling Over Winter (56 farms)

13% STATED no manuring on frozen ground
48% spread until snow got too deep, then stacked
31% stacked during the winter
21% spread manure all winter

Fertilizer Use for Corn, Oats and Hay

Corn = 260 pounds per acre average (32 farms)
Oats = 196 pounds per acre average (26 farms)
Hay = 246 pounds per acre average (19 farms)

(1970) found that the winter application of dairy cow manure on snow covered ground resulted in a three fold increase in the average annual nitrogen and phosphorus losses as compared to areas with no manure applied. It is noteworthy that the BOD_{50} originating from the manured soils in the Hamann Creek area is the highest of the three land use types. Moreover, it is the only land use requiring a first decay rate (or de-oxygenation rate) greater than 0.1 (Table 20). In the semi-wooded pasture areas, water quality is similar to the non-manured tilled land (Table 20). The high BOD and nutrients from the pastured areas may be due to the different dates or sampling or from manure on these lands from the past year's use by cattle.

Table 20. Water Quality of the Big Eau Pleine River near Stratford, Wi. and Surface Drainage from Varied Land Use in the Sub-basin, Hamann Creek.

Site	Date	BOD_{20} +	BOD_{50}	COD	React P	Total P	NH_4	N+N	Kjld N	Susp S	k_1
HA- 4W *	4/15/75	18.9	32.3	26.8	0.120	0.280	0.21	0.91	0.98	---	.0524
****		17.0	30.0	---	0.120	---	0.21	0.91	---	---	.0436
HA-11W	2/26/76	27.1	47.3	78.2	0.360	0.580	2.62	0.31	4.45	5.9	.0536
****		25.3	44.4	75.0	0.360	0.550	2.62	0.31	4.32	1.6	.0428
HA-11P	3/24/76	19.9	35.0	120.9	0.103	0.755	0.66	0.14	7.49	4031.0	.0521
****		17.9	32.5	67.3	0.103	0.570	0.66	0.14	4.27	3619.0	.0446
HA-13M	3/24/76	48.1	77.2	224.6	1.640	4.300	0.88	0.10	34.72	3042.0	.1165
****		41.4	69.5	177.1	1.640	3.940	0.88	0.10	32.08	2401.0	.0511
HA- 4P	3/24/76	10.0	16.3	65.2	0.024	0.520	5.25	1.19	6.40	1256.0	.0657
****		10.7	16.0	53.4	0.024	0.503	5.25	1.19	5.95	1071.0	.0676
HA- M	3/24/76	259.1	396.0	375.9	0.224	4.600	0.74	0.00	49.84	69.4	.1649
****		242.1	380.0	324.4	0.224	4.580	0.74	0.00	49.70	43.8	.1894
Site 6	2/18/76	27.0	35.7	53.6	0.195	0.372	0.81	1.26	2.84	7.6	.3015
****		27.1	34.6	45.0	0.195	0.362	0.81	1.26	2.80	6.2	.3780
Site 6	2/24/76	24.3	34.3	61.9	0.290	0.482	1.44	1.02	4.13	7.7	.1285
****		24.1	34.1	54.3	0.290	0.392	1.44	1.02	3.89	6.9	.0950
Site 6	2/26/76	16.9	26.4	49.0	0.236	0.405	1.74	1.57	2.73	5.0	.0845
Site 6	3/ 2/76	19.3	33.0	55.0	0.307	0.380	2.21	0.81	4.60	4.7	.0751
Site 6	3/24/76	15.9	23.2	44.8	0.248	0.470	1.02	0.21	3.15	57.8	.1724
****		15.5	23.4	38.5	0.248	0.422	1.02	0.21	1.92	39.8	.1565

+ All values are in mg/l except for the decay rate (k_1).
* W: semi-wooded pastured land; P: unmanured plowed land; M: manured plowed field.
**** represents the same sample, but it has been filtered with a #300 soil sieve and thus is the filtrable quality.

River Water Quality

The average spring water quality of the Big Eau Pleine River is similar to the runoff from specific agricultural fields such as those tilled and spread with manure during the winter (Table 20). For example, the ratio of Kjeldahl N (mg/l) to total P (mg/l) for the varying land uses ranges from 8 to 12 units, while the ratio for the inflowing waters (site 6) is approximately 8 units. This slight reduction in the river concentrations may be explained by dilution of surface runoff from "cleaner" sources.

The high inflowing BOD appears to be primarily from surface runoff, particularly from those lands spread with manure during the winter. An examination of Table 20 for site 6, which drains the upper two-thirds of the watershed, shows the first deoxygenation rate (k_1) averages about 0.1. This is similar to the runoff decay rate originating from lands spread with manure.

A survey of a manured field and its impact on a small tributary during spring runoff shows a dramatic increase in COD, nutrients, BOD and suspended solids in the river below the manured field (Table 21). The first deoxygenation rate also increases to above 0.1 and thus is similar to the manured field input.

In summary, much of the spring organic and nutrient loading to the Big Eau Pleine Reservoir may originate from manured fields. The majority of this organic matter is smaller than

50 microns and thus would not immediately settle out in the reservoir. No estimate of the river bedload was available, although it may be considerable. The bedload would settle out in the upper reservoir area and act as a nutrient source, oxygen sink, and be available for resuspension during subsequent reservoir drawdown.

Table 21. Case Study of Winter Manure Spreading on Snow Covered Cropland and Its Impact on a Tributary in the Big Eau Pleine Watershed.

Location	BOD_{50}*	COD	React P	Total P	NH_4	N+N	Kjld N	Susp S	k_1
HA-13+									
Above	18.5	26.2	0.015	0.232	0.60	0.24	1.68	10.4	.0620
Below	22.7	39.3	0.225	0.374	0.88	0.18	3.04	1129.0	.1600
Manured Field	77.2	224.6	1.640	4.300	0.88	0.10	34.72	3042.0	.1165

* All values in mg/l.

\+ Samples collected on March 24, 1976 near site HA-13 (northern part of Hamann Creek Watershed). Approximate river flow was 25 to 50 cms.

Reservoir Drawdown

The Big Eau Pleine Reservoir's primary purpose is to provide flow augmentation for the Wisconsin River. However, it also serves for recreational activities. The reservoir is known for its walleye and panfish; it is also known for its winter fish kills.

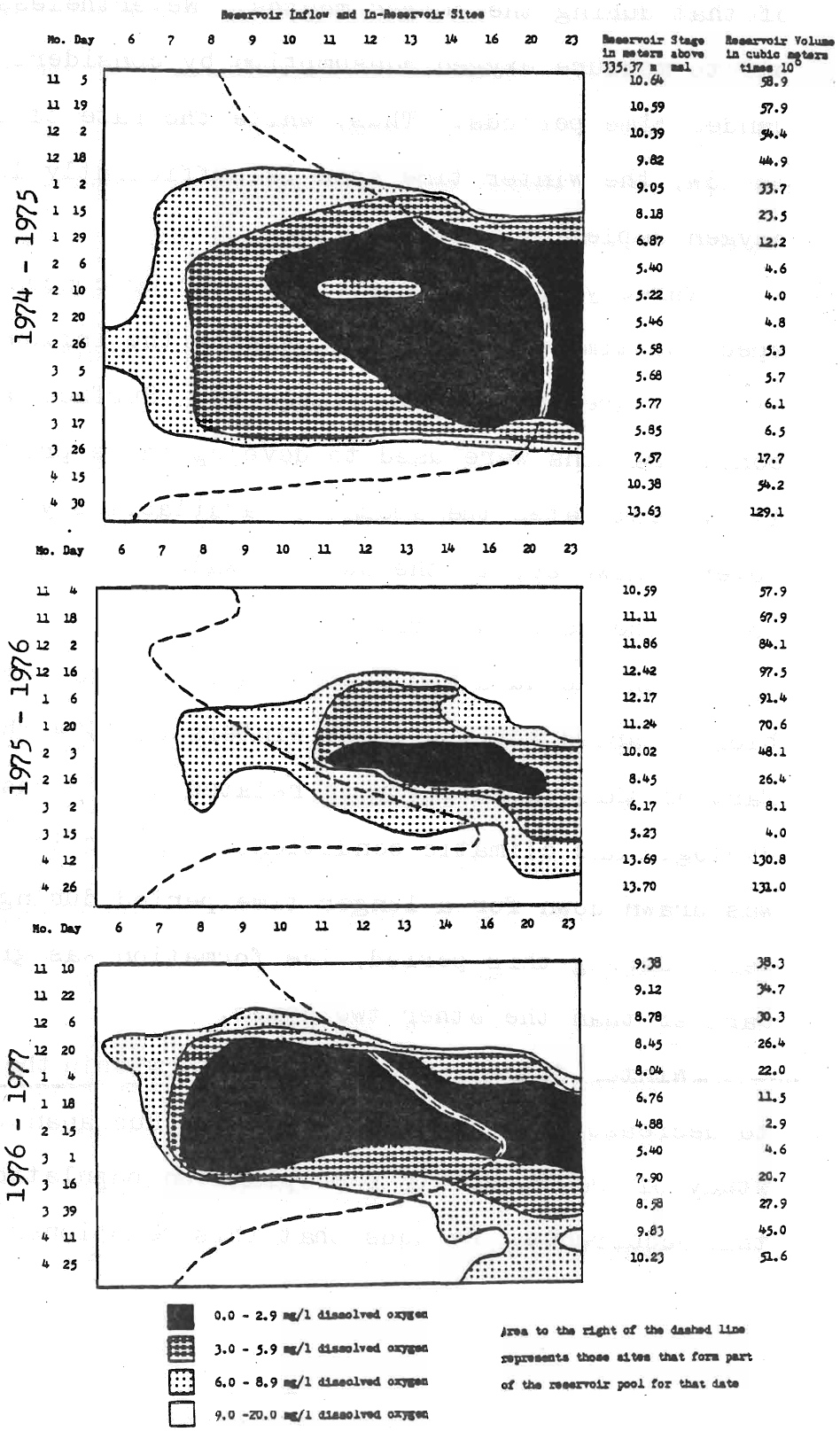
The processes of biological oxygen consumption during the winter are difficult to measure in situ because biological, physical and chemical rates of activity are reduced 60% to 80% of that during the summer months. Nevertheless, it is possible to measure oxygen consumption by considering it over extended time periods. Thus, while the rate of oxygen depletion is low, the winter time span is sufficiently long to produce oxygen depletion.

Three years of winter reservoir DO concentrations with respect to time and reservoir length (the inflow at site 6 to site 23) are depicted in Figure 14. Surface dissolved oxygen concentrations were used to develop these profiles even though it overestimates the amount of available oxygen during ice cover. However, if the surface waters are devoid of oxygen, so are the lower waters.

Both the duration and the area of the reservoir anaerobiosis varied for the three winters of 1974 through 1976. Part of this variability is related to the changes of the hydrologic and climatic conditions. In particular, the reservoir was drawn down for a longer time period during the 1976-77 winter. During this period, ice formation was greater and began earlier than the other two years.

Winter dissolved oxygen levels within the reservoir tend to decrease with decreasing stage. Buchanan (1976) in his study of the reservoir's zooplankton population also mentions this occurrence. He adds that this relationship (reduced stage

Figure 14. Reservoir Surface Dissolved Oxygen as Viewed through Drawdown.



and DO) has not been reported elsewhere. Because the reservoir was drawn down longer during the winter of 1976-77, the period of very low DO is longer. The area of low DO extends further upstream with greater duration during low stage.

It is significant that areas which become river channels due to drawdown have low DO. An examination of Figure 14 for the time period of January 4, 1977 to January 18, 1977, clearly shows this occurrence. As stage dropped from 8.04 meters to 6.76 meters, the area of DO concentrations less than 3.0 mg/l expanded from site 13 to site 23. In the winter of 1975-76, this situation was not as evident, possibly due to higher water levels and a delayed drawdown schedule.

Measured DO concentrations from the inflowing waters (site 6) of the reservoir were always above 6 mg/l for the three winters being studied (Table 22). Except for occasional winter thaw periods, the BOD entering the reservoir is low (ETF 1974-77). Thus, other factors besides the inflowing waters are causing oxygen depletion further downstream.

The anaerobic conditions are not totally due to the normal BOD in the reservoir during higher stage. By assuming a fall BOD_{50} of 10 mg/l (Table 9; average of 9 mg/l for this time period), some oxygen relationships may be determined. Because ice cover lasts 110 to 140 days, an estimate of a proportional fall BOD_{130} from the BOD_{50} may be made. If a value of 25 mg/l of oxygen consumption at 20° C is used as total BOD_{130}, then the value of BOD exerted at 4° C during this period would be

approximately 5 to 7 mg/l. Accordingly, this 5 - 7 mg/l of BOD_{130} is insufficient to devoid the reservoir of the 9 - 12 mg/l of oxygen present at fall turnover.

Alexson (1969) states that one of the effects of the reservoir drawdown is the stirring and resuspension of sedimentation, especially by ice during low stage. Scouring by river current as the upper reservoir area is drawn down to the old river bed adds organic matter and may be the major factor resulting in increased BOD, color and low oxygen. This may account for the low DO conditions that rapidly develop at the upper sites during the winter months.

Winter water samples from this upper area are yellowish-green or yellowish-brown in color, and have much of their BOD composed of DOM (Figure 15). It is probable that this BOD, as well as SOD from the upper areas, quickly consumes oxygen from the inflowing waters. The sediment oxygen consumption is of major significance in the oxygen balance when the water depth is relatively shallow. This combined occurrence of BOD and SOD may produce anaerobic conditions in the upper reservoir area. With drawdown, this "slug of deoxygenated water" flows downstream resulting in an additional release of organics from the sediments (Environmental Task Force 1977 and Marano 1977). As such, a "snowball" effect of more oxygen demanding organics is produced. This is caused by resuspension of organics and the redox chemistry in the oxidized microzone. Hence, as the oxygen sink moves downstream it produces increased oxygen consuming materials.

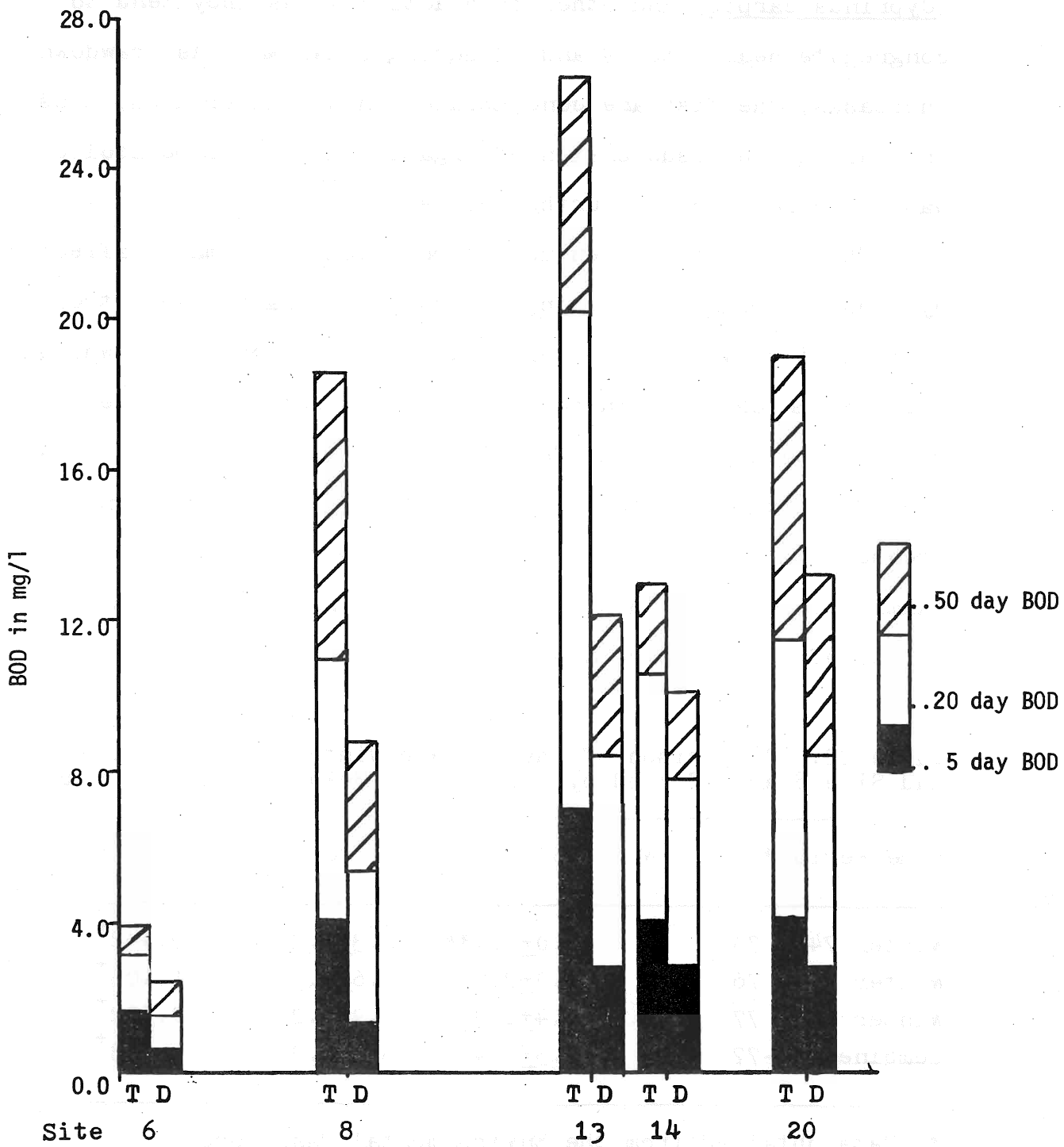


Figure 15. Total (T) and Dissolved (D) Long Term BOD Values from the Big Eau Pleine River and Reservoir Sites, Jan. 7, 1977.

Another means of sediment resuspension is that of carp (Cyprinus carpio) and other fish activity, as they tend to congregate near sites 9 and 10 during drawdown. As drawdown increases, the fish are concentrated in a smaller area, thus increasing the resuspension of organics and their metabolic wastes to be oxidized further downstream.

The reservoir oxygen depletion appears minimally affected by constant point source input from a secondary sewage treatment plant between site 6 and site 8 during low flow. While there is an observed increase in BOD_5 at site 8 relative to site 6, the degree of difference is statistically small (Table 22). In the winter of 1975 to 1976, there was a 30% increase in the BOD_5 at site 8 relative to site 6. However, an examination of the data indicates the possibility of an error in one of the measurements.

Table 22. Comparison of the Average Winter BOD_5 for Site 6 and Site 8 as Affected by a Secondary Sewage Treatment Plant.

Time Period*	N	Site 6	Site 8	T (from T-test)
Winter 74 - 75	11	2.0±2.4**	2.3±2.2	0.442+
Winter 75 - 76	6	2.3±2.9	4.6±2.3	1.106+
Winter 76 - 77	4	2.4±1.3	2.9±1.2	0.532+
Combined 74-77	21	2.5±2.4	3.1±2.3	1.273+

* Data obtained from the Environmental Task Force.

** BOD_5 in mg/l.

\+ Cannot reject at alpha 0.05.

Figure 14 shows that for the three winters there is a definite drop in the reservoir oxygen level as stage decreases. The timing and extent of this oxygen depletion follows the timing and extent of drawdown fairly closely. The reservoir surface waters approach near zero oxygen levels as stage falls below 8.5 meters (above the base level of 335 meters mean sea level (msl)), and the reservoir volume falls below 25 MCM. These values would be higher for the 1975 - 1976 winter, but the rate of drawdown was quicker.

A series of correlations among the winter reservoir stage, volume and average DO concentrations for the surface and bottom waters were strong ($r \geq .619$). The positive correlations suggest that as stage and volume decreases, so does the surface and bottom waters' oxygen level. Overall, reservoir stage correlates slightly better than reservoir volume with oxygen concentrations (Table 23). Thus, by knowing the stage level one can predict the probable oxygen concentrations to be found at that reservoir depth. The data used to develop these relationships involved an average of the measured surface or bottom DO concentrations which were part of the reservoir system. Hence, only the right side of the dotted line (Figure 14) for that day was used.

Variations in the slope and intercept of the equation for each year is a function of the climatic conditions for that year. A greater uniformity and an improvement in the correlation coefficients might be made by using multiple regression

Table 23. Reservoir Stage and Volume Correlation Coefficients and Regression Equations for Winter Surface and Bottom Depth Dissolved Oxygen Concentrations in the Big Eau Pleine Reservoir.

Period	Surface DO vs. Stage - Volume		Bottom DO vs. Stage - Volume		Surface DO vs. Bottom DO
1974-75	.876+	.719*	.878+	.787*	.909+
1975-76	.619*	.651*	.707*	.714*	.856+
1976-77	.828+	.765+	.803+	.817+	.905+
Overall	.744+	.613+	.776+	.689+	.900+

Period	Regression Equation	Regression Equation
1974-75	Surf DO = -7.50 + 0.5211 STAGE	= 2.81 + 0.1077 VOL.
	Bot DO = -7.90 + 0.4779 STAGE	= 1.27 + 0.1078 VOL.
1975-76	Surf DO = 1.04 + 0.2047 STAGE	= 5.14 + 0.0449 VOL.
	Bot DO = -2.65 + 0.2690 STAGE	= 2.89 + 0.0566 VOL.
1976-77	Surf DO = -12.5 + 0.7300 STAGE	= 0.75 + 0.2449 VOL.
	Bot DO = -12.7 + 0.6700 STAGE	=-1.13 + 0.2473 VOL.
Overall	Surf DO = -4.01 + 0.3795 STAGE	= 4.02 + 0.0732 VOL.
	Bot DO = -5.65 + 0.3811 STAGE	= 2.18 + 0.0792 VOL.

* Significant at 0.05 level.
\+ Significant at 0.01 level.
STAGE: measured in feet above the base of 1100 feet mean sea level.
VOLUME: measured in million cubic meters with a base volume of 1100 feet mean sea level.

techniques. Such variables as 1) the time period since initial ice cover, 2) projected rate of stage or reservoir volume drop for a given time period, 3) approximate 5, 20 and 50 day CBOD at the fall turnover, 4) average DO concentrations and stage levels during fall turnover could be used to improve the correlation coefficients. In addition, these equations would serve as a valuable tool in managing the reservoir water levels to maintain sufficient oxygen concentrations for fish survival.

Long Term BOD Procedures: Ancillary Studies

Methylene Blue as a Nitrification Inhibitor

The effectiveness of methylene blue as a nitrification inhibitor is minimally known. Abbott (1948), who initially advocated its use, suggested it suppresses nitrification and denitrification for periods greater than five days. Recently Montgomery and Borne (1966), in comparing methylene blue with two other inhibitors, found no difference among them in effectively suppressing nitrification.

The effectiveness of methylene blue over long periods of time has not been established. Both of the above studies lasted less than 10 days. In this study the carbonaceous BODs were run for a minimum of 50 days.

Nitrogenous BOD occurs from the oxidation of ammonia to nitrite and from nitrite to nitrate (Equations 7 and 8).

$$2NH_3 + 3O_2 \xrightarrow{\text{nitrite forming bacteria}} 2NO_2^- + 2H^+ + 2H_2O$$

Equation 7

$$2\,NO_2^- + O_2 \xrightarrow{\text{nitrate forming bacteria}} 2NO_3^-$$

Equation 8

In the first equation, 1.5 moles of oxygen participate in the formation of 1 mole of nitrite-nitrogen. In terms of BOD, this means that the nitrite-nitrogen concentration multiplied by 3.43 is equal to the total BOD involved in the oxidation of ammonia-nitrogen to nitrite-nitrogen (Zanoni 1968). The second equation, representing nitrate formation, shows

that two moles of oxygen are required for the total oxidation of ammonia to nitrate. This makes the total conversion factor for the BOD equal to 4.57 (Zanoni 1968).

The results of Table 24 indicate that the inhibiting ability of methylene blue does not correlate with the theoretical NBOD. The measured $NBOD_{50}$ exceeds the calculate theoretical NBOD by 50% to 60% (average $NBOD_{50}$ = 3.8 mg/l; theoretical average $NBOD_{50}$ = 2.4 to 2.5 mg/l; n = 146; Table 24). The higher value of measurable $NBOD_{50}$ may be due to 1) an internal recycling of nitrogen oxidation and reduction (Keshavan et al 1965) in the total BOD_{50} which would not be measured in the pre and post chemistry analysis of the nitrogen forms, or 2) an inhibition of carbon oxidation which is linked to nitrogen forms in the carbonaceous BOD. The first explanation is more plausible in accounting for the difference between the observed and measurable $NBOD_{50}$.

Temperature Affects on Long Term BOD

Because the standard BOD test is run at 20° C (APHA 1971), the results obtained from the tests for the colder months are not representative of the oxygen consumption due to BOD. It is during the winter months that the oxygen sinks, particularly BOD, determine the very life of a water system. Therefore, it is important to have an accurate description of the long term BOD at low temperatures.

Table 24. Comparison of Observed and Theoretical Nitrogenous BOD in the Big Eau Pleine River and Reservoir.

Parameter	Reservoir Total BOD_{50}	Reservoir Filt. BOD_{50}	River Total BOD_{50}	River Filt. BOD_{50}	Combined
N	66.	57.	13.	10.	146.
NBOD	4.0±2.4	3.6±2.0	4.3±3.0	3.1±2.4	3.8±2.3
dif NN x 4.6	2.8±3.4	1.9±2.6	3.5±5.4	2.5±4.0	2.5±3.4
dif KN x 4.6	3.3±4.1	1.0±4.8	4.5±5.7	1.3±3.7	2.4±4.7
Total Pre N	2.15±1.00	1.55±0.82	2.65±1.63	1.83±1.37	1.94±1.08
Total Post N	2.02±1.12	1.72±1.06	2.46±1.79	2.07±1.54	1.94±1.08
dif Total N	0.13±0.77	-0.16±0.85	0.19±0.73	-0.23±0.46	-0.00±0.79
NBOD-(dif NN x 4.6)	-1.19±3.61	-1.76±3.40	-0.86±3.26	-0.59±2.76	-1.34±3.44
NBOD-(dif KN x 4.6)	-0.68±4.29	-2.61±5.14	-0.11±3.89	-1.77±2.34	-1.49±4.59
Corr of NBOD to NN x 4.6	0.269	-0.085	0.838*	0.732*	0.320+
Corr of NBOD to KN x 4.6	0.221	0.052	0.757*	0.778*	0.280

All values are in mg/l except the correlation coefficients.

N.....number of observed observations

NBOD.....observed $NBOD_{50}$ (the difference between the total BOD_{50} and the carbonaceous BOD_{50}.

dif NN x 4.6.....the difference between the pre and post NO_2+NO_3-N analysis times the factor of 4.6. This equals the theoretical NBOD.

dif KN x 4.6.....the difference between the pre and post Kjeldahl N analysis times the factor of 4.6. This equals the theoretical NBOD.

Total Pre N.....sum of the NO_2+NO_3-N and Kjeldahl N before incubation.

Total Post N.....sum of the NO_2+NO_3-N and Kjeldahl N after incubation was terminated.

dif Total N.....difference between the pre and post total N.

NBOD - (dif NN x 4.6).....difference in the observed and theoretical NBOD based upon an increase in the NO_2+NO_3-N concentration.

NBOD - (dif KN x 4.6).....difference in the observed and theoretical NBOD based upon a decrease in the Kjeldahl N concentration.

Corr of NBOD to NN x 4.6.....correlation coefficient between the observed and the theoretical NBOD based upon NO_2+NO_3-N.

Corr of NBOD to KN x 4.6.....correlation coefficient between the observed and the theoretical NBOD based upon Kjeldahl N.

\+ Significant at 0.05 level.

* Significant at 0.01 level.

Historically, Streeter and Phelps (1922) were the first to present an empirical relationship between incubation temperature and the BOD rate constant (k) as follows:

$$k_1/k_2 = \theta^{(T_1-T_2)} \qquad \text{Equation 9}$$

where (k_1) and (k_2) are the velocity constants at temperature T_1 and T_2 in degrees Celcius respectively (k_2 is usually presented as the decay rate at T_2 or 20° C), and theta (θ) is a constant for a specific temperature range referred to as the "temperature coefficient". According to the above equation, an increase in theta (θ) results in a decrease of the decay rate. That is, within limits, as the water temperature increases so does biochemical activity. At lower temperatures the deoxygenation rate is generally reduced to where it practically ceases (Zanoni 1967). Equation 9 is also referred to as the Arrehnious relationship (Therialt 1927 and Zanoni 1967).

Based on experimental results from both waste water and river water, Streeter and Phelps (1927) found the average value of theta to be 1.047 for the temperature range 10° to 27.5° C. Some studies have been made at lower temperatures on river water and waste water (Schroepfer et al 1964 and Zanoni 1964), but few studies have been conducted on lake waters.

BOD samples were incubated at 20° C and 4° for water samples collected during cold months (October - April). This afforded a comparison of the BOD kinetics at 4° C and that of the more common 20° C BOD. The comparison showed that the

theta values for the combined and the individual water types in this study are all higher than the commonly used 1.047 factor (Table 25). There is a decrease in the best-fit theta value using the combined data (n = 74) when the period of incubation is reduced (that is, from BOD_{50} to BOD_5; Table 26). This occurrence may be related to at least three factors. First, the rate of decay of the easily oxidizable organic matter is now slowed down as much at low temperatures as expected, resulting in a greater development of the expected BOD. This indicates that the first rate constant (k_1) need not be reduced as much as the slower and very slow rate constants (k_2 and k_3; from equation 5) retain their normal reduction. Second, the BOD at 20° C is lower than it should be due to the time required to shift the bacteria populations from phychrophiles (cold water) to mesophychrophiles or mesophiles (warm water). Third, the decay process, represented by the decay rate(s) or decay stage(s) are really a complex of more stages indistinguishable at the higher temperatures, but become apparent as the decay rate(s) are reduced to lower temperatures (Moore 1941).

Studies by Schroepfer et al (1964) and Zanoni (1964) present theta values similar to those determined for the Big Eau Pleine Reservoir and River sites (theta = about 1.133 and 1.100 respectively). In both the above studies, the sample water was waste water effluent. Gotaas (1948) working with the temperature range of 5° - 15° C with waste water,

Table 25. BOD_{50} Temperature Coefficients at 4° C for Various Water Types in the Big Eau Pleine Reservoir.

Water Type	N	theta	Factor times decay value (k) at 20° C	r*	Alpha or level of significance
Reservoir	35	1.120	0.16312	.967	0.7402
River section of reservoir	20	1.140	0.12289	.965	0.6789
Various watershed tributaries	19	1.1247	0.15255	.949	0.9537
Point Sources	6	1.067	0.35429	.999	0.9652
Combined (excluding point sources)	74	1.073	0.32389	.943	0.8418

* correlation coefficient of observed BOD to predicted BOD at 4° C.

Table 26. Temperature Coefficients at 4° C for 5, 20 and 50 Day BOD in the Big Eau Pleine Reservoir and River.

BOD - Time	N	theta	Factor times decay value (k) at 20° C	r*	Alpha or level of significance
BOD_5	74	1.060	0.39364	.939	0.6527
BOD_{20}	74	1.065	0.36509	.950	0.9023
BOD_{50}	74	1.073	0.32389	.943	0.8418

* correlation coefficient of observed BOD to predicted BOD at 4° C.

estimated a correct theta value to be 1.109. Moore (1941) in his long term study of low temperature BOD kinetics of waste water estimated a theta value of about 1.06 which is very similar to that of this study for point source pollution (Table 25).

Oxygen Consumption from Rubber Stoppers Used in the BOD Test

Oxygen consumption resulting from the rubber stoppers was estimated at 0.08 mg/l/day. This value was used to adjust all long term BOD results. The values of 0.5, 1.9 and 4.0 mg of oxygen were subtracted from the 5, 20 and 50 day original BOD values. This represents a 0.1 mg/day over 5 days; 0.095 mg/day over 20 days and 0.08 mg/day over 50 days. When plotted against time these values represent a decreasing (log) curve. This decreasing oxygen demand with respect to time may be rationalized when considering the similar kinetics of organic matter decomposition in the BOD test.

It is felt that 0.08 mg/2.5 liters/day BOD over 50 days is a good estimate of the oxygen demand by the rubber stoppers. When various BOD blanks were run, they seldom averaged more than 3 - 4 mg/l/50 days. Furthermore, a comparison of 200 matched samples using the 5-day rubber stopper BOD values, corrected by the above factor, and the standard 300 ml glass stoppered BOD values showed little difference between the two methods (T = 0.0370). The average for the rubber stoppered BOD_5 was 3.14 $\pm$ 3.19 mg/l, while that for the glass stoppered BOD_5 was 3.13 $\pm$ 2.94 mg/l.

The average rate constant for the four samples, which measured the rubber stopper BOD, was approximately 0.267 mg of oxygen/day/2.5 liters/stopper. The above calculation assumes a straight line passing through the zero intercept. Approximately 30% of the number 4 stopper, used to seal each BOD bottle, was directly exposed to BOD sample water. Therefore, approximately 0.08 mg/l/day of BOD was subtracted from the long term BOD results (0.267 mg x 0.30 = 0.08 mg).

SUMMARY

Measurements of oxygen consumption due to algal biomass decomposition were determined during the summer months. One mg of biomass (AFDW) consumed approximately 0.21 mg/l DO in 5 days; 0.46 mg/l DO were consumed in 20 days; and 0.59 mg/l DO were consumed in 50 days. Approximately one-half of the summer surface BOD is directly related to this biomass.

Based upon the particulate fractions within the BOD samples, the summer surface BOD is primarily composed of algal biomass and the bottom depth BOD is primarily composed of decomposing biomass and DOM. The winter waters are generally low in BOD, yet high in small sized organic matter and DOM. Spring and fall in-reservoir BOD are primarily composed of detrital matter.

The filtrable BOD_{50} averaged 84% on a yearly basis. It varied seasonally: summer, 72%; winter, 92%; spring, 94%; and fall, 80%.

About 31% of the yearly total BOD is nitrogenous BOD. It varies seasonally as follows: summer, 31%; winter, 36%; spring, 20%; and fall, 30%. On the average, about 90% of the nitrogenous BOD_{50} from the inflow and reservoir waters are filtrable.

Yearly filtrable BOD_{50} from the inflowing river waters averaged 87%. Seasonally it varied as follows: summer, 77%; winter, 82%; spring and fall, 97%.

A three fold increase in inflowing BOD occurs in the spring due to agricultural originated runoff. Of the three land managements surveyed, winter manuring of fields contributed the greatest BOD and nutrient loading in the spring. However, the non-manured tilled soils and pastured areas were found to be a large non-point source of pollution.

Strong relationships were found between the winter reservoir stage and drop in DO. The winter inflowing BOD and the late fall in-reservoir BOD are sufficient to produce the observed low DO in the winter reservoir.

The reservoir was segmented into various water quality to establish modeling coefficients describing long term BOD. Based upon these coefficients, the various types of BOD may be described for the four seasons.

CONCLUSIONS

1. Long term BOD (as 50 days) provides an accurate description of the organic matter degradation, although it also generally requires a more sophisticated first order equation to describe it. The long term BOD can be readily separated into its carbonaceous, nitrogenous and filtrable fractions.

2. The BOD in the Big Eau Pleine Reservoir is primarily autochthonous. BOD was greatest in the summer, the majority of which is caused by primary production and its subsequent degradation. Summer BOD at depth was found to increase after an algal bloom, which indicates algal biomass is a large BOD source. This is supported by the high correlations between both BOD and organic nitrogen, and the nitrogenous BOD and biomass.

3. Only the spring inflowing waters were high in BOD and nutrients. This input originates from agricultural surface runoff; the highest pollution source was runoff from winter manured fields. A concentrated effort should be made to reduce the runoff originating from manured fields. Either stacking or storing the manure in a holding system during the winter and early spring would be beneficial. Other tilled and pastured soils also contributed poor water quality to the reservoir. Developing more buffer strips next to all streams and rivers would less the erosion and nutrient loading. A reduction in this nutrient load would eventually minimize the primary production in the reservoir.

4. A reduction in BOD may be accomplished by: a) a decrease in inflowing nutrients and hence a decrease in primary production, and b) delaying and reducing the winter reservoir drawdown which would decrease the resuspension of sediments and the exposure of unoxidized substrate.

5. Based upon three years of BOD_5 and one year of long term BOD data, the effect of the Stratford treatment plant during winter low flow conditions on the quality of the Big Eau Pleine River appears minimal. No significant increase is found using the long term BOD.

6. The majority of the inflowing and reservoir BOD are filtrable (87% and 84% respectively). Nitrogenous BOD comprises approximately 31% of the total BOD in the reservoir and inflowing waters. On the average, over 90% of this nitrogenous BOD is filtrable.

7. Increased in-reservoir BOD in 1976 relative to 1975 was related to the rapid spring melt and the increase in primary production.

8. Generally the reservoir and river BOD decay rates are low (0.05), suggesting complex organics with slow rates of decomposition. Only in the spring inflow waters does the deoxygenation rate exceed 0.1. This was found to be characteristic of agricultural runoff.

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APPENDIX A. Decay Rate (k), "Ultimate BOD" (L) Values and 5-20-50 Day BOD from the Big Eau Pleine Watershed.

			TOTAL BOD*									CARBONACEOUS BOD								
SITE	DATE	TYPE	BOD5	BOD20	BOD50	K1	K2	K3	L1*	L2	L3*	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP 12T	7/16/75	T 20	1.0	3.0	6.5	0.035	0.038	0.005	1.92	2.39	9.92	0.5	1.7	3.6	0.028	0.028	0.004	1.42	1.09	7.98
	7/16/75	FS20	0.4	2.6	5.2	0.039	0.041	0.007	1.54	1.84	6.89	0.4	1.5	3.1	0.064	0.041	0.009	1.00	0.97	3.58
	8/ 6/75	T 20	1.1	3.6	7.8	0.037	0.040	0.006	2.29	2.74	12.07	0.9	2.6	5.2	0.047	0.053	0.010	2.07	1.25	6.36
	8/ 6/75	FS20	0.7	2.5	5.2	0.036	0.036	0.005	1.78	1.83	7.91	0.6	2.2	4.7	0.042	0.042	0.008	1.48	1.53	6.44
	8/12/75	T 20	1.1	4.2																
	8/12/75	T 20	1.1	4.1																
	8/25/75	T 20	1.2	2.7	4.7	0.075	0.061	0.019	1.64	1.14	2.77	1.2	2.5	4.4	0.068	0.059	0.013	1.56	1.21	3.03
	8/25/75	FS20	0.7	1.9	3.6	0.055	0.045	0.006	1.04	1.44	4.67	0.4	1.2	1.8	0.054	0.044	0.006	0.75	0.77	2.00
	9/24/75	T 20	1.1	2.5	4.3	0.104	0.041	0.006	1.20	1.81	5.68	0.4	1.2	2.6	0.030	0.031	0.005	1.05	0.83	3.94
	9/24/75	FS20	0.8	2.1	3.6	0.072	0.043	0.015	1.25	0.89	2.50	0.5	1.2	2.0	0.061	0.050	0.009	0.80	0.67	1.84
	10/21/75	T 4	0.3	0.9	1.7	0.049	0.041	0.005	0.64	0.65	2.02									
	10/21/75	FS 4	0.4	1.0	1.6	0.049	0.040	0.007	0.65	0.65	2.43									
	10/21/75	T 20	1.2	2.4	4.5	0.067	0.058	0.012	1.61	1.26	3.16	0.5	1.3	2.1	0.079	0.077	0.023	0.70	0.53	1.17
	10/21/75	FS20	0.9	2.3	4.7	0.054	0.052	0.009	1.67	1.34	4.23	0.5	1.6	2.5	0.077	0.070	0.018	0.85	0.61	1.45
	11/ 5/75	T 20	1.1	3.1																
	11/15/75	T 20	1.5	5.1	9.4	0.045	0.042	0.007	3.17	3.42	12.24	1.1	3.7	7.4	0.036	0.036	0.006	2.55	2.63	9.96
	11/18/75	FS20	1.4	4.4	8.4	0.043	0.042	0.006	2.51	3.21	10.95	1.5	4.4	7.8	0.050	0.045	0.006	2.34	3.16	9.98
	11/18/75	T 4	0.7	1.8	2.7	0.059	0.049	0.009	1.21	0.94	1.95	0.3	1.2	2.4	0.039	0.041	0.006	0.71	0.91	3.23
	12/16/75	T 20	5.3	13.4	24.7	0.034	0.044	0.007	6.85	9.35	31.50	5.4	11.4	18.4	0.133	0.040	0.005	5.39	8.31	21.51
	12/16/75	FS20	4.8	12.0	17.5	0.130	0.054	0.008	5.21	6.83	15.80	5.1	9.9	14.5	0.254	0.049	0.006	4.15	5.75	18.98
	12/16/75	T 4	2.0	5.3	8.3	0.092	0.050	0.005	2.77	3.58	11.24									
	1/ 6/76	T 20	1.0	3.6	7.9	0.036	0.042	0.007	2.64	3.06	10.14	0.4	0.8	1.4	0.049	0.046	0.006	0.47	0.48	1.75
	1/ 6/76	FS20	1.2	4.0	7.9	0.047	0.042	0.006	2.82	2.84	9.59	0.5	1.0	1.8	0.071	0.041	0.032	0.60	0.49	1.08
	1/ 6/76	T 4	0.3	0.5	0.8	0.163	0.065	0.013	0.23	0.21	0.63									
	2/ 3/76	T 20	1.0	3.2	5.5	0.051	0.051	0.009	2.25	1.94	5.11	0.8	2.7	4.6	0.034	0.033	0.005	1.71	1.60	8.39
	2/ 3/76	FS20	0.6	2.4	4.2	0.052	0.044	0.006	1.53	1.45	4.60	0.4	1.3	2.0	0.082	0.080	0.023	0.69	0.52	1.09
	2/ 3/76	T 4	0.4	1.3	2.8	0.034	0.034	0.008	0.65	0.93	4.40									
	2/18/76	T 20	13.2	27.0	35.7	0.302	0.080	0.006	10.89	13.65	48.75	10.9	19.4	28.4	0.264	0.065	0.006	9.22	10.53	37.65
	2/18/76	FS20	13.9	27.1	34.6	0.378	0.075	0.005	10.11	15.53	41.55	10.8	18.4	27.4	0.224	0.070	0.005	7.92	10.80	34.82
	2/18/76	T 4	3.8	11.0	19.3	0.049	0.045	0.006	5.57	7.88	24.58									
	2/24/76	T 20	9.8	24.3	34.3	0.129	0.062	0.006	9.87	14.47	46.72	5.9	16.0	25.3	0.062	0.052	0.010	9.61	8.12	21.94
	2/24/76	FS20	8.9	24.1	34.1	0.095	0.067	0.012	11.82	10.35	27.10	5.7	16.5	24.8	0.070	0.056	0.012	7.02	9.37	22.47
	2/24/76	T 4	2.7	8.1	13.5	0.050	0.055	0.010	3.85	4.73	14.42									
	2/26/76	T 20	5.9	16.9	26.4	0.085	0.046	0.007	7.55	11.18	29.29	3.9	14.0	22.5	0.043	0.044	0.006	7.98	8.98	29.83
	2/26/76	T 20	5.8	18.7																
	3/ 2/76	T 20	7.2	23.6	37.1	0.045	0.045	0.006	19.76	13.37	34.38	4.5	14.2	27.7	0.045	0.049	0.007	8.54	10.13	30.15
	3/ 2/76	T 20	8.5	23.4	37.1	0.075	0.046	0.008	12.24	14.05	42.07	4.5	14.2	27.7	0.045	0.049	0.007	8.54	10.13	30.15
	3/ 2/76	FS20	6.3	19.3	33.0	0.046	0.042	0.006	14.05	12.42	36.45	4.3	14.3	25.5	0.043	0.046	0.007	7.31	9.82	33.40
	3/ 2/76	T 4	1.4	4.9	9.9	0.040	0.043	0.006	3.12	3.52	13.70									
	3/24/76	T 20	7.4	15.9	23.2	0.172	0.049	0.006	6.99	10.26	23.41	6.1	12.6	19.5	0.175	0.072	0.008	5.30	7.35	20.28

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP 6T	3/24/76	FS20	7.2	15.5	23.4	0.156	0.056	0.007	6.86	9.53	21.47	6.4	12.0	18.0	0.175	0.072	0.008	5.31	7.15	16.93
	3/24/76	T 4	1.9	5.9	10.5	0.044	0.043	0.006	3.96	3.98	12.83									
	5/11/76	T 20	2.2	6.4																
	1/ 7/77	T 20	1.6	3.2	3.9	0.105	0.097	0.098	1.25	1.48	1.43									
	1/ 7/77	FM20	0.7	1.4	2.4	0.064	0.094	0.110	0.61	0.76	2.00									
EP 6T	1/ 9/75	T 20	2.0	5.9	11.2	0.041	0.040	0.006	3.76	4.02	15.38									
	1/ 9/75	FS20	1.5	4.9	9.0	0.030	0.045	0.008	2.52	3.41	12.68									
	1/ 9/75	T 4	0.7	2.5	5.3	0.045	0.044	0.008	1.70	1.67	6.73									
	1/ 9/75	FS 4	0.7	2.4	4.5	0.047	0.043	0.006	1.59	1.64	5.79									
	4/15/75	T 20	2.9	8.9	14.3	0.046	0.043	0.006	5.79	4.90	16.91	1.4	5.1	10.2	0.050	0.042	0.006	3.76	3.79	12.45
	4/15/75	FS20	1.9	7.3	12.3	0.033	0.056	0.019	3.47	2.73	11.28	1.1	4.3	8.7	0.019	0.042	0.007	2.52	3.65	10.95
	4/15/75	T 4	1.0	3.2	5.7	0.044	0.045	0.006	1.66	2.26	7.39									
	4/15/75	FS 4	0.9	2.8	5.2	0.044	0.043	0.006	1.76	1.97	5.92									
	7/30/75	T 20	6.5	14.1																
	8/12/75	T 20	5.9	16.4																
	8/12/75	T 20	5.5	15.9																
	11/ 5/75	T 20	1.6	4.3																
	1/ 7/76	T 20	1.3	3.2	4.4	0.144	0.047	0.014	1.39	1.58	3.87	0.7	1.9	2.8	0.064	0.054	0.011	0.95	0.97	2.40
	1/ 7/76	FS20	0.6	2.1	3.3	0.031	0.044	0.021	1.08	0.96	3.09	0.3	0.9	1.1	0.064	0.059	0.055	0.30	0.18	0.70
	1/ 7/76	T 4	0.3	0.7	1.1	0.219	0.040	0.044	0.29	0.30	0.49									
	2/ 3/76	T 20	1.2	3.9	6.5	0.050	0.042	0.006	2.47	2.49	7.98	0.6	1.7	3.3	0.043	0.042	0.006	0.97	1.19	4.35
	2/ 3/76	FS20	1.1	3.5	6.2	0.050	0.042	0.006	2.51	2.53	7.67	0.4	1.5	2.8	0.035	0.038	0.005	0.99	0.88	4.32
	2/ 3/76	T 4	0.3	1.0	2.2	0.050	0.040	0.006	0.81	0.82	2.46									
	3/ 2/76	T 20	5.2	17.9	28.1	0.047	0.042	0.006	10.51	10.10	35.27	4.5	12.1	22.7	0.043	0.044	0.007	6.54	8.99	29.49
	3/ 2/76	T 20	5.2	14.7	25.9	0.049	0.043	0.006	7.70	9.75	30.61	4.5	12.1	22.7	0.043	0.044	0.007	6.54	8.99	29.49
	3/ 2/76	FS20	5.9	16.8	27.6	0.077	0.043	0.006	8.01	11.54	36.34	3.5	11.2	21.8	0.045	0.041	0.007	6.83	8.04	28.58
	3/ 2/76	T 4	1.5	4.9	8.9	0.043	0.044	0.006	2.94	3.37	12.14									
	4/12/76	T 20	1.3	3.9	7.6	0.041	0.043	0.006	2.58	2.85	9.91	1.1	3.7	7.0	0.043	0.041	0.005	2.45	2.51	9.82
	4/12/76	FS20	1.1	4.0	8.0	0.022	0.041	0.006	2.40	3.37	11.40	0.8	3.1	6.6	0.051	0.040	0.006	2.44	1.85	8.86
	5/11/76	T 20	2.6	6.7																
	1/ 7/77	T 20	4.1	10.9	18.5	0.059	0.058	0.027	4.59	3.25	14.76									
	1/ 7/77	FM20	1.8	5.4	8.7	0.059	0.052	0.010	3.32	2.79	7.28									
EP 9T	1/29/75	T 20	2.2	6.8	8.4	0.111	0.093	0.041	2.38	1.88	4.98									
	1/29/75	FS20	2.2	6.8	8.4	0.092	0.046	0.032	2.75	2.32	4.62									
	1/29/75	T 4	0.8	2.3	3.4	0.055	0.046	0.006	1.65	1.15	2.99									
	1/29/75	FS 4	0.7	1.9	3.1	0.063	0.055	0.011	1.19	1.01	2.55									
EP1CT	10/10/74	T 20	2.9	7.8	11.4	0.118	0.044	0.007	3.34	4.98	11.85									
	10/10/74	FS20	2.3	6.5	10.4	0.047	0.042	0.006	4.33	4.21	12.79									
	10/25/74	T 20	1.5	3.5	5.6	0.070	0.061	0.012	2.08	1.53	3.75									
	11/21/74	T 20	2.0	5.1	9.1	0.048	0.044	0.006	2.62	3.59	11.58									

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = CAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP1CT	11/21/74	FS20	1.7	4.7	8.5	0.049	0.041	0.005	2.64	3.43	10.62									
	11/21/74	T 4	0.9	2.8	4.7	0.043	0.049	0.007	1.88	1.55	5.46									
	11/21/74	FS 4	1.0	2.9	4.9	0.062	0.052	0.009	1.74	1.57	4.16									
	12/19/74	T 20	1.0	3.6	6.5	0.045	0.044	0.006	2.20	2.58	8.25									
	12/19/74	FS20	1.2	3.7	6.1	0.063	0.047	0.007	1.77	2.41	7.40									
	12/19/74	T 4	0.7	2.8	4.9	0.045	0.043	0.006	1.85	1.81	6.00									
	12/19/74	FS 4	0.7	2.5	4.5	0.044	0.045	0.007	1.26	1.74	5.59									
	1/ 9/75	T 20	1.1	3.6	6.0	0.041	0.046	0.006	1.95	2.63	8.97									
	1/ 9/75	FS20	1.2	4.3	8.7	0.040	0.043	0.006	3.43	2.46	9.39									
	1/ 9/75	T 4	1.2	2.9	5.4	0.011	0.050	0.009	1.52	2.29	7.40									
	1/ 9/75	FS 4	0.5	1.6	3.5	0.042	0.042	0.006	0.99	1.25	4.52									
	1/29/75	T 20	3.4	7.9	9.9	0.117	0.109	0.049	3.27	3.07	3.50									
	1/29/75	FS20	2.6	6.8	8.9	0.095	0.083	0.036	3.49	2.09	4.16									
	1/29/75	T 4	1.2	3.2	4.9	0.135	0.042	0.015	1.43	1.55	3.40									
	1/29/75	FS 4	0.9	2.3	3.9	0.061	0.050	0.009	1.59	1.22	3.23									
	4/ 4/75	T 20	3.1	9.0	16.0	0.050	0.041	0.006	4.04	6.30	19.08	1.8	6.8	14.8	0.029	0.035	0.008	4.27	5.68	20.98
	4/ 4/75	FS20	3.9	11.1	19.7	0.052	0.044	0.006	7.55	7.17	20.69									
	4/ 4/75	T 4	1.2	3.7	7.3	0.044	0.043	0.006	2.16	2.74	9.51									
	4/ 4/75	FS 4	1.3	4.1	7.4	0.044	0.042	0.006	2.21	2.98	10.74									
	11/ 5/75	T 20	1.6	4.6																
	11/13/75	T 20	1.1	3.7	6.4	0.050	0.042	0.006	2.50	2.48	7.43	1.0	3.1	5.1	0.059	0.049	0.008	1.93	1.67	4.52
	11/13/75	FS20	1.0	3.5	6.2	0.046	0.043	0.006	2.37	2.22	7.23	0.8	2.8	4.8	0.054	0.046	0.007	1.75	1.58	4.79
	11/13/75	T 4	0.3	1.0	2.0	0.050	0.042	0.006	0.76	0.77	2.32	0.3	1.1	2.2	0.050	0.042	0.006	0.84	0.85	2.59
	1/ 7/76	T 20	2.6	6.6	11.7	0.050	0.042	0.006	4.04	4.65	13.85	1.6	5.0	7.1	0.076	0.073	0.027	2.00	1.81	4.85
	1/ 7/76	FS20	1.7	5.9	10.1	0.053	0.045	0.007	3.49	3.51	10.35	1.2	4.2	6.2	0.062	0.067	0.025	1.77	1.50	4.30
	1/ 7/76	T 4	0.6	2.1	4.5	0.037	0.038	0.006	1.49	1.45	6.85									
	2/ 3/76	T 20	2.5	6.5	13.6	0.059	0.048	0.008	5.31	4.26	13.01	2.0	7.6	11.0	0.072	0.041	0.005	4.21	4.00	12.93
	2/ 3/76	FS20	2.5	7.9	11.5	0.062	0.053	0.010	4.45	3.45	10.47	1.3	4.0	7.5	0.044	0.046	0.007	2.09	2.70	9.41
	2/ 3/76	T 4	0.6	1.7	3.6	0.025	0.038	0.006	1.02	1.38	6.00									
	2/26/76	T 20	4.4	17.7																
	3/ 2/76	T 20	5.5	16.4	27.6	0.050	0.042	0.006	10.98	10.76	31.72	3.5	12.0	21.7	0.045	0.044	0.006	7.08	8.40	28.66
	3/ 2/76	FS20	4.7	16.1	28.0	0.043	0.044	0.007	8.02	11.21	35.06									
	3/ 2/76	T 4	1.4	4.8	8.1	0.044	0.044	0.006	2.72	3.03	10.36									
	3/24/76	T 20	4.9	10.9	17.3	0.127	0.054	0.007	5.85	5.04	21.56									
	3/24/76	FS20	4.5	10.1	15.8	0.141	0.045	0.005	4.49	6.45	20.36									
	3/24/76	T 4	1.0	3.5	6.5	0.044	0.043	0.006	2.43	2.42	7.96									
	4/12/76	T 20	1.5	3.8	7.1	0.049	0.043	0.007	2.10	2.67	8.49	0.9	2.8	5.6	0.041	0.040	0.006	1.63	2.15	8.15
	4/12/76	T 20	1.3	3.9	7.6	0.041	0.040	0.006	2.59	2.99	10.50	0.9	2.8	5.6	0.041	0.040	0.006	1.63	2.15	8.15
	4/12/76	FS20	1.1	3.4	6.2	0.024	0.048	0.009	1.80	2.50	7.98									
	5/11/76	T 20	2.4	6.6																

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP11T	4/12/76	T 20	1.0	3.4	7.0	0.046	0.043	0.007	2.34	2.35	8.95	0.9	2.7	5.6	0.055	0.048	0.009	1.88	1.85	4.87
	4/12/76	FS20	1.2	3.4	6.8	0.051	0.043	0.006	2.60	2.52	7.36	0.8	2.5	5.0	0.038	0.040	0.006	1.53	1.87	6.83
	5/11/76	T 20	2.6	5.8																
EP12T	8/ 6/75	T 20	5.0	15.1	27.4	0.047	0.046	0.007	7.98	10.67	34.42	4.0	11.9	20.5	0.050	0.042	0.006	7.99	8.06	24.03
	8/ 6/75	FS20	2.5	8.6	16.6	0.041	0.045	0.006	5.74	5.37	22.15	1.5	5.4	11.5	0.038	0.037	0.006	3.80	3.85	16.74
	8/11/75	T 20	7.1	18.8																
	9/ 3/75	T 20	7.0	15.6	22.5	0.127	0.080	0.014	6.47	7.73	15.96	5.0	10.5	16.9	0.224	0.045	0.006	4.78	6.57	22.21
	9/ 3/75	FS20	1.5	4.7	8.6	0.031	0.046	0.008	2.46	3.53	11.06	0.9	2.9	5.5	0.017	0.045	0.008	1.58	2.36	6.90
	9/23/75	T 20	2.4	7.6	13.1	0.035	0.052	0.009	3.74	4.95	15.35	2.0	5.7	10.3	0.044	0.042	0.006	3.56	3.97	13.69
	9/23/75	FS20	2.2	6.7	11.6	0.049	0.043	0.006	4.44	4.41	13.40	1.5	5.1	9.7	0.038	0.038	0.006	3.87	3.80	14.00
	10/21/75	T 4	0.5	1.9	3.5	0.044	0.042	0.006	1.61	1.34	4.40									
	10/21/75	FS 4	0.5	1.6	3.5	0.040	0.041	0.006	1.14	1.23	4.46									
	10/21/75	T 20	2.3	6.3	10.4	0.056	0.046	0.007	4.12	3.85	10.05	1.3	4.2	8.5	0.040	0.039	0.008	2.48	2.47	12.98
	10/21/75	FS20	1.7	5.4	9.5	0.036	0.043	0.008	2.69	3.86	11.85	1.3	4.3	8.6	0.040	0.041	0.006	2.47	3.27	11.86
	11/ 5/75	T 20	2.2	6.2																
	11/18/75	T 20	3.6	9.6	14.2	0.126	0.050	0.006	4.07	5.86	13.46	2.5	7.5	11.7	0.064	0.048	0.008	3.88	4.48	12.46
	11/18/75	FS20	2.9	9.1	13.4	0.051	0.043	0.006	5.60	5.46	16.02	2.9	8.2	11.6	0.078	0.068	0.019	3.81	3.47	7.90
	11/18/75	T 4	1.1	2.6	5.1	0.046	0.044	0.006	1.95	1.88	6.27	1.1	2.8	5.3	0.046	0.044	0.006	1.95	1.88	6.86
	3/ 4/76	T 20	4.1	14.5	27.0	0.021	0.044	0.008	7.70	11.89	31.48	3.0	10.3	20.9	0.035	0.042	0.006	6.10	7.51	33.00
	4/13/76	T 20	2.2	6.0	9.5	0.077	0.042	0.006	3.76	3.64	9.56	1.2	3.9	7.5	0.053	0.045	0.007	2.88	2.66	7.57
	4/13/76	FS20	1.6	5.2	9.0	0.051	0.043	0.006	3.48	3.40	9.98	1.0	3.4	6.7	0.050	0.042	0.006	2.52	2.47	7.84
	4/27/76	T 20	2.4	6.0																
	5/10/76	T 20	2.9	6.7																
EP12B	8/ 6/75	T 20	3.5	13.1	24.8	0.044	0.044	0.006	9.03	10.65	34.05	4.0	11.9	23.6	0.034	0.044	0.006	6.85	9.35	31.00
	8/ 6/75	FS20	3.5	10.6	20.9	0.043	0.045	0.006	6.09	7.06	27.45	1.8	5.3	9.9	0.046	0.043	0.006	4.09	3.06	11.66
	8/11/75	T 20	2.2	6.3																
	5/10/76	T 20	3.0	6.3																
EP13T	10/ 7/74	T 20	3.3	12.8	20.2	0.051	0.047	0.007	5.76	8.25	24.61									
	10/25/74	T 20	5.2	13.6	22.9	0.056	0.057	0.020	7.20	5.25	14.45									
	6/18/75	T 20	3.0	6.9	10.6	0.155	0.044	0.006	3.02	4.22	13.56	2.1	4.5	7.9	0.065	0.050	0.008	2.96	2.52	6.69
	6/18/75	FS20	1.5	3.6	7.5	0.040	0.042	0.007	2.10	2.50	11.23	1.1	3.3	6.7	0.042	0.039	0.005	2.04	2.62	9.36
	7/28/75	T 20	15.9	39.2																
	11/ 5/75	T 20	2.4	6.4																
	12/ 2/75	T 20	2.3	6.1	9.7	0.068	0.041	0.014	3.18	2.95	7.60	1.5	4.7	8.3	0.072	0.071	0.029	1.69	1.21	6.84
	12/ 2/75	FS20	1.9	5.7	8.9	0.070	0.041	0.005	3.45	3.52	10.11	1.4	4.1	7.3	0.050	0.042	0.006	2.72	2.74	8.51
	12/ 2/75	T 4	0.4	1.5	2.4	0.025	0.041	0.006	0.96	1.11	3.82									
	12/18/75	T 20	3.6	7.8																
	1/ 6/76	T 20	1.8	5.1	10.0	0.023	0.044	0.007	2.98	5.00	12.34	1.5	4.4	6.4	0.060	0.051	0.010	2.62	2.11	5.50
	1/ 6/76	FS20	2.1	5.5	10.1	0.044	0.043	0.006	3.50	3.83	12.12	1.3	3.9	6.0	0.054	0.052	0.009	1.69	2.33	7.40
	1/ 6/76	T 4	0.7	2.4	4.4	0.050	0.042	0.006	1.69	1.70	5.11									

SITE: LOCATION OF SAMPLES AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
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APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP13T	2/ 6/76	T 20	1.4	4.1	6.6	0.056	0.049	0.008	2.60	2.27	6.15	0.5	1.9	3.4	0.061	0.049	0.008	1.22	1.04	3.51
	2/ 6/76	FS20	1.7	4.3	7.2	0.052	0.042	0.006	2.30	2.68	7.35	1.0	2.7	4.6	0.050	0.042	0.006	1.78	1.76	5.15
	2/ 6/76	T 4	0.4	1.3	2.5	0.050	0.042	0.006	0.99	0.99	2.98									
	2/17/76	T 20	1.3	4.3	7.2	0.040	0.056	0.016	2.02	1.86	5.85	0.6	2.2	3.8	0.042	0.045	0.006	1.27	1.32	4.96
	2/17/76	T 4	0.6	2.1	3.5	0.043	0.055	0.022	0.92	0.68	2.71									
	2/26/76	T 20	7.1	19.5																
	5/10/76	T 20	3.5	5.1																
	1/ 7/77	T 20	7.0	20.2	26.4	0.073	0.061	0.043	8.88	5.32	13.97									
	1/ 7/77	FM20	2.3	8.4	12.1	0.065	0.058	0.028	4.05	2.77	7.13									
EP13M	12/18/75	T 20	1.5	4.0																
	5/10/76	T 20	1.5	4.3																
EP13B	12/18/75	T 20	1.4	5.1																
	2/26/76	T 20	7.2	19.5																
	5/10/76	T 20	1.9	4.8																
EP14T	12/18/75	T 20	7.6	12.6																
	5/10/76	T 20	2.2	6.0																
	1/ 7/77	T 20	4.0	10.5	12.9	0.079	0.048	0.058	4.38	3.18	5.48									
	1/ 7/77	FM20	2.8	7.6	10.1	0.084	0.070	0.035	3.46	2.42	5.05									
EP14M	5/10/76	T 20	2.3	6.0																
EP14B	5/10/76	T 20	2.0	6.1																
EP16T	10/ 7/74	T 20	3.4	11.3	19.2	0.050	0.044	0.006	6.42	7.77	22.36									
	10/25/74	T 20	4.5	11.7	18.5	0.065	0.064	0.031	6.16	3.52	12.00									
	7/28/75	T 20	6.4	16.8																
	8/ 6/75	T 20	8.0	19.4	29.5	0.074	0.044	0.006	10.64	11.75	38.68	6.3	13.1	18.0	0.146	0.280	0.038	5.03	1.41	13.73
	8/ 6/75	FS20	1.7	5.8	11.4	0.040	0.039	0.006	3.83	4.13	14.92	0.6	1.8	3.6	0.043	0.042	0.006	1.20	1.37	4.60
	8/11/75	T 20	2.4	8.3																
	9/ 3/75	T 20	2.7	7.2	12.5	0.062	0.041	0.006	4.74	4.77	14.67	1.4	4.4	7.8	0.040	0.036	0.005	3.13	2.60	10.54
	9/ 3/75	FS20	1.3	4.2	7.6	0.053	0.045	0.007	2.44	2.61	7.45	0.8	2.7	5.8	0.036	0.035	0.005	1.94	1.99	10.21
	9/23/75	T 20	5.5	14.1	21.4	0.104	0.043	0.006	6.29	9.76	24.17	3.7	9.6	14.4	0.077	0.069	0.024	4.79	3.37	9.34
	9/23/75	FS20	3.3	9.0	12.3	0.091	0.032	0.026	3.42	3.77	7.56	1.9	5.6	9.9	0.052	0.044	0.006	3.74	3.54	10.79
	10/21/75	T 4	0.6	2.0	3.2	0.051	0.043	0.006	1.36	1.35	3.92									
	10/21/75	FS 4	0.4	1.3	2.5	0.038	0.035	0.005	0.49	0.89	3.98									
	10/21/75	T 20	2.9	8.7	15.7	0.047	0.044	0.006	5.90	5.48	14.46	1.8	5.3	10.5	0.041	0.041	0.008	3.09	4.00	14.73
	10/21/75	FS20	1.3	5.6	11.3	0.049	0.038	0.006	3.51	4.45	15.19	0.7	2.6	5.7	0.035	0.030	0.005	1.93	1.95	9.42
	11/ 5/75	T 20	2.3	6.5																
	11/18/75	T 20	2.3	6.3	9.7	0.063	0.051	0.013	3.22	2.98	7.73	1.4	4.3	6.0	0.048	0.043	0.007	2.33	3.08	10.66
	11/18/75	FS20	1.4	5.3	8.7	0.046	0.043	0.006	3.46	2.98	10.24	0.9	2.9	6.1	0.040	0.042	0.007	1.77	2.17	7.95
	11/18/75	T 4	0.5	1.6	3.4	0.050	0.042	0.006	1.37	1.38	4.16	0.5	1.5	2.4	0.050	0.043	0.006	1.02	1.03	2.99
	12/18/75	T 20	1.7	3.6																
	1/ 8/76	T 20	3.2	6.7	11.0	0.091	0.053	0.006	4.47	2.84	12.91	1.3	4.0	5.9	0.059	0.049	0.008	2.21	1.98	5.23

SITE: LOCATION OF SAMPLES, AS "EP12T" WHERE EP12 = EPU PLUME SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
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APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP1ET	1/ 8/76	FS20	2.8	6.5	10.3	0.126	0.048	0.007	3.30	3.74	13.14	1.2	3.7	5.5	0.059	0.047	0.008	2.21	1.93	5.03
	1/ 8/76	T 4	0.4	1.5	2.4	0.040	0.041	0.006	1.21	1.09	3.52									
	3/ 4/76	T 20	6.9	19.0	27.6	0.115	0.053	0.005	7.97	12.66	33.79									
	3/ 4/76	FS20	6.4	19.5	28.0	0.071	0.064	0.019	7.40	9.40	21.40									
	3/ 4/76	T 4	1.2	4.6	8.6	0.043	0.043	0.006	2.86	3.27	11.43									
	4/13/76	T 20	3.4	12.0	21.1	0.033	0.047	0.008	5.94	8.35	29.44	3.1	9.4	17.5	0.043	0.044	0.006	5.07	6.87	22.96
	4/13/76	FS20	3.7	12.0	19.5	0.052	0.044	0.006	6.62	7.93	23.34									
	4/27/76	T 20	2.7	8.0																
	5/10/76	T 20	2.0	4.8																
EP1EM	12/18/75	T 20	1.4	3.4																
	5/10/76	T 20	2.2	5.1																
EP1EB	8/ 6/75	T 20	2.4	6.6	11.7	0.054	0.046	0.007	4.46	4.02	11.28	1.0	3.7	7.2	0.018	0.045	0.008	2.07	3.12	9.06
	8/ 6/75	FS20	1.6	5.5	10.4	0.040	0.039	0.005	3.62	3.49	14.87	0.7	2.7	5.1	0.062	0.052	0.010	1.88	1.61	4.04
	8/11/75	T 20	1.5	4.8																
	9/ 3/75	T 20	1.9	5.5	11.3	0.047	0.042	0.008	3.94	4.65	10.55	0.9	2.6	5.0	0.044	0.043	0.006	1.47	1.88	6.62
	9/ 3/75	FS20	1.7	5.8	10.7	0.044	0.044	0.007	3.05	4.17	14.10	0.8	2.4	4.8	0.043	0.042	0.006	1.40	1.82	6.45
	9/23/75	T 20	2.7	7.7	14.4	0.046	0.046	0.007	4.18	5.39	14.35	2.5	7.2	12.2	0.053	0.045	0.007	4.74	4.39	12.45
	9/23/75	FS20	1.9	6.0	10.6	0.034	0.044	0.006	5.56	3.86	13.01	1.2	4.4	8.8	0.051	0.043	0.006	3.35	3.25	9.50
	10/21/75	T 4	0.6	2.1	3.5	0.047	0.042	0.006	1.44	1.35	4.26									
	10/21/75	FS 4	0.4	1.3	2.5	0.050	0.042	0.005	1.01	1.01	3.03									
	10/21/75	T 20	2.5	9.1	18.4	0.034	0.044	0.007	5.30	7.42	24.88	1.5	3.9	8.1	0.048	0.042	0.006	2.39	2.99	10.88
	10/21/75	FS20	1.7	5.6	11.1	0.041	0.040	0.006	3.18	4.03	16.81	0.7	2.6	5.7	0.032	0.038	0.010	2.10	1.81	5.31
	11/18/75	T 20	2.2	6.1	8.7	0.062	0.078	0.005	3.46	4.09	10.28	1.1	3.7	8.0	0.023	0.036	0.007	2.28	3.15	10.88
	11/18/75	FS20	2.2	6.1	8.8	0.060	0.042	0.006	3.56	3.59	9.40	1.0	3.3	6.7	0.041	0.038	0.005	2.25	2.35	9.27
	11/18/75	T 4	0.7	1.9	3.9	0.046	0.045	0.007	1.30	1.22	5.26	0.4	1.3	2.4	0.041	0.038	0.005	0.97	0.86	3.45
	12/18/75	T 20	1.1	2.7																
	4/13/76	T 20	2.6	8.6	13.4	0.050	0.042	0.006	5.44	5.39	14.99	1.7	6.3	12.6	0.045	0.044	0.006	3.93	4.89	16.66
	4/13/76	FS20	2.3	8.3	13.6	0.044	0.044	0.006	6.22	4.65	16.12									
	4/27/76	T 20	2.7	8.1																
	5/10/76	T 20	1.7	4.9																
EP2CT	10/ 7/74	T 20	4.0	12.2	23.0	0.042	0.043	0.007	6.84	8.65	31.96									
	10/25/74	T 20	2.1	6.2	12.8	0.015	0.045	0.009	3.62	5.50	17.05									
	6/11/75	T 20	25.5	65.0																
	11/ 5/75	T 20	2.6	7.8																
	12/ 2/75	T 20	1.4	4.7	8.1	0.043	0.044	0.006	2.71	3.21	10.34	1.0	3.2	6.4	0.040	0.038	0.005	2.55	2.12	8.63
	12/ 2/75	FS20	1.0	3.4	6.5	0.045	0.042	0.007	2.37	2.39	7.82	0.8	2.8	5.8	0.049	0.041	0.005	1.96	1.98	8.07
	12/ 2/75	T 4	0.4	1.3	2.4	0.050	0.042	0.006	0.99	1.00	2.94									
	12/19/75	T 20	1.1	2.2																
	1/ 8/76	T 20	0.7	1.9	3.5	0.086	0.041	0.005	0.99	1.45	4.84	0.3	0.7	1.3	0.057	0.126	0.102	0.68	0.39	0.26
	1/ 8/76	FS20	0.7	2.2	3.6	0.078	0.045	0.003	1.29	0.81	1.73	0.2	0.5	0.8	0.057	0.049	0.082	0.33	0.41	0.26

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = SAN PEDRO SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

			TOTAL BOD*									CARBONACEOUS BOD*								
SITE	DATE	TYPE	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP20T	1/ 6/76	T 4	0.2	0.7	0.9	0.061	0.050	0.010	0.36	0.28	0.73									
	2/ 6/76	T 20	1.5	3.7	6.7	0.040	0.044	0.005	2.59	2.87	9.86	0.8	2.7	5.7	0.039	0.038	0.006	1.66	1.98	9.37
	2/ 6/76	FS20	1.0	3.6	7.[illegible]	0.039	0.038	0.006	2.44	2.65	10.05	0.9	3.0	6.1	0.051	0.045	0.007	2.24	2.08	6.33
	2/ 6/76	T 4	0.4	1.2	2.5	0.035	0.035	0.005	0.85	0.83	3.79									
	2/26/76	T 20	6.5	23.3																
	5/10/76	T 20	2.3	6.1																
	1/ 7/77	T 20	4.1	11.5	18.9	0.060	0.047	0.008	7.30	6.39	16.30									
	1/ 7/77	FM20	2.8	9.4	13.2	0.061	0.052	0.009	5.22	4.27	10.26									
EP2GM	12/18/75	T 20	1.1	2.0																
	2/ 6/76	T 20	1.3	4.4	9.0	0.046	0.042	0.006	3.11	3.74	10.84									
	2/26/76	T 20	6.0	18.7																
	5/10/76	T 20	2.2	6.4																
EP2GB	12/18/75	T 20	0.9	2.7																
	2/ 6/76	T 20	1.9	6.7	11.5	0.044	0.045	0.006	3.32	4.36	15.08									
	2/26/76	T 20	5.0	16.9																
	5/10/76	T 20	1.5	5.0																
EP24T	5/10/76	T 20	2.2	6.4																
EP23T	10/ 7/74	T 20	2.4	10.6	16.5	0.052	0.044	0.006	5.53	6.73	20.28									
	10/25/74	T 20	3.3	9.2	15.2	0.073	0.042	0.006	5.83	5.14	17.34									
	11/20/74	T 20	2.3	7.5	12.5	0.051	0.043	0.006	4.96	4.77	13.84									
	11/20/74	FS20	2.3	5.7	9.8	0.053	0.045	0.006	4.00	3.76	10.85									
	11/20/74	T 4	0.7	2.4	4.7	0.046	0.040	0.006	1.64	1.68	5.88									
	11/20/74	FS 4	0.6	2.2	3.7	0.040	0.055	0.015	1.07	1.02	3.58									
	12/20/74	T 20	1.2	3.5	7.1	0.044	0.042	0.007	1.93	2.15	11.56									
	12/20/74	FS20	1.2	3.7	6.6	0.049	0.045	0.007	1.92	2.59	9.55									
	12/20/74	T 4	0.4	1.9	2.7	0.129	0.027	0.020	1.28	0.30	2.25									
	12/20/74	FS 4	0.4	2.6	3.7	0.064	0.055	0.045	1.05	0.61	2.79									
	1/29/75	T 20	1.1	4.0	8.3	0.021	0.047	0.009	2.38	2.30	10.99									
	1/29/75	FS20	1.4	4.3	8.0	0.042	0.042	0.006	2.78	2.84	10.42									
	1/29/75	T 4	0.5	1.5	2.4	0.056	0.052	0.009	0.82	0.94	2.63									
	1/29/75	FS 4	0.5	1.3	2.2	0.055	0.045	0.007	0.89	0.78	2.11									
	5/ 6/75	T 4	0.7	2.6	4.8	0.043	0.044	0.006	1.54	1.72	6.77									
	5/ 6/75	T 20	3.4	8.8	14.[illegible]	0.090	0.043	0.006	4.13	6.17	18.65	1.6	5.9	11.0	0.043	0.044	0.006	3.47	4.00	13.72
	5/ 6/75	FS20	2.2	7.6	10.[illegible]	0.057	0.054	0.012	3.03	4.00	10.41									
	6/13/75	T 20	1.6	5.2	10.0	0.043	0.040	0.005	3.96	3.43	13.48	1.1	4.3	9.2	0.028	0.033	0.007	3.04	4.22	14.96
	6/13/75	FS20	1.7	5.4	11.0	0.050	0.041	0.006	3.10	4.05	18.07	0.8	2.9	6.2	0.023	0.038	0.007	1.78	2.39	9.98
	7/15/75	T 20	3.2	7.5	12.4	0.091	0.052	0.006	4.12	4.52	15.84	2.2	5.8	11.4	0.034	0.045	0.007	3.02	4.46	16.75
	7/15/75	FS20	1.3	3.4	7.3	0.043	0.042	0.006	2.24	2.65	9.88	0.6	1.4	3.0	0.043	0.040	0.005	1.00	1.08	4.95
	7/28/75	T 20	4.9	14.8																
	7/28/75	T 20	5.2	14.9																

SITE: LOCATION OF SAMPLE, IE "P12T" MEANS GP12 = SMU PLTN. SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

			TOTAL BOD*									CARBONACEOUS BOD								
SITE	DATE	TYPE	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EF23T	8/ 6/75	T 20	7.6	18.9	26.0	0.116	0.048	0.023	7.50	7.98	15.91	3.5	10.7	17.4	0.055	0.047	0.007	6.96	6.18	16.30
	8/ 6/75	FS20	1.5	5.1	10.4	0.041	0.039	0.005	3.97	3.96	12.84	0.6	1.9	3.9	0.055	0.045	0.007	1.04	1.44	4.92
	8/11/75	T 20	15.0	45.5																
	9/ 3/75	T 20	2.1	6.6	11.7	0.045	0.046	0.007	3.38	4.45	14.95	1.1	3.1	6.4	0.041	0.043	0.008	1.85	2.28	8.94
	9/ 3/75	FS20	1.1	3.7	7.4	0.037	0.038	0.005	2.96	2.55	11.04	0.7	1.9	3.7	0.033	0.023	0.004	1.24	1.22	8.84
	9/23/75	T 20	3.3	8.4	13.2	0.080	0.044	0.005	5.22	5.25	14.98	1.8	4.9	8.8	0.049	0.041	0.005	2.64	3.44	12.65
	9/23/75	FS20	2.7	7.1	11.3	0.075	0.045	0.005	4.48	4.38	12.17	1.2	3.5	6.2	0.044	0.042	0.006	2.53	2.31	7.72
	10/21/75	T 4	0.9	2.4	3.[illegible]	0.054	0.049	0.008	1.39	1.19	3.15									
	10/21/75	FS 4	0.5	1.6	2.[illegible]	0.050	0.042	0.006	1.13	1.15	3.40									
	10/21/75	T 20	2.9	7.7	14.1	0.093	0.042	0.006	3.80	6.00	19.43	1.6	4.2	7.9	0.051	0.047	0.007	2.95	2.63	8.39
	10/21/75	FS20	1.9	5.4	10.0	0.051	0.045	0.007	3.74	3.48	10.99	0.6	2.2	4.7	0.039	0.038	0.005	1.84	1.54	6.41
	11/ 5/75	T 20	2.3	6.7																
	11/18/75	T 20	1.7	4.9	8.1	0.066	0.042	0.006	2.52	3.51	11.11	0.7	2.4	5.2	0.033	0.035	0.005	1.78	1.82	7.75
	11/18/75	FS20	1.1	4.2	7.0	0.023	0.056	0.015	1.93	1.67	6.84	0.6	2.0	4.1	0.027	0.046	0.006	1.43	1.95	5.85
	11/18/75	T 4	0.5	1.3	2.6	0.041	0.043	0.006	0.79	1.03	3.61									
	2/ 6/76	T 20	0.5	1.9	4.0	0.034	0.033	0.006	1.33	1.33	8.03	0.3	1.0	1.6	0.092	0.089	0.039	0.51	0.41	0.70
	2/ 6/76	FS20	0.6	2.0	4.3	0.040	0.041	0.007	1.26	1.51	6.56	0.5	1.4	3.0	0.040	0.041	0.006	0.86	1.07	3.98
	2/ 6/76	T 4	0.4	1.2	2.5	0.036	0.071	0.006	1.01	1.12	3.24									
	3/ 4/76	T 20	3.1	10.7	19.1	0.050	0.045	0.007	5.29	7.12	22.89	2.0	7.8	16.0	0.023	0.041	0.008	4.54	6.35	20.59
	3/ 4/76	FS20	3.2	10.8	18.1	0.050	0.045	0.007	5.29	7.14	22.68	2.1	7.8	16.2	0.022	0.039	0.007	4.65	6.38	23.07
	3/ 4/76	T 4	1.0	3.5	6.7	0.040	0.042	0.006	2.55	2.47	8.81									
	4/13/76	T 20	4.0	11.0	18.1	0.074	0.042	0.006	5.47	7.74	22.96	2.5	9.5	15.7	0.045	0.044	0.007	5.01	5.98	20.82
	4/13/76	T 20	3.9	11.2	17.1	0.067	0.051	0.009	6.50	4.63	14.48	2.5	9.5	15.7	0.045	0.044	0.007	5.01	5.98	20.82
	4/13/76	FS20	2.9	10.4	16.0	0.050	0.042	0.006	6.00	6.85	19.03	2.9	8.2	14.4	0.049	0.043	0.006	4.91	5.43	16.99
	4/27/76	T 20	2.5	6.1																
	5/10/76	T 20	2.3	7.0																
EF23N	10/ 7/74	T 20	4.1	12.7	20.4	0.050	0.042	0.006	4.32	4.15	23.99									
	10/25/74	T 20	4.3	11.5	17.4	0.096	0.053	0.026	5.75	3.96	11.05									
	11/20/74	T 20	2.3	8.0	14.3	0.044	0.046	0.007	4.15	5.39	14.99									
	11/20/74	FS20	1.6	4.5	7.1	0.090	0.045	0.007	2.01	2.88	8.80									
	11/20/74	T 4	0.5	1.9	4.1	0.044	0.040	0.007	1.59	1.24	4.89									
	11/20/74	FS 4	0.7	2.4	4.3	0.050	0.042	0.006	1.77	1.57	4.51									
	12/20/74	T 20	2.1	6.7	12.[illegible]	0.044	0.044	0.006	4.22	5.04	16.74									
	12/20/74	FS20	0.8	2.7	5.4	0.025	0.071	0.007	2.05	3.00	8.00									
	12/20/74	T 4	0.5	1.5	3.4	0.016	0.044	0.004	0.97	1.49	4.46									
	12/20/74	FS 4	0.5	1.3	2.[illegible]	0.057	0.040	0.006	0.99	0.46	2.63									
	7/15/75	T 20	3.5	8.7	14.[illegible]	0.050	0.044	0.008	5.85	5.04	13.88	2.3	5.8	10.4	0.049	0.048	0.005	3.18	4.13	12.85
	7/15/75	FS20	1.9	4.2	8.7	0.046	0.042	0.006	2.90	3.08	11.15	0.7	2.7	5.6	0.041	0.041	0.006	1.60	2.32	8.54
	8/ 6/75	T 20	3.4	10.0	19.[illegible]	0.046	0.044	0.006	5.38	7.36	26.00	2.7	6.3	10.9	0.053	0.034	0.007	4.19	3.87	11.03
	8/ 6/75	FS20	1.6	5.3	10.7	0.041	0.041	0.007	3.77	3.77	12.45	0.8	2.4	5.0	0.045	0.042	0.006	1.48	1.94	6.07

SITE: LOCATION OF SAMPLE. EF23T [illegible] = [illegible] SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP23H	8/11/75	T 20	2.2	6.5																
	2/ 6/76	T 20	0.3	2.4	4.7	0.045	0.044	0.006	1.29	1.74	5.90	0.4	1.4	2.9	0.040	0.040	0.006	0.97	0.97	3.85
	2/ 6/76	FS20	0.3	2.4	5.1	0.041	0.039	0.006	1.49	1.76	6.82	0.5	1.7	3.5	0.043	0.043	0.008	1.20	1.03	4.75
	2/ 6/76	T 4	0.4	1.3	2.8	0.040	0.042	0.006	1.12	0.90	3.02									
	4/13/76	T 20	3.5	10.5	16.3	0.060	0.052	0.009	4.63	6.13	17.05	1.7	5.9	11.9	0.046	0.042	0.005	4.75	4.88	13.97
	4/13/76	FS20	3.3	9.6	15.6	0.079	0.042	0.006	6.05	5.54	17.94									
	5/10/76	T 20	3.2	10.5																
EP23B	10/ 7/74	T 20	3.0	10.7	18.4	0.034	0.044	0.007	5.39	7.83	24.43									
	10/25/74	T 20	3.8	10.2	15.2	0.135	0.047	0.007	4.92	5.70	19.42									
	11/20/74	T 20	2.3	8.4	13.5	0.053	0.045	0.007	5.61	5.14	14.52									
	11/20/74	FS20	0.9	3.4	6.0	0.043	0.044	0.006	2.02	2.24	7.79									
	11/20/74	T 4	0.7	2.0	4.1	0.046	0.044	0.006	1.44	1.26	4.91									
	11/20/74	FS 4	0.4	2.6	4.3	0.050	0.046	0.007	1.26	1.74	5.41									
	12/20/74	T 20	1.7	5.5	10.4	0.045	0.040	0.006	3.47	3.72	14.34									
	12/20/74	FS20	1.0	3.5	5.0	0.050	0.042	0.006	2.17	2.16	6.98									
	12/20/74	T 4	0.7	1.9	2.9	0.145	0.042	0.006	0.42	1.30	3.72									
	12/20/74	FS 4	0.5	1.4	2.7	0.050	0.041	0.007	0.99	1.00	2.90									
	1/29/75	T 20	1.2	3.6	5.7	0.054	0.048	0.004	2.08	1.96	5.43									
	1/29/75	FS20	0.8	2.6	4.4	0.044	0.045	0.007	1.39	1.81	6.12									
	1/29/75	T 4	0.5	1.5	2.4	0.053	0.092	0.045	0.78	0.54	1.63									
	1/29/75	FS 4	0.4	0.9	1.7	0.075	0.047	0.017	0.60	0.44	1.04									
	5/ 6/75	T 4	0.7	2.1	4.2	0.043	0.044	0.006	1.26	1.53	5.37									
	5/ 6/75	T 20	2.4	8.4	12.9	0.063	0.042	0.006	5.06	5.10	14.67	0.9	3.1	6.0	0.042	0.041	0.006	2.04	2.11	7.89
	5/ 6/75	FS20	2.5	8.2	12.[illegible]	0.055	0.047	0.006	4.32	5.25	14.35									
	6/18/75	T 20	1.8	5.1	9.9	0.048	0.044	0.006	2.93	2.78	10.46	0.7	2.7	5.9	0.036	0.036	0.005	1.98	2.05	9.65
	6/18/75	FS20	1.2	4.0	8.8	0.030	0.045	0.004	2.36	3.50	11.65	0.9	2.9	5.6	0.043	0.042	0.006	1.88	2.05	7.25
	7/15/75	T 20	2.2	6.1	9.7	0.043	0.041	0.005	2.79	4.39	11.89	0.9	3.2	6.3	0.039	0.039	0.005	1.87	2.41	9.59
	7/15/75	FS20	1.7	4.3	8.1	0.029	0.049	0.003	2.18	3.30	10.56	0.6	1.9	4.0	0.036	0.036	0.005	1.39	1.35	6.78
	8/ 6/75	T 20	3.3	8.2	12.3	0.114	0.073	0.009	4.46	2.06	12.82	2.1	6.9	11.4	0.051	0.043	0.006	4.50	4.38	12.81
	8/ 6/75	FS20	2.7	7.2	11.1	0.055	0.047	0.007	3.27	4.51	14.09	1.1	3.5	7.0	0.041	0.042	0.008	2.37	2.54	9.86
	8/11/75	T 20	4.6	13.0																
	9/ 3/75	T 20	1.1	3.7	7.4	0.044	0.043	0.006	2.49	2.77	10.50	0.9	2.9	5.5	0.043	0.043	0.006	1.84	2.00	7.12
	9/ 3/75	FS20	0.9	3.1	6.3	0.040	0.037	0.006	2.64	2.27	9.75	0.7	2.3	4.6	0.041	0.042	0.006	1.54	1.64	6.05
	9/23/75	T 20	3.0	7.1	11.6	0.046	0.043	0.006	4.57	4.22	13.85	1.5	4.7	8.0	0.053	0.045	0.007	3.13	2.91	8.36
	9/23/75	FS20	1.7	5.0	8.8	0.047	0.042	0.006	3.49	3.42	10.39	0.8	2.6	5.3	0.040	0.042	0.006	1.54	1.89	7.50
	10/21/75	T 4	0.6	1.9	3.0	0.055	0.042	0.006	1.13	1.15	3.62									0.10
	10/21/75	FS 4	0.5	1.6	2.6	0.050	0.042	0.006	1.02	1.02	3.07									
	10/21/75	T 20	2.0	7.2	12.3	0.042	0.042	0.006	3.43	5.20	19.45	1.1	4.0	8.2	0.021	0.041	0.007	2.31	3.25	10.51
	10/21/75	FS20	1.6	5.4	9.5	0.036	0.046	0.003	2.71	3.95	12.21	1.2	3.4	6.4	0.037	0.039	0.006	1.92	2.26	9.67
	11/18/75	T 20	2.1	6.4	11.7	0.045	0.043	0.007	3.44	4.59	14.75	1.1	3.8	7.9	0.021	0.042	0.007	3.00	4.25	8.65

SITE: LOCATION OF SAMPLES, AS [illegible] WHERE EP13 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.

TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.

* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP23B	11/18/75	FS20	1.6	5.6	11.2	0.042	0.040	0.006	3.14	4.20	14.60	0.7	2.2	4.5	0.034	0.041	0.006	1.51	1.59	5.98
	11/18/75	T 4	0.4	1.5	3.3	0.032	0.033	0.009	0.69	1.28	4.54									
	2/ 6/76	T 20	1.7	4.0	5.1	0.103	0.089	0.042	1.40	1.31	2.37	0.7	2.1	2.5	0.084	0.091	0.029	0.82	0.65	1.33
	2/ 6/76	FS20	1.4	3.7	4.5	0.044	0.039	0.053	1.55	1.28	1.93	1.0	3.0	3.6	0.045	0.089	0.006	1.03	1.75	2.99
	2/ 6/76	T 4	0.7	2.1	3.4	0.060	0.076	0.022	1.19	0.81	2.31									
	3/ 4/76	T 20	3.9	12.9	23.2	0.042	0.042	0.006	7.83	8.98	30.31	2.0	7.4	16.0	0.022	0.037	0.006	4.65	6.38	23.12
	3/ 4/76	FS20	3.2	11.2	21.4	0.041	0.040	0.006	7.30	7.81	24.53	2.5	8.6	17.9	0.035	0.039	0.006	5.38	6.56	26.45
	3/ 4/76	T 4	1.1	3.6	6.4	0.035	0.043	0.006	2.17	2.54	8.14									
	4/13/76	T 20	3.8	10.8	16.6	0.070	0.043	0.006	6.73	4.17	19.61	2.4	8.2	14.1	0.040	0.044	0.006	6.15	5.33	17.40
	4/13/76	FS20	3.5	10.6	15.6	0.074	0.057	0.029	4.54	3.12	10.99									
	5/10/76	T 20	2.0	5.9																
EP23C	11/21/74	T 20	2.5	8.1	13.3	0.051	0.043	0.006	5.30	5.15	13.07	2.1	6.9	12.1	0.050	0.042	0.008	4.51	4.49	13.43
	12/20/74	T 20	1.3	4.3	7.6	0.051	0.045	0.007	2.82	2.63	7.55	1.0	3.7	7.1	0.050	0.047	0.007	2.76	2.51	7.80
EP24T	5/10/76	T 20	2.7	7.8																
EP26T	12/19/74	T 20	1.2	4.2	7.9	0.036	0.042	0.006	2.64	3.05	10.34									
	12/19/74	FS20	1.2	4.2	7.4	0.044	0.044	0.006	2.70	2.62	9.02									
	12/19/74	T 4	0.7	2.5	3.6	0.053	0.048	0.009	1.48	1.10	3.62									
	12/19/74	FS 4	0.6	2.1	3.5	0.051	0.043	0.006	1.33	1.34	3.93									
	1/29/75	T 20	1.3	4.3	7.0	0.055	0.047	0.008	2.65	2.32	6.32									
	1/29/75	FS20	1.2	3.8	6.6	0.052	0.045	0.006	1.91	2.67	8.94									
	1/29/75	T 4	0.3	1.1	1.7	0.041	0.076	0.024	0.60	0.34	0.75									
	1/29/75	FS 4	0.3	0.8	1.4	0.065	0.059	0.013	0.50	0.38	0.98									
	7/16/75	T 20	3.5	9.0	14.2	0.119	0.040	0.005	4.03	6.96	17.53	1.5	4.0	7.6	0.029	0.041	0.006	2.63	3.46	11.86
	7/16/75	FS20	1.9	4.9	9.2	0.032	0.049	0.007	2.48	3.85	11.88	0.8	2.5	5.1	0.039	0.040	0.006	1.47	1.88	7.77
	7/30/75	T 20	4.6	12.8																
	8/ 6/75	T 20	2.2	6.6	12.4	0.047	0.042	0.006	3.69	4.58	15.05	1.1	3.8	7.6	0.041	0.041	0.006	2.39	2.85	10.64
	8/ 6/75	FS20	1.9	6.4	12.0	0.042	0.042	0.006	3.52	4.64	15.72	0.9	3.1	6.3	0.041	0.040	0.006	2.43	2.22	8.96
	8/12/75	T 20	2.1	7.9																
	8/12/75	T 20	1.8	7.5																
	8/25/75	T 20	7.4	18.2	25.1	0.150	0.066	0.022	7.20	7.39	16.08	5.2	13.0	19.4	0.067	0.084	0.033	5.48	4.03	12.61
	8/25/75	FS20	3.0	8.5	14.7	0.072	0.040	0.005	5.40	5.48	16.51	1.3	3.7	7.0	0.041	0.040	0.006	2.05	2.58	9.56
	9/24/75	T 20	3.3	8.5	13.1	0.110	0.043	0.006	3.82	5.79	14.48	1.9	5.3	9.1	0.048	0.042	0.006	3.90	3.33	9.94
	9/24/75	FS20	1.2	3.7	7.5	0.023	0.044	0.007	1.92	2.84	11.41	0.7	2.8	5.2	0.046	0.031	0.008	2.20	1.90	5.29
	10/21/75	T 4	1.0	3.5	5.1	0.050	0.042	0.006	2.09	2.06	6.04									
	10/21/75	FS 4	0.9	2.2	3.4	0.095	0.054	0.008	1.24	0.90	3.52									
	10/21/75	T 20	4.6	12.2	17.6	0.095	0.059	0.016	5.02	5.94	12.65	2.5	6.5	11.1	0.055	0.047	0.007	4.33	3.96	10.63
	10/21/75	FS20	2.3	6.9	12.0	0.048	0.045	0.006	3.47	4.83	15.23	1.2	4.2	8.2	0.021	0.091	0.007	2.32	3.29	10.55
	11/ 5/75	T 20	2.1	8.0																
	1/ 7/76	T 20	1.2	2.9	4.6	0.107	0.040	0.005	1.41	1.75	6.49	0.3	1.2	2.4	0.039	0.038	0.005	0.88	0.85	3.32
	1/ 7/76	FS20	0.9	2.3	3.9	0.069	0.060	0.013	1.43	1.04	2.61	0.3	1.0	2.0	0.067	0.050	0.028	0.60	0.45	1.45

SITE: LOCATION OF SAMPLE, AS "P12T" WHERE P12 = ESU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.6 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP26T	1/ 7/76	T 4	0.3	1.1	1.4	0.085	0.083	0.047	0.37	0.31	1.25									
	2/ 5/76	T 20	2.4	7.6	11.6	0.065	0.043	0.006	4.61	4.36	11.88	1.3	4.8	8.5	0.043	0.045	0.006	3.05	3.04	11.78
	2/ 5/76	FS20	1.3	5.1	9.4	0.040	0.044	0.006	3.84	3.42	10.29	1.0	3.5	5.6	0.055	0.047	0.008	2.07	1.86	5.30
	2/ 5/76	T 4	0.7	1.9	2.9	0.052	0.044	0.006	1.16	1.15	3.28									
	2/17/76	T 20	2.0	5.7	8.6	0.072	0.063	0.015	2.93	2.58	6.75	1.0	3.5	5.5	0.059	0.050	0.009	2.10	1.80	4.94
	2/17/76	T 4	0.8	2.6	5.0	0.050	0.042	0.006	1.87	1.89	5.68									
	2/26/76	T 20	0.1	0.4																
	3/ 4/76	T 20	3.3	12.6	24.7	0.037	0.041	0.006	7.30	8.98	33.07	2.4	8.4	16.5	0.036	0.036	0.005	5.73	6.10	25.23
	4/13/76	T 20	3.6	10.1	14.7	0.113	0.054	0.016	4.26	4.18	11.55	2.1	6.4	11.0	0.044	0.055	0.011	3.14	3.53	11.72
	4/13/76	FS20	3.1	9.2	14.8	0.061	0.053	0.010	4.17	5.53	15.42									
	5/10/76	T 20	2.0	5.9																
STP A	2/18/75	T 20	71.5	148.0	136.0	0.189	0.102	0.020	53.36	73.61	94.06	29.5	62.1	92.5	0.240	0.046	0.006	26.54	41.98	113.00
	2/18/75	FS20	37.5	126.0	161.0	0.068	0.068	0.057	46.46	33.19	91.86	27.5	55.1	77.0	0.303	0.063	0.006	22.18	30.97	96.00
	2/18/75	T 4	8.4	26.2	45.3	0.053	0.046	0.007	13.38	17.45	58.72									
	2/18/75	FS 4	7.4	24.7	47.1	0.044	0.044	0.006	15.06	17.92	61.75									
HA 4W	4/15/75	T 20	6.5	16.9	32.3	0.052	0.042	0.005	12.73	12.17	36.39	5.8	14.3	25.0	0.082	0.038	0.008	7.93	9.60	30.25
	4/15/75	FS20	5.9	17.0	30.0	0.052	0.044	0.006	11.55	10.64	32.13									
	4/15/75	T 4	1.0	2.9	6.3	0.024	0.042	0.007	1.82	2.46	8.23									
HA11W	2/26/76	T 20	9.0	27.1	47.3	0.054	0.046	0.006	15.39	18.69	55.53	6.5	22.1	41.7	0.038	0.043	0.007	12.99	16.41	54.81
	2/26/76	FS20	8.1	25.3	44.4	0.043	0.045	0.006	17.53	14.57	51.93	5.8	19.6	33.4	0.033	0.042	0.006	11.04	15.39	52.71
	2/26/76	T 4	2.1	7.1	13.9	0.039	0.041	0.006	4.15	5.36	15.56									
HA M	3/24/76	T 20	125.5	259.1	386.0	0.165	0.046	0.006	107.00	130.00	443.00	110.5	219.1	337.0	0.174	0.045	0.005	95.68	153.00	345.00
	3/24/76	FS20	116.5	242.1	360.0	0.149	0.041	0.006	110.00	164.00	455.00	104.5	210.1	329.0	0.174	0.046	0.005	95.68	151.00	396.00
	3/24/76	T 4	40.9	91.7	137.3	0.052	0.059	0.006	39.31	53.95	176.00									
HA13M	3/24/76	T 20	19.3	48.1	77.2	0.117	0.041	0.006	27.22	34.70	95.45	18.1	46.9	74.5	0.102	0.041	0.005	21.76	33.60	99.07
	3/24/76	FS20	14.3	41.1	69.5	0.051	0.042	0.006	27.30	26.85	79.22	13.6	47.1	74.8	0.117	0.041	0.006	22.22	34.70	94.43
	3/24/76	T 4	4.6	14.6	26.9	0.019	0.046	0.008	7.49	11.35	34.58									
HA13B	3/24/76	T 20	6.3	19.1	22.7	0.160	0.041	0.005	6.68	15.52	23.93	4.7	12.6	15.6	0.078	0.044	0.005	7.66	7.63	22.20
	3/24/76	FS20	5.9	14.3	22.0	0.099	0.043	0.013	7.27	6.26	16.31									
HA11P	3/24/76	T 20	6.9	19.9	35.0	0.052	0.044	0.006	10.28	13.86	45.78	6.0	17.6	32.0	0.042	0.045	0.006	9.29	12.69	41.17
	3/24/76	FS20	6.3	17.9	32.5	0.045	0.044	0.006	10.82	12.83	42.06									
HA 4P	3/24/76	T 20	4.0	10.0	16.3	0.065	0.050	0.013	6.13	4.43	11.84	3.5	9.3	13.8	0.067	0.071	0.022	3.82	3.85	12.25
	3/24/76	FS20	4.0	10.7	16.0	0.065	0.050	0.020	4.40	4.45	12.23	3.1	8.8	12.9	0.054	0.049	0.009	3.83	5.93	12.58
	3/24/76	T 4	1.0	3.6	6.4	0.023	0.044	0.007	1.97	2.91	4.97									
WELCO	3/25/76	T 20	23.3	44.5	69.6	0.156	0.073	0.011	20.40	25.82	48.96	17.6	39.7	59.5	0.149	0.063	0.005	16.69	24.45	33.77
HLUSO	3/25/76	T 20	10.5	25.8	35.4	0.141	0.061	0.005	14.94	12.58	38.66	9.7	22.9	30.8	0.131	0.084	0.019	9.02	10.53	18.04
ABSON	3/25/76	T 20	167.5	257.1	366.0	0.140	0.083	0.061	93.46	145.00	100.00	157.0	228.0	260.0	0.143	0.093	0.180	75.28	152.00	22.60
HA 1T	12/19/74	T 20	0.4	2.2	3.2	0.045	0.075	0.060	0.90	0.90	1.48									
	12/19/74	FS20	0.7	1.7	2.5	0.091	0.090	0.073	0.72	0.65	1.04									
	12/19/74	T 4	0.7	1.7	3.2	0.045	0.042	0.006	1.28	1.21	3.97									

SITE: LOCATION OF SAMPLES AT THE WEST FORK HA 4 = AT OR NEAR HAMANN CREEK SITE 4. W = SEMI-WOODED OR PASTURED RUNOFF.
M = MANURE SPREAD ON PLOWED FIELD. P = PLOWED FIELD. B = 150 METERS BELOW SAMPLE SITE.
STP A = ACTIVATED SLUDGE SEWAGE TREATMENT PLANT EFFLUENT AT STRATFORD. WELCO, HLUSO AND ABSON = RUNOFF
FROM WELCOME, HALVERSON AND ABBOTSFORD DAMS.
TYPE: T = TOTAL BOD, FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.6 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

SITE	DATE	TYPE	TOTAL BOD* BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	CARBONACEOUS BOD BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
HA 4T	12/19/74	FS 4	0.7	1.4	3.4	0.052	0.044	0.006	1.33	1.28	3.67									
	4/15/75	T 20	1.9	6.2	10.6	0.050	0.042	0.006	4.12	4.08	12.11	1.1	3.3	6.0	0.055	0.047	0.008	2.19	1.94	5.42
	4/15/75	FS20	1.3	4.7	8.0	0.043	0.043	0.006	2.71	3.12	10.30	0.9	2.9	6.2	0.034	0.034	0.005	2.38	2.38	9.33
	4/15/75	T 4	0.4	2.4	5.1	0.023	0.035	0.006	1.55	1.97	7.82									
	4/15/75	FS 4	0.9	2.7	4.9	0.047	0.044	0.006	1.70	1.79	6.32									
	7/29/75	T 20	1.5	4.6																
	1/ 6/76	T 20	0.6	2.2	4.0	0.038	0.037	0.006	1.20	1.40	4.35	0.4	0.9	1.9	0.044	0.041	0.005	0.72	0.65	2.65
	1/ 6/76	FS20	0.4	1.4	2.4	0.045	0.046	0.007	0.70	0.91	3.05	0.2	0.5	1.0	0.045	0.044	0.006	0.33	0.37	1.28
	1/ 6/76	T 4	0.2	0.7	1.3	0.050	0.042	0.006	0.47	0.47	1.44									
	2/26/76	T 20	3.4	12.7	22.0	0.041	0.040	0.006	8.45	8.15	27.34	2.8	9.7	20.0	0.038	0.040	0.005	6.69	7.13	28.85
	5/11/76	T 20	2.6	6.8																
HA 2T	2/26/76	T 20	12.5	22.6	31.1	0.355	0.075	0.006	9.00	10.96	44.63	10.5	20.3	29.4	0.220	0.072	0.006	8.04	10.94	33.90
	3/ 3/76	T 20	2.1	6.8	13.2	0.043	0.042	0.006	3.86	4.82	18.25	1.0	3.7	9.1	0.036	0.036	0.006	2.71	2.86	10.95
HA 4T	4/15/75	T 20	1.6	4.5	7.6	0.060	0.047	0.008	2.95	2.61	7.04	1.2	3.5	6.3	0.055	0.047	0.008	2.35	2.08	5.80
	4/15/75	FS20	2.1	6.0	10.0	0.061	0.043	0.008	3.86	3.34	8.89	1.0	3.4	7.2	0.037	0.036	0.008	2.13	2.39	10.39
	4/15/75	T 4	0.8	2.6	5.1	0.040	0.041	0.007	1.49	1.99	6.99									
	4/15/75	FS 4	0.6	1.8	3.1	0.043	0.044	0.006	1.06	1.22	4.02									
HA16T	2/26/76	T 20	4.3	12.7	21.2	0.055	0.044	0.006	8.31	7.75	22.03	2.6	9.6	16.6	0.027	0.045	0.007	4.77	6.98	21.88
	2/26/76	FS20	3.9	11.8	21.0	0.049	0.044	0.006	7.26	8.52	26.88	2.3	8.2	16.0	0.026	0.044	0.007	4.79	6.99	22.21
	2/26/76	T 4	1.0	3.5	7.4	0.035	0.037	0.007	2.72	3.03	10.00									
	3/ 3/76	T 20	4.2	12.8	23.0	0.043	0.044	0.006	7.76	9.17	32.37	3.1	9.7	18.4	0.030	0.043	0.006	5.23	7.50	25.12
HA11T	4/15/75	T 20	1.7	5.0	8.3	0.055	0.047	0.007	3.26	2.91	8.14	1.0	2.8	5.6	0.036	0.041	0.007	2.29	2.50	5.89
	4/15/75	FS20	1.3	4.2	7.2	0.035	0.046	0.007	2.11	3.00	9.25	0.7	2.2	4.0	0.035	0.038	0.005	1.65	1.97	5.35
	4/15/75	T 4	0.6	1.9	3.7	0.044	0.044	0.006	1.42	1.39	4.71									
	4/15/75	FS 4	0.7	2.2	3.7	0.051	0.043	0.006	1.45	1.45	4.21									
	2/26/76	T 20	6.0	16.9	28.0	0.045	0.043	0.006	9.50	9.97	35.14	4.3	13.5	24.0	0.043	0.044	0.006	8.02	9.11	32.79
	2/26/76	FS20	6.3	18.0	29.3	0.041	0.041	0.005	11.75	11.53	33.41									
	2/26/76	T 4	1.4	5.2	10.2	0.031	0.038	0.005	3.61	3.78	14.44									
	3/ 3/76	T 20	6.3	19.7	33.7	0.050	0.046	0.007	9.64	13.48	42.26	3.5	11.4	24.1	0.036	0.041	0.006	7.20	9.25	34.63
	3/24/76	T 20	6.6	15.9	25.0	0.133	0.052	0.007	6.94	10.02	33.86	5.6	14.4	23.4	0.087	0.050	0.007	7.47	9.35	28.21
	3/24/76	FS20	6.2	15.4	24.1	0.107	0.041	0.005	7.03	11.06	27.30									
HA13T	3/24/76	T 20	4.2	11.1	18.5	0.062	0.042	0.006	7.15	5.90	20.96	3.2	8.7	15.6	0.050	0.042	0.006	5.93	5.98	18.37
	3/24/76	FS20	3.9	10.6	17.5	0.074	0.043	0.006	4.72	5.65	20.33									
BU 1T	4/15/75	T 20	2.1	7.0	12.9	0.049	0.043	0.006	4.45	4.60	16.14	1.2	2.7	4.5	0.077	0.072	0.019	1.57	1.09	2.50
DI 1T	4/15/75	T 20	2.0	7.5	15.0	0.037	0.039	0.005	5.04	5.34	22.48	0.6	2.2	4.6	0.039	0.039	0.005	1.32	1.71	6.85
	2/15/76	T 20	0.5	1.5	2.4	0.050	0.042	0.006	1.17	0.94	2.94	0.3	0.7	1.0	0.168	0.039	0.030	0.33	0.41	0.44
DI 2T	2/15/76	T 20	0.5	1.8	3.4	0.057	0.044	0.006	1.24	1.15	3.70	0.2	0.5	1.0	0.064	0.068	0.050	0.52	0.48	0.12
DI 4T	2/15/76	T 20	0.5	1.8	3.8	0.041	0.039	0.005	1.30	1.31	5.45	0.4	0.9	1.6	0.090	0.042	0.006	0.48	0.65	1.98
EL 1T	4/15/75	T 20	2.1	7.4	14.6	0.046	0.041	0.005	6.25	5.17	16.46	1.3	4.3	7.9	0.043	0.044	0.006	2.27	3.05	10.39
EL 2T	2/15/76	T 20	0.8	2.2	4.1	0.052	0.044	0.006	1.52	1.54	4.47	0.4	1.0	1.7	0.079	0.072	0.019	0.60	0.39	0.95

SITE: LOCATION OF SAMPLE, AS FOR ITEM WHERE HA 1 = HAMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELM (EL), EAU PLEINE (EP), FERNWOOD (FE), FRIEMAN (FR), NEISCY (NE), PORKY (PO),
RANDALL (RA), ROCK (RO), ROCKY RUN (RR), WINTING (WI).

TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.

* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX A continued.

			TOTAL BOD*									CARBONACEOUS BOD								
SITE	DATE	TYPE	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3	BOD5	BOD20	BOD50	K1	K2	K3	L1	L2	L3
EP 1T	4/15/75	T 20	2.7	9.4	19.6	0.033	0.040	0.006	5.85	9.51	25.65	1.6	6.1	13.0	0.031	0.036	0.006	4.35	4.26	19.32
EP 2T	4/15/75	T 20	2.7	9.2	20.1	0.040	0.031	0.007	7.49	6.64	29.42	1.4	4.9	10.1	0.038	0.038	0.005	3.58	3.87	13.96
EP 5T	7/29/75	T 20	3.1	6.4																
	5/11/76	T 20	2.0	6.3																
FE 1T	4/15/75	T 20	1.3	4.8	10.1	0.043	0.040	0.006	4.07	3.34	11.06	0.4	1.5	2.9	0.077	0.073	0.021	1.06	0.67	1.74
FR 1T	4/15/75	T 20	1.2	4.5	9.5	0.030	0.032	0.006	4.27	4.02	13.98	0.9	2.5	5.1	0.041	0.040	0.006	1.48	1.90	7.60
NO 1T	4/15/75	T 20	1.8	6.3	11.0	0.052	0.041	0.007	4.12	3.91	11.34	0.8	2.3	4.5	0.039	0.041	0.006	1.49	1.81	6.67
	4/15/75	FS20	1.4	4.7	9.0	0.042	0.041	0.006	3.02	3.32	11.68	0.6	2.0	4.2	0.036	0.033	0.004	1.94	1.03	7.24
	4/15/75	T 4	0.6	1.9	4.1	0.035	0.036	0.005	1.53	1.56	5.90									
	4/15/75	FS 4	0.4	1.5	2.9	0.046	0.040	0.006	1.01	0.98	3.69									
	7/29/75	T 20	2.0	5.4																
	1/ 6/76	T 20	0.8	2.9	5.5	0.043	0.040	0.006	2.17	1.80	5.22	0.6	1.8	3.2	0.060	0.050	0.009	1.12	0.95	2.98
	1/ 6/76	FS20	0.7	2.2	4.3	0.061	0.053	0.015	1.43	1.19	3.66	0.5	1.3	2.1	0.101	0.040	0.005	0.70	0.38	2.60
	1/ 6/76	T 4	0.2	0.5	0.7	0.149	0.089	0.031	0.19	0.20	0.36									
	5/11/76	T 20	2.2	4.9																
NO 2T	4/15/75	T 20	3.0	8.3	12.6	0.081	0.053	0.007	4.93	4.17	11.06	2.5	5.6	9.0	0.087	0.064	0.004	2.60	4.13	10.46
	4/15/75	FS20	2.3	6.5	11.5	0.030	0.058	0.011	3.16	4.15	13.71	1.4	3.9	7.4	0.029	0.043	0.009	2.05	2.91	10.04
	4/15/75	T 4	1.1	4.2	8.4	0.026	0.042	0.007	2.39	3.31	10.88									
	3/24/76	T 20	8.3	19.9	30.-	0.129	0.055	0.006	8.51	12.07	43.59	6.5	16.5	26.0	0.080	0.061	0.013	9.83	6.83	16.41
	3/24/76	FS20	8.3	18.6	28.2	0.192	0.048	0.008	8.59	9.74	37.50	5.9	13.5	19.4	0.103	0.097	0.006	7.44	7.38	24.09
	3/24/76	T 4	2.0	6.6	12.2	0.019	0.045	0.008	2.41	5.17	15.46									
PO 1T	4/15/75	T 20	1.9	6.6	12.8	0.031	0.052	0.010	3.71	4.85	16.05	1.1	3.3	6.8	0.043	0.045	0.007	2.59	2.41	7.90
RA 1T	4/15/75	T 20	2.3	8.4	16.4	0.045	0.044	0.006	5.12	5.72	23.13	1.9	6.3	12.5	0.025	0.045	0.008	3.70	5.31	16.95
RC 1T	4/15/75	T 20	2.3	6.9	12.8	0.045	0.043	0.007	3.75	4.39	16.86	0.6	1.9	4.1	0.040	0.039	0.006	1.22	1.43	5.68
RR 1T	4/15/75	T 20	1.3	6.1	11.3	0.047	0.043	0.006	4.39	4.14	12.92	0.8	2.9	6.1	0.032	0.039	0.007	1.75	2.22	9.24
WI 1T	4/15/75	T 20	4.2	13.5	24.4	0.043	0.044	0.007	8.16	9.17	32.38	2.1	8.1	17.6	0.041	0.034	0.007	5.39	6.83	24.10
	4/15/75	FS20	3.1	10.9	20.3	0.045	0.040	0.007	6.37	7.49	25.78	2.4	8.5	16.7	0.040	0.036	0.005	5.60	5.40	28.60
	4/15/75	T 4	1.4	4.5	8.8	0.046	0.041	0.006	2.97	3.18	13.44									
	4/15/75	FS 4	1.3	4.3	8.5	0.040	0.040	0.005	3.41	2.83	11.43									
	2/15/76	T 20	0.2	0.5	0.8	0.217	0.040	0.005	0.23	0.35	1.00	0.1	0.2	0.4	0.088	0.098	0.011	0.16	0.26	0.22
WI 2T	4/23/75	T 20	3.7	11.7	20.8	0.048	0.046	0.007	7.65	6.22	25.86	2.8	8.2	16.1	0.043	0.044	0.007	4.80	6.12	22.65
	4/23/75	FS20	3.5	10.5	18.2	0.050	0.042	0.006	7.16	7.10	21.14	2.3	7.7	15.4	0.037	0.041	0.006	4.55	5.65	22.55
	4/23/75	T 4	1.3	4.3	7.9	0.046	0.045	0.007	2.72	2.77	9.45									
	4/23/75	FS 4	1.2	4.0	7.0	0.044	0.043	0.006	2.66	2.65	8.87									
	2/15/76	T 20	0.9	2.7	4.7	0.050	0.042	0.006	1.79	1.77	5.39	0.4	1.5	2.8	0.064	0.054	0.010	1.01	0.81	2.12

SITE: LOCATION OF SAMPLE, AS RHA 1T WHERE HA 1 = HEMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELM (EL), EAU PLEINE (EP), FERNWOOD (FE), FREEMAN (FR), NOISEY (NO), PORKY (PO),
RANDALL (RA), ROCK (RC), ROCKY RUN (RR), WINDING (WI).

TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATION AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.

* BOD IN MG/L. K AND L VALUES ARE BOD DECAY RATE AND RESPECTIVE ULTIMATE BOD. SEE DISCUSSION IN THE INTRODUCTION.

APPENDIX B. Biomass and Detrital Fractions of Suspended Solids from BOD Samples Collected in the Big Eau Pleine Reservoir.

SITE	DATE	SUSP SOLIDS*	CHLORO A**	DETRITUS+	PLANKTON+	VOL SOLIDS+	% PLANKTON++
EP 6T	8/25/75	4.8		1.31	0.700	2.8	34.8
	10/21/75	2.5		1.03	0.343	1.1	25.0
	12/16/75	14.7		4.62	0.210	9.9	4.3
	1/ 6/76	6.8		3.77	0.000	3.0	0.0
	2/15/76	7.6		2.89	0.316	4.4	9.9
	2/24/76	7.7		2.94	0.316	4.4	9.7
	3/ 2/76	6.8		2.93	0.000	3.9	0.0
	3/ 2/76	6.8		2.93	0.000	3.9	0.0
	3/24/76	57.8		21.24	0.000	36.6	0.0
EP 8T	1/ 7/76	7.6		3.88	0.000	3.7	0.0
	3/ 2/76	9.5		3.66	0.237	5.6	6.1
	3/ 2/76	9.5		3.66	0.237	5.6	6.1
	4/12/76	19.8		7.57	0.026	12.2	0.3
EP10T	11/14/75	10.5		2.31	1.954	6.2	45.8
	1/ 7/76	50.9		9.72	0.000	41.2	0.0
	3/ 2/76	6.1		3.38	0.290	2.4	7.9
	3/24/76	101.1		15.89	0.605	84.6	3.7
	4/12/76	8.3		1.86	1.610	4.8	46.4
	4/12/76	8.3		1.86	1.610	4.8	46.4
EP11T	4/12/76	4.2	9.35	2.99	0.581	0.6	16.3
EP12T	9/23/75	23.4	26.19	4.78	6.045	12.6	55.8
	10/21/75	22.3	23.85	7.19	1.162	13.9	13.9
	11/18/75	22.4	5.94	7.95	0.422	14.0	5.0
	3/ 4/76	11.7	4.49	5.14	0.210	6.3	3.9
	4/13/76	5.6	9.35	4.14	0.581	3.9	12.3
	4/27/76	20.9	9.23	7.45	0.528	12.9	6.6

* TOTAL OR VOLATILE SUSPENDED SOLIDS IN MG/L
** IN MG/M**3
\+ IN MG/L AS ASH FREE DRY WEIGHT (AFDW)
++ PERCENT OF PLANKTON AS FIXED SOLIDS

APPENDIX B continued.

SITE	DATE	SUSP SOLID*	CHLORO A**	DETRITUS+	PLANKTON+	VOL SOLID*	% PLANKTON++
EP13T	6/18/75	44.2	24.68	7.96	10.481	25.8	56.8
	1/ 6/76	9.1	0.94	4.87	0.021	4.3	0.4
	2/ 6/76	4.0	1.11	3.79	0.066	0.1	1.7
	2/17/76	13.7	4.25	5.54	0.192	8.0	3.3
EP16T	8/11/75	26.9		6.61	5.491	14.8	45.4
	9/ 3/75	10.0	29.12	2.46	3.458	4.1	58.4
	9/23/75	33.3	104.79	0.20	16.078	22.0	98.8
	10/21/75	11.7	76.82	3.67	1.873	6.2	33.8
	11/18/75	12.2	27.76	3.28	2.402	6.5	42.3
	1/ 8/76	9.9	17.10	4.80	0.198	4.9	4.0
	4/13/76	17.9	1.12	7.15	0.031	10.7	0.4
	4/27/76	17.6	8.86	6.42	0.686	10.5	9.7
EP16B	8/11/75	20.3		12.51	1.056	6.7	7.8
	9/ 3/75	22.5	3.35	15.16	0.177	7.2	1.2
	9/23/75	17.5	51.19	0.48	10.824	6.2	95.8
	10/21/75	14.7	72.10	5.82	0.845	8.0	12.7
	11/18/75	12.0	70.34	5.05	1.795	9.2	26.2
	4/27/76	19.7	18.97	6.44	0.950	12.3	12.9
EP20T	1/ 8/76	3.3	0.94	4.67	0.016	3.6	0.3

* TOTAL OR VOLATILE SUSPENDED SOLIDS IN MG/L
** IN MG/M**3
\+ IN MG/L AS ASH FREE DRY WEIGHT (AFDW)
++ PERCENT OF PLANKTON AS FIXED SOLIDS

APPENDIX B continued.

SITE	DATE	SUSP SOLID*	CHLORO A**	DETRITUS+	PLANKTON+	VOL SOLID*	% PLANKTON++
EP23T	6/18/75	19.3	5.72	8.74	0.581	10.0	6.2
	7/15/75	25.9	37.32	7.75	3.986	14.2	34.0
	8/11/75	96.5		1.35	36.960	60.2	96.5
	9/ 3/75	17.0	17.51	3.44	5.042	8.5	59.4
	9/23/75	19.8	47.01	0.12	9.372	10.3	98.7
	10/21/75	11.9	30.22	4.47	1.134	6.3	20.2
	11/18/75	9.9	17.73	4.60	0.475	4.8	9.4
	2/ 6/76	4.0	1.58	3.84	0.021	0.1	0.5
	4/13/76	6.0	1.22	4.16	0.040	2.4	1.0
	4/13/76	6.6	1.22	4.16	0.040	2.4	1.0
	4/27/76	13.1	3.47	5.34	0.581	7.2	9.8
EP23M	7/15/75	39.5	36.78	17.01	5.650	16.6	24.9
	8/11/75	27.4		10.78	1.162	10.5	9.7
EP23B	6/18/75	29.0	0.31	20.51	0.053	8.4	0.3
	7/15/75	18.5		11.85	0.263	6.4	2.2
	8/11/75	28.7		19.52	0.800	8.4	9.9
	9/ 3/75	17.5	3.48	9.75	1.558	6.2	[illegible]
	9/23/75	14.1	46.08	2.23	6.336	5.5	[illegible]
	10/21/75	10.8	20.21	4.54	1.556	4.7	25.5
	11/18/75	6.8	29.92	4.88	0.634	1.3	[illegible]
	3/ 4/76	13.3	2.25	5.17	0.053	8.1	1.0
EP26T	6/25/75	11.2		2.45	3.907	4.8	61.5
	10/21/75	15.8	8.28	6.10	0.528	9.2	8.0
	3/ 4/76	11.5		5.07	0.237	6.2	4.5
	4/13/76	5.7		2.64	1.320	1.7	33.3

* TOTAL OR VOLATILE SUSPENDED SOLIDS IN MG/L
** IN MG/M**3
\+ IN MG/L AS ASH FREE DRY WEIGHT (AFDW)
++ PERCENT OF PLANKTON AS FIXED SOLIDS

APPENDIX C. Pre and Post Chemical and Physical Analysis of BOD Samples from the Big Eau Pleine Watershed.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP 6T	7/16/75	T 20	PRE	0.18	0.14	0.88	35.4	0.235	0.258		172.		23.0		72.	44.24
			POST	0.00	0.16	1.12	35.1	0.190		8.0	169.					
	7/16/75	F*20	PRE	0.18	0.18	0.77	39.2	0.235	0.485		172.		23.0		72.	44.24
			POST	0.00	0.20	1.02	28.7	0.190		8.0	175.					
	8/ 6/75	T 20	PRE	0.11	0.04	0.70	21.5	0.220	0.575	7.8			25.0		68.	42.32
			POST	0.07	0.11	1.26	26.2	0.205		7.7	188.					
	8/ 6/75	F*20	PRE	0.11	0.11	0.74	22.3	0.220	0.319	7.7			25.0		68.	42.32
			POST	0.00	0.14	0.84	26.8	0.125		7.6	204.					
	8/12/75	T 20	PRE	0.07	0.00	0.56	0.0	0.141	0.190				25.0		9.	41.70
			POST													
	8/12/75	T 20	PRE	0.07	0.00	0.56	0.0	0.141	0.190				25.0		9.	41.70
			POST													
	8/25/75	T 20	PRE	0.14	0.13	1.09	13.0	0.223	0.299	8.3		9.1	25.0	4.8	73.	40.52
			POST	0.00	0.11	0.21	26.4	0.065		7.6	189.					
	8/25/75	F*20	PRE	0.14	0.13	0.53	16.1	0.223	0.271	8.3			25.0		73.	40.52
			POST	0.00	0.00	0.42	20.9	0.090		7.6	190.					
	9/24/75	T 20	PRE	0.07	0.04	1.26	39.8	0.200	0.270	8.1			13.0		53.	40.81
			POST	0.00	0.07	2.10	46.5	0.210		7.6	152.					
	9/24/75	F*20	PRE	0.04	0.14	1.08	41.7	0.200	0.270	8.1			13.0		53.	40.81
			POST	0.00	0.11	2.17	37.9	0.209		7.7	179.					
	10/21/75	T 4	PRE	0.04	0.00	0.74	26.4	0.033	0.077	7.9		10.8	6.0	2.5	56.	36.03
			POST	0.00	0.11		29.4	0.050		7.7	216.					
	10/21/75	F* 4	PRE	0.04	0.06	1.68	26.4	0.033	0.068	7.9			6.0		56.	36.03
			POST	0.00	0.07		35.2	0.050		7.8	216.					

SITE: LOCATION OF SAMPLE, AS PER12TH WALBE CRIP = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.6 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET. VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP 6T	10/21/75	T 20	PRE	0.04	0.00	0.74	26.4	0.033	0.077	7.9		10.8	9.0	2.5	56.	36.03
			POST	0.00	0.04		26.9	0.044		7.4	224.					
	10/21/75	FS20	PRE	0.04	0.00	1.68	26.4	0.033	0.068	7.9			9.0		56.	36.03
			POST	0.00	0.07		27.7	0.031		7.7	215.					
	11/ 5/75	T 20	PRE	0.00	0.00	0.42	24.5	0.162	0.179	8.4			10.0		11.	34.94
			POST													
	11/18/75	T 20	PRE	0.00	0.56	0.74	47.5	0.107	0.144	7.6			5.0		56.	36.72
			POST	0.00	0.60	0.46	37.0	0.091		7.4	149.					
	11/18/75	FS20	PRE	0.00	0.56	0.91	41.5	0.107	0.153	7.6			5.0		56.	36.72
			POST	0.00	0.49	0.96	34.9	0.069		7.2	150.					
	11/18/75	T 4	PRE	0.00	0.56	0.74	47.5	0.107	0.144	7.6			5.0		56.	36.72
			POST	0.00	0.56	0.84	39.9	0.107		7.2	154.					
	12/16/75	T 20	PRE	0.39	0.32	1.58	36.9	0.372	0.510	7.0		11.6	0.0	14.7	52.	41.03
			POST	0.00	1.05	0.18	38.3	0.333		6.8	101.					
	12/16/75	FS20	PRE	0.39	0.32	1.05	35.8	0.368	0.470	7.0			0.0		52.	41.03
			POST	0.00	1.23	0.77	31.5	0.352		6.8	94.					
	12/16/75	T 4	PRE	0.39	0.32	1.58	36.9	0.372	0.510	7.0		11.6	0.0	14.7	52.	41.03
			POST	0.70	0.53	1.37	37.6	0.352		6.6	107.					
	1/ 6/76	T 20	PRE	0.18	1.12	1.19	17.2	0.153	0.155	7.4			0.0	6.8	49.	40.23
			POST	0.00	1.26	0.11	21.1	0.162		7.5	194.					
	1/ 6/76	FS20	PRE	0.18	1.12	1.09	20.7	0.153	0.254	7.4			0.0		49.	40.23
			POST	0.00	1.09	0.63	23.0	0.172		7.4	194.					
	1/ 6/76	T 4	PRE	0.18	1.12	1.19	17.2	0.153	0.155	7.4			0.0	6.8	49.	40.23
			POST	0.21	1.19	0.95	24.3	0.197		7.3	214.					

SITE: LOCATION OF SAMPLE AS "EP12T" MEANS EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP 6T	2/ 3/76	T 20	PRE	0.18	1.40	0.88	11.7	0.246	0.250	7.3			0.0		47.	33.16
			POST	0.00	0.46	0.56	14.6	0.219		7.7	243.					
	2/ 3/76	FS20	PRE	0.18	1.40	0.60	10.3	0.246	0.250	7.3			0.0		47.	33.16
			POST	0.00	1.93	0.25	15.7	0.217		7.7	182.					
	2/ 3/76	T 4	PRE	0.18	1.40	0.88	11.7	0.246	0.250	7.3			0.0		47.	33.16
			POST	0.25	1.30	1.37	16.7	0.226		7.2	254.					
	2/18/76	T 20	PRE	0.61	1.26	2.84	53.6	0.195	0.372	7.0		9.6	1.0	7.6	53.	27.10
			POST	0.24	2.94	1.12	35.4	0.259		7.8	206.					
	2/18/76	FS20	PRE	0.61	1.26	2.80	45.0	0.195	0.362	7.0			1.0		53.	27.10
			POST	0.31	2.87	1.09	28.5	0.219		7.1	213.					
	2/18/76	T 4	PRE	0.61	1.26	2.84	53.6	0.195	0.376	7.0		9.6	1.0	7.6	53.	27.10
			POST	0.41	1.86	1.93	31.0	0.262		7.5	214.					
	2/24/76	T 20	PRE	1.44	1.02	3.89	61.9	0.290	0.482	7.4		12.0	1.0	7.7	47.	24.87
			POST	0.00	3.33	2.35	38.0	0.280		7.2	223.					
	2/24/76	FS20	PRE	1.44	1.02	4.13	54.3	0.290	0.392	7.4			1.0		47.	24.87
			POST	0.00	3.36	1.51	50.9	0.275		7.4	223.					
	2/24/76	T 4	PRE	1.44	1.02	3.89	61.9	0.290	0.482	7.4		12.0	1.0	7.7	47.	24.87
			POST	1.82	1.16	4.13	50.0	0.252		7.5	232.					
	2/26/76	T 20	PRE	1.74	1.57	2.73	49.0	0.236	0.405	7.8			1.0		44.	23.76
			POST	0.00	2.42	2.38	110.2	0.222		7.2	229.					
	2/26/76	T 20	PRE	2.24	2.24	2.80	49.0	0.000	0.280				0.0		17.	23.76
			POST													
	3/ 2/76	T 20	PRE	2.21	0.81	4.82	67.8	0.307	0.405	7.3			0.0	6.8	48.	21.91
			POST	0.42	2.98	1.96	25.0	0.310		7.1	238.					

SITE: LOCATION OF SAMPLES AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS STAGE
EP oT	3/ 2/76	T 20	PRE	2.21	0.81	4.82	67.8	0.307	0.405	7.3			0.0	6.8	48. 21.91
			POST												
	3/ 2/76	FS20	PRE	2.21	0.81	4.60	55.0	0.307	0.390	7.3			0.0		48. 21.91
			POST	0.53	2.73	3.36	39.0	0.302		7.3	227.				
	3/ 2/76	T 4	PRE	2.21	0.81	4.82	67.8	0.307	0.405	7.3			0.0	6.8	48. 21.91
			POST	0.53	3.47	2.17	54.9	0.296		7.0	241.				
	3/24/76	T 20	PRE	1.02	0.21	3.15	44.8	0.248	0.470	7.1			0.5	57.8	49. 33.05
			POST	0.00	1.65	1.05	27.0	0.333		6.9	73.				
	3/24/76	FS20	PRE	1.02	0.21	1.92	38.5	0.248	0.422	7.1			0.5		49. 33.05
			POST	0.00	1.72	0.60	29.6	0.351		6.9	73.				
	3/24/76	T 4	PRE	1.02	0.21	3.15	44.8	0.248	0.470	7.1			0.5	57.8	49. 33.05
			POST	0.07	1.65	1.09	32.2	0.297		6.5	78.				
	5/11/76	T 20	PRE	0.00	0.04	0.21	37.1	0.030	0.043	7.9			9.0		22. 45.18
			POST												
	1/ 7/77	T 20	PRE	0.04		0.46	7.8	0.021	0.035	0.0			2.0		48. 25.80
			POST				13.6								
	1/ 7/77	FM20	PRE	0.04		0.00	7.0	0.021	0.000	0.0			2.0		48. 25.80
			POST				12.8								
EP oT	1/ 9/75	T 20	PRE	0.42	1.12	1.40	19.7	0.106	0.115				0.0		151. 28.52
			POST	0.25	0.39	0.38	20.9	0.177		5.7	300.				
	1/ 9/75	FS20	PRE	0.42	1.12	0.00	0.0	0.106	0.000				0.0		151. 28.52
			POST	0.38	0.98	0.42	20.9	0.181		6.5	300.				
	1/ 9/75	T 4	PRE	0.42	1.12	1.40	19.7	0.106	0.115				0.0		151. 28.52
			POST	0.32	1.37	0.42	20.9	0.204		6.9	325.				

SITE: LOCATION OF SAMPLE, 4S MEANS THAT EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
d = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP 8T	1/ 9/75	FS 4	PRE	0.42	1.12	0.00	0.0	0.106	0.000				0.0		151.	28.52
			POST	0.00	1.23		24.9	0.208		7.1	320.					
	4/15/75	T 20	PRE	0.63	0.60	1.50	44.9	0.298	0.450	7.1	95.		2.0		54.	34.33
			POST	0.00	1.05	0.34	24.7	0.218		6.8	126.					
	4/15/75	FS20	PRE	0.63	0.60	0.00	29.9	0.298	0.000		95.		2.0		54.	34.33
			POST	0.00	1.19	0.98	24.3	0.245		6.6	90.					
	4/15/75	T 4	PRE	0.63	0.60	1.50	44.9	0.298	0.450	7.1	95.		2.0		54.	34.33
			POST	0.00	1.22	0.91	31.5	0.225		6.8	97.					
	4/15/75	FS 4	PRE	0.63	0.60	0.00	29.9	0.298	0.000		95.		2.0		54.	34.33
			POST	0.00	1.26		29.4	0.256		6.8	96.					
	7/30/75	T 20	PRE	0.11	0.70	1.51	0.0	0.113	0.192		158.		24.0		5.	43.03
			POST													
	8/12/75	T 20	PRE	0.04	0.04	2.42	0.0	0.122	0.330				24.5		9.	41.70
			POST													
	8/12/75	T 20	PRE	0.04	0.04	2.42	0.0	0.122	0.330				24.5		9.	41.70
			POST													
	11/ 5/75	T 20	PRE	0.00	0.00	0.53	21.4	0.091	0.095	8.3			10.0		11.	34.94
			POST													
	1/ 7/76	T 20	PRE	0.35	1.05	0.53	18.0	0.150	0.158	7.1			0.0	7.6	49.	40.02
			POST	0.00	0.77	0.55	21.8	0.143		7.7	227.					
	1/ 7/76	FS20	PRE	0.35	1.05	0.86	19.3	0.150	0.151	7.1			0.0		49.	40.02
			POST	0.00	0.98	0.46	18.5	0.141		7.4	197.					
	1/ 7/76	T 4	PRE	0.35	1.05	0.53	18.0	0.150	0.158	7.1			0.0	7.6	49.	40.02
			POST	0.28	0.35	0.64	18.5	0.195		7.2	187.					

SITE: LOCATION OF SAMPLE, AS EP12T WHERE EP12 = EAU PLAINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATION AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
CP 6T	2/ 3/76	T 20	PRE	0.46	1.33	1.19	15.1	0.235	0.249	6.8			0.0		47.	33.16
			POST	0.00	1.64	0.39	16.2	0.220		8.0	234.					
	2/ 3/76	FS20	PRE	0.46	1.33	0.77	10.3	0.235	0.237	6.8			0.0		47.	33.16
			POST	0.00	1.36	0.63	12.5	0.215		7.8	236.					
	2/ 3/76	T 4	PRE	0.46	1.33	1.19	15.1	0.235	0.249	6.8			0.0		47.	33.16
			POST	0.10	1.40	0.42	9.7	0.216		7.6	244.					
	3/ 2/76	T 20	PRE	1.86	0.77	3.72	43.5	0.274	0.330	7.2		9.7	0.0	9.5	48.	21.91
			POST	0.70	2.98	1.59	30.3	0.280		7.4	220.					
	3/ 2/76	T 20	PRE	1.86	0.77	3.72	43.5	0.274	0.330	7.2		8.7	0.0	9.5	48.	21.91
			POST	1.45	3.19	1.89	34.2	0.252		7.3	229.					
	3/ 2/76	FS20	PRE	1.86	0.77	3.87	46.7	0.274	0.318	7.2			0.0		48.	21.91
			POST	0.32	3.08	1.75	30.3	0.284		7.3	166.					
	3/ 2/76	T 4	PRE	1.86	0.77	3.72	43.5	0.274	0.330	7.2		8.7	0.0	9.5	48.	21.91
			POST	0.95	2.39	1.96	39.8	0.267		7.2	238.					
	4/12/76	T 20	PRE	0.21	0.49	0.88	26.1	0.073	0.113	7.7		10.1	10.0	19.8	50.	45.20
			POST	0.17	0.60		12.3	0.045		7.1	131.					
	4/12/76	FS20	PRE	0.21	0.49	0.49	31.0	0.073	0.115	7.7			10.0		50.	45.20
			POST	0.17	0.67		9.2	0.134		7.3	130.					
	5/11/76	T 20	PRE	0.04	0.07	0.28	33.1	0.041	0.080	8.3			11.0		22.	45.18
			POST													
	1/ 7/77	T 20	PRE	0.77		1.51	11.7	0.125	0.134	0.0			1.0		45.	25.80
			POST				14.0									
	1/ 7/77	FM20	PRE	0.77		0.00	3.1	0.125	0.000				1.0		48.	25.80
			POST				3.6									

SITE: LOCATION OF SAMPLE, AS MEPI21M WHERE CP12 = SEU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
6 = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP 9T	1/29/75	T 20	PRE	0.77	0.77	1.09	0.0	0.137	0.142				0.0		130.	22.78
			POST	0.00	1.47	0.70	21.1	0.195		7.4	350.					
	1/29/75	F*20	PRE	0.77	0.77	0.00	0.0	0.137	0.000				0.0		130.	22.78
			POST	0.07	1.65	0.53	18.7	0.194		7.4	360.					
	1/29/75	T 4	PRE	0.77	0.77	1.09	0.0	0.137	0.142				0.0		130.	22.78
			POST	0.91	0.88	1.51	19.5	0.194		7.4	340.					
	1/29/75	F* 4	PRE	0.77	0.77	0.00	0.0	0.137	0.000				0.0		130.	22.78
			POST	0.88	1.09		18.7	0.203		7.4	360.					
EP1CT	10/10/74	T 20	PRE	0.00	0.00	0.76	39.0	0.048	0.076				11.1		110.	36.75
			POST	0.00	0.14	0.49	18.3	0.080			196.					
	10/10/74	F*20	PRE	0.00	0.00	0.00	0.0	0.048	0.000				11.1		110.	36.75
			POST	0.04	0.21	0.49	20.0	0.092			195.					
	10/25/74	T 20	PRE	0.00	0.00	0.66	26.3	0.093	0.118				10.0		99.	35.48
			POST	0.00	0.07	0.84	16.3	0.135		7.6	224.					
	11/21/74	T 20	PRE	0.00	0.02	0.88	56.2	0.051	0.113				1.0		139.	35.06
			POST	0.00	0.11	0.60	19.6	0.072		7.7	254.					
	11/21/74	F*20	PRE	0.00	0.02	0.00	48.7	0.051	0.000				1.0		139.	35.06
			POST	0.00	0.07	0.70	18.8	0.035		7.4	249.					
	11/21/74	T 4	PRE	0.00	0.02	0.88	56.2	0.051	0.113				1.0		139.	35.06
			POST	0.00	0.18	0.56	21.1	0.080		7.7	260.					
	11/21/74	F* 4	PRE	0.00	0.02	0.00	48.7	0.051	0.000				1.0		118.	35.06
			POST	0.00	0.13	0.63	21.8	0.083		7.5	260.					
	12/19/74	T 20	PRE	0.17	0.00	1.29	22.9	0.099	0.116		327.		0.0		118.	32.36
			POST	0.00	0.56	0.56	15.6	0.074		7.8	320.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLAINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. F* = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP16T	12/19/74	FS20	PRE	0.17	0.00	0.00	21.4	0.099	0.000		327.		0.0		119.	32.36
			POST	0.00	0.56	0.53	16.4	0.064		7.8	324.					
	12/19/74	T 4	PRE	0.17	0.00	1.29	22.9	0.099	0.116		327.		0.0		119.	32.36
			POST	0.00	0.32	1.09	31.2	0.063		6.9	320.					
	12/19/74	FS 4	PRE	0.17	0.00	0.00	21.4	0.099	0.000		327.		0.0		118.	32.36
			POST	0.00	0.60	1.60	18.7	0.068		7.9	325.					
	1/ 9/75	T 20	PRE	0.60	1.02	1.68	20.2	0.115	0.149				0.0		151.	28.52
			POST	0.28	0.70	0.42	15.9	0.121		6.4	330.					
	1/ 9/75	FS20	PRE	0.60	1.02	0.00	0.0	0.115	0.000				0.0		151.	28.52
			POST	0.32	0.77	0.42	14.3	0.114		6.5	280.					
	1/ 9/75	T 4	PRE	0.60	1.02	1.68	20.2	0.115	0.149				0.0		151.	28.52
			POST	0.00	0.98	0.46	20.1	0.109		7.2	335.					
	1/ 9/75	FS 4	PRE	0.60	1.02	0.00	0.0	0.115	0.000				0.0		151.	28.52
			POST	0.07	0.84		17.7	0.149		6.9	335.					
	1/29/75	T 20	PRE	0.77	0.61	0.84	13.7	0.142	0.168				0.0		130.	22.78
			POST	0.04	1.54	0.70	13.7	0.180		7.1	360.					
	1/29/75	FS20	PRE	0.77	0.41	0.00	0.0	0.142	0.000				0.0		130.	22.79
			POST	0.00	1.40	0.81	12.8	0.172		7.2	375.					
	1/29/75	T 4	PRE	0.77	0.61	0.84	13.7	0.142	0.169				0.0		130.	22.78
			POST	0.56	1.05	1.47	16.9	0.181		7.2	377.					
	1/29/75	FS 4	PRE	0.77	0.41	0.00	0.0	0.142	0.000				0.0		130.	22.78
			POST	0.56	1.02		20.1	0.181		7.3	360.					
	4/ 4/75	T 20	PRE	1.02	2.10	1.22	35.5	0.178	0.198		737.		2.0		68.	26.97
			POST	0.28	1.66	1.37	35.7	0.154		7.3	175.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PELLINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET. VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP16T	4/ 4/75	F*20	PRE	0.38	2.06	0.00	0.0	0.178	0.000		337.		2.0		68.	26.97
			POST	1.05	0.98	1.09	29.1	0.133		7.2	170.					
	4/ 4/75	T 4	PRE	1.02	2.10	1.22	35.5	0.178	0.188		337.		2.0		68.	26.97
			POST	0.67	1.09	1.37	34.1	0.152		7.3	175.					
	4/ 4/75	F* 4	PRE	0.38	2.06	0.00	0.0	0.178	0.000		337.		2.0		68.	26.97
			POST	0.07	1.65		42.7	0.150		7.3	175.					
	11/ 5/75	T 20	PRE	0.00	0.07	0.46	22.2	0.105	0.110	7.7			10.0		11.	34.94
			POST													
	11/18/75	T 20	PRE	0.00	0.14	1.20	36.1	0.133	0.134	7.6		11.0	5.0	10.5	56.	36.72
			POST	0.00	0.67	0.70	29.2	0.076		7.3	148.					
	11/18/75	F*20	PRE	0.00	0.14	0.90	33.9	0.133	0.170	7.6			5.0		56.	36.72
			POST	0.00	0.77	0.88	31.3	0.091		7.4	149.					
	11/18/75	T 4	PRE	0.00	0.14	1.20	36.1	0.133	0.134	7.6		11.0	5.0	10.5	56.	35.72
			POST		0.60	0.74	33.5	0.096		7.1	150.					
	1/ 7/76	T 20	PRE	0.53	1.26	2.42	50.4	0.322	0.580	6.6			0.0	50.9	49.	40.02
			POST	0.00	0.74	0.77	42.3	0.526		7.2	197.					
	1/ 7/76	F*20	PRE	0.53	1.26	2.10	50.4	0.322	0.461	6.6			0.0		49.	40.02
			POST	0.00	0.98	4.04	42.9	0.400		7.4	184.					
	1/ 7/76	T 4	PRE	0.53	1.26	2.42	50.4	0.322	0.580	6.6			0.0	50.9	49.	40.02
			POST	0.14	1.33	0.81	52.8	0.423		6.9	181.					
	2/ 3/76	T 20	PRE	0.56	1.19	1.63	55.7	0.376	0.506	6.4			0.0		47.	33.16
			POST	0.00	1.58	0.53	31.3	0.375		7.1	197.					
	2/ 3/76	F*20	PRE	0.56	1.19	1.86	48.9	0.349	0.470	6.4			0.0		47.	33.16
			POST	0.00	1.50	0.74	33.4	0.392		7.0	200.					

SITE: LOCATION OF SAMPLE, AS MONITOR WELL EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. F5 = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP12T	2/ 3/76	T 4	PRE	0.56	1.19	1.63	55.7	0.376	0.506	6.4			0.0		47.	33.16
			POST	0.10	1.30	0.60	37.6	0.319		7.1	189.					
	2/26/76	T 20	PRE	2.00	2.00	2.73	43.5	0.000	0.273				0.5		17.	23.76
			POST													
	3/ 2/76	T 20	PRE	2.00	0.77	4.28	50.6	0.300	0.375	7.3		9.3	0.0	6.1	48.	21.91
			POST	0.46	3.50	2.14	34.3	0.282		7.4	228.					
	3/ 2/76	F*20	PRE	2.00	0.77	4.43	49.3	0.300	0.362	7.3			0.0		48.	21.91
			POST	0.74	3.08	2.87	24.2	0.287		7.3	227.					
	3/ 2/76	T 4	PRE	2.00	0.77	4.28	50.6	0.300	0.375	7.3		9.3	0.0	6.1	48.	21.91
			POST	1.29	2.63	2.35	44.6	0.265		7.2	238.					
	3/24/76	T 20	PRE	0.74	0.32	2.84	41.7	0.124	0.327	7.2		0.0	0.0	101.1	49.	33.05
			POST	0.00	1.40	3.89	27.0	0.203		6.7	64.					
	3/24/76	F*20	PRE	0.74	0.32	2.66	33.1	0.124	0.304	7.2			0.0		49.	33.05
			POST	0.00	1.05	3.50	26.5	0.200		6.8	66.					
	3/24/76	T 4	PRE	0.74	0.32	2.84	41.7	0.124	0.327	7.2		0.0	0.0	101.1	49.	33.05
			POST	0.14	0.91	1.02	32.2	0.175		6.7	66.					
	4/12/76	T 20	PRE	0.25	0.63	0.95	32.4	0.040	0.245	7.5		9.6	9.0	8.3	50.	45.20
			POST	0.24	0.74		6.9	0.046		7.7	122.					
	4/12/76	T 20	PRE	0.25	0.63	0.95	32.4	0.040	0.245	7.5		9.6	9.0	8.3	50.	45.20
			POST	0.24	0.56		10.0	0.035		7.0	124.					
	4/12/76	F*20	PRE	0.25	0.63	0.42	40.5	0.040	0.104	7.5			9.0		50.	45.20
			POST	0.24	0.67		9.2	0.051		7.1	125.					
	5/11/76	T 20	PRE	0.07	0.14	0.42	33.1	0.018	0.058	8.1			11.0		22.	45.18
			POST													

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS STAGE
EP11T	4/12/76	T 20	PRE	0.21	0.53	0.84	21.1	0.086	0.123	7.5	126.	10.1	10.0	4.2	50. 45.20
			POST	0.21	0.63		11.5	0.056		7.3	131.				
	4/12/76	FS20	PRE	0.21	0.53	0.42	21.8	0.048	0.092	7.5			10.0		50. 45.20
			POST	0.21	0.70		12.3	0.045		7.1	128.				
	5/11/76	T 20	PRE	0.00	0.11	0.21	36.7	0.037	0.039	7.9			10.0		22. 45.18
			POST												
EP12T	8/ 6/75	T 20	PRE	0.14	0.18	2.17	53.8	0.085	0.249	8.2			24.0		69. 42.32
			POST	0.21	0.50	1.54	34.6	0.116		7.0	156.				
	8/ 6/75	FS20	PRE	0.14	0.21	1.05	37.6	0.085	0.210	8.1			24.0		68. 42.32
			POST	0.21	0.24	1.62	43.4	0.070		7.0	144.				
	8/11/75	T 20	PRE	0.04	0.00	2.38	0.0	0.076	0.163				24.0		10. 41.83
			POST												
	9/ 3/75	T 20	PRE	0.11	0.14	2.59	32.9	0.050	0.196	8.3	123.		17.5		63. 40.90
			POST	0.00	1.02	0.84	34.8	0.076		7.3	142.				
	9/ 3/75	FS20	PRE	0.11	0.14	1.26	34.3	0.050	0.196	8.3	123.		17.5		63. 40.90
			POST	0.00	0.32	1.37	38.8	0.141		7.5	132.				
	9/23/75	T 20	PRE	0.32	0.07	1.65	43.4	0.145	0.246	7.5	133.	7.3	14.0	23.4	53. 41.00
			POST	0.00	0.49	1.23	30.3	0.135		7.6	127.				
	9/23/75	FS20	PRE	0.21	0.11	1.44	40.0	0.145	0.241	7.5	133.		14.0		53. 41.00
			POST	0.00	0.42	1.19	31.4	0.120		7.2	128.				
	10/21/75	T 4	PRE	0.21	0.35	2.22	39.5	0.180	0.255	7.3	148.	8.8	10.0	22.3	56. 36.03
			POST	0.00	0.84	1.29	40.3	0.145		7.0	140.				
	10/21/75	FS 4	PRE	0.21	0.35	1.54	36.0	0.180	0.261	7.3	148.		10.0		56. 36.03
			POST	0.00	0.77	0.91	37.0	0.180		7.0	139.				

SITE: LOCATION OF SAMPLE. AS "EP12T" WHERE EP12 = SAU PLAINS SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET. VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP12T	10/21/75	T 20	PRE	0.21	0.35	2.22	39.5	0.180	0.255	7.3	148.	8.8	10.0	22.3	56.	36.03
			POST	0.00	0.95	0.81	35.3	0.181		7.4	140.					
	10/21/75	FS20	PRE	0.21	0.35	1.54	36.0	0.180	0.261	7.3	148.		10.0		56.	36.03
			POST	0.00	0.91	1.02	32.8	0.177		7.2	141.					
	11/ 5/75	T 20	PRE	0.04	0.21	0.14	34.1	0.176	0.263	7.7	156.		8.0		11.	34.94
			POST													
	11/18/75	T 20	PRE	0.00	0.81	1.12	39.3	0.241	0.323	7.1	129.	9.3	4.0	22.4	56.	36.72
			POST	0.00	0.95	0.86	31.5	0.231		7.0	131.					
	11/18/75	FS20	PRE	0.00	0.81	1.10	40.4	0.241	0.310	7.1	129.		4.0		56.	36.72
			POST	0.00	0.77	0.98	33.5	0.228		7.0	138.					
	11/18/75	T 4	PRE	0.00	0.81	1.12	39.3	0.241	0.323	7.1	129.	9.3	4.0	22.4	56.	36.72
			POST		1.02		32.8	0.232		7.2	142.					
	3/ 4/76	T 20	PRE	1.61	0.63	3.54	51.8	0.274	0.343	7.0	269.	8.2	1.0	11.7	48.	21.14
			POST	0.28	3.05	2.52	27.3	0.231		4.3	218.					
	4/13/76	T 20	PRE	0.09	0.13	1.09	26.8	0.085	0.133	7.3	122.	10.1	8.5	8.6	50.	45.19
			POST	0.24	1.12		7.7	0.050		7.0	118.					
	4/13/76	FS20	PRE	0.09	0.13	0.91	27.3	0.085	0.124	7.3	122.		8.5		50.	45.19
			POST	0.24	1.19		7.7	0.056		7.1	116.					
	4/27/76	T 20	PRE	0.46	0.95	1.47	34.2	0.036	0.131	7.9	122.	11.2	8.0	20.9	22.	45.01
			POST													
	5/10/76	T 20	PRE	0.46	0.46	1.47	46.2	0.036	0.100	7.8	140.		8.0		22.	45.21
			POST													
EP12B	8/ 6/75	T 20	PRE	0.11	0.25	1.79	49.9	0.095	0.256				23.0		68.	42.32
			POST	0.00	0.78	1.20	38.4	0.098		7.0	148.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLAINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP12B	8/ 6/75	F*20	PRE	0.14	0.21	0.95	41.5	0.095	0.193	8.2			23.0		68.	42.32
			POST	0.14	0.28	1.40	34.6	0.041		7.0	152.					
	8/11/75	T 20	PRE	0.25	0.00	1.30	0.0	0.097	0.245				23.0		10.	41.83
			POST													
	5/10/76	T 20	PRE	0.42	0.42	1.09	39.2	0.039	0.127	7.9			7.5		22.	45.21
			POST													
EP13T	10/ 7/74	T 20	PRE	0.00	0.12	2.03	57.4	0.138	0.277				10.8		113.	37.05
			POST	0.00	0.74	0.84	38.5	0.160			105.					
	10/25/74	T 20	PRE	0.00	0.00	2.10	51.2	0.122	0.267				9.0		99.	35.48
			POST	0.14	0.91	0.91	33.3	0.200		7.0	115.					
	6/16/75	T 20	PRE	0.04	0.53	1.14	30.7	0.048	0.075	7.3	123.	8.8	16.0	44.2	99.	44.84
			POST	0.00	0.74	0.49	22.8	0.054		7.3	132.					
	6/16/75	F*20	PRE	0.04	0.53	0.98	30.0	0.048	0.000		123.		16.0		99.	44.84
			POST	0.04	0.46	0.63	23.5	0.034		7.5	120.					
	7/28/75	T 20	PRE	0.07	0.04	4.48	0.0	0.083	0.352	9.6	127.		27.0		6.	43.19
			POST													
	11/ 5/75	T 20	PRE	0.11	0.42	1.40	35.6	0.164	0.202	7.6	150.		9.0		11.	34.94
			POST													
	12/ 2/75	T 20	PRE	0.07	0.28	0.60	37.5	0.135	0.207	7.1	160.		0.0		50.	39.19
			POST	0.00	1.37	0.77	41.0	0.138		7.1	155.					
	12/ 2/75	F*20	PRE	0.07	0.14	0.63	34.3	0.138	0.181	7.1	160.		0.0		50.	39.19
			POST	0.00	1.19	0.77	43.8	0.148		7.0	140.					
	12/ 2/75	T 4	PRE	0.07	0.28	0.60	37.5	0.138	0.207	7.1	160.		0.0		50.	39.19
			POST	0.25	1.16	1.09	43.4	0.160		6.9	100.					

SITE: LOCATION OF SAMPLE, AS EP12T WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP13T	12/16/75	T 20	PRE	0.25	0.09	1.23	0.0	0.262	0.389	7.0	148.		0.0		6.	41.16
			POST													
	1/ 6/76	T 20	PRE	0.39	0.69	1.65	34.5	0.240	0.271	6.9	194.	4.8	5.0	9.1	49.	40.23
			POST	0.00	0.95	2.87	29.4	0.268		7.3	116.					
	1/ 6/76	F 20	PRE	0.39	0.69	1.58	33.3	0.240	0.271	6.9	194.		5.0		49.	40.23
			POST	0.00	0.70	0.95	31.4	0.271		7.0	117.					
	1/ 6/76	T 4	PRE	0.39	0.69	1.65	34.5	0.240	0.271	6.9	194.	4.8	5.0	9.1	49.	40.23
			POST	0.38	0.30	1.72	37.1	0.300		6.8	129.					
	2/ 6/76	T 20	PRE	0.74	0.46	0.78	22.3	0.220	0.292	7.2	195.	2.4	0.0	4.0	47.	32.22
			POST	0.00	1.65	0.63	24.0	0.174		7.4	183.					
	2/ 6/76	F 20	PRE	0.74	0.46	0.76	24.0	0.220	0.230	7.2	195.		0.0		47.	32.22
			POST	0.00	1.72	0.56	24.0	0.194		7.3	173.					
	2/ 6/76	T 4	PRE	0.74	0.46	0.78	22.3	0.220	0.292	7.2	195.	2.4	0.0	4.0	47.	32.22
			POST	0.64	0.88	1.02	25.0	0.190		7.0	182.					
	2/17/76	T 20	PRE	1.02	1.02	1.23	13.2	0.233	0.240	7.5	245.	1.2	0.0	13.7	53.	27.55
			POST	0.28	1.82	0.84	21.4	0.124		7.7	232.					
	2/17/76	T 4	PRE	1.02	1.02	1.23	13.2	0.233	0.240	7.5	245.	1.2	0.0	13.7	53.	27.55
			POST	0.63	1.23	1.89	22.9	0.114		7.4	248.					
	2/26/76	T 20	PRE	2.70	2.70	2.97	47.6	0.000	0.297				0.5		17.	23.76
			POST													
	5/10/76	T 20	PRE	0.04	0.29	1.30	43.3	0.037	0.106	8.0	143.		8.5		22.	45.21
			POST													
	1/ 7/77	T 20	PRE	1.29		2.38	29.6	0.057	0.215	0.0			1.0		48.	25.80
			POST				22.3									

SITE: LOCATION OF SAMPLE, AS PREFIX WHERE EP12 = LAKE PLAINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. F1 = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET. VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP13T	1/ 7/77	FM20	PRE	1.29		0.00	21.8	0.057	0.000				1.0		48.	25.80
			POST				15.1									
EP13M	12/18/75	T 20	PRE	0.18	0.95	1.05	0.0	0.183	0.300		160.		1.0		6.	41.16
			POST													
	5/10/76	T 20	PRE	0.00	0.81	1.05	42.9	0.077	0.155	7.4	124.		8.5		22.	45.21
			POST													
EP13B	12/18/75	T 20	PRE	0.14	0.75	1.75	0.0	0.240	0.399		169.		2.0		6.	41.16
			POST													
	2/26/76	T 20	PRE	2.52	2.52	2.97	50.3	0.000	0.297				2.0		17.	23.76
			POST													
	5/10/76	T 20	PRE	0.56	0.53	1.02	40.4	0.047	0.117	7.8	127.		8.5		22.	45.21
			POST													
EP14T	12/18/75	T 20	PRE	0.00	0.42	1.47	0.0	0.274	0.563		127.		0.0		6.	41.16
			POST													
	5/10/76	T 20	PRE	0.07	0.42	1.19	37.1	0.067	0.092	7.9			9.0		22.	45.21
			POST													
	1/ 7/77	T 20	PRE	1.85		3.05	7.0	0.174	0.215				1.0		48.	25.80
			POST				25.0									
	1/ 7/77	FM20	PRE	1.85		0.00	2.3	0.174	0.000				1.0		48.	25.80
			POST				1.2									
EP14M	5/10/76	T 20	PRE	0.11	0.67	2.24	39.6	0.037	0.095	7.9			9.0		22.	45.21
			POST													
EP14B	5/10/76	T 20	PRE	0.04	0.70	1.51	31.4	0.032	0.099	7.8			9.0		22.	45.21
			POST													

SITE: LOCATION OF SAMPLE. AS PRIOR WHERE EP13 = SAU PLAINE SITE 13. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES C STIGMAN RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP16T	10/ 7/74	T 20	PRE	0.00	0.12	1.88	48.2	0.088	0.229		103.		10.6		113.	37.05
			POST	0.18	0.53	0.77	29.1	0.130			106.					
	10/25/74	T 20	PRE	0.00	0.00	1.84	48.6	0.086	0.187		106.		9.0		99.	35.48
			POST	0.00	0.60	0.63	29.9	0.135		7.2	120.					
	7/28/75	T 20	PRE	0.07	0.04	1.61	0.0	0.019	0.084		113.		27.0		6.	43.19
			POST													
	8/ 6/75	T 20	PRE	0.04	0.04	5.04	49.2	0.034	0.175	8.8	112.		25.0		68.	42.32
			POST	0.00	0.91	1.05	27.5	0.042		7.1	126.					
	8/ 6/75	FS20	PRE	0.07	0.07	0.95	34.6	0.034	0.096	8.9	113.		25.0		68.	42.32
			POST	0.11	0.21	1.12	24.9	0.019		7.1	117.					
	8/11/75	T 20	PRE	0.11	0.04	1.19	0.0	0.013	0.060	9.0		7.4	24.0	26.9	10.	41.83
			POST													
	9/ 3/75	T 20	PRE	0.07	0.04	1.61	33.6	0.019	0.290	9.7	113.	7.9	19.0	10.0	63.	40.90
			POST	0.00	0.39	0.39	27.2	0.048		7.4	115.					
	9/ 3/75	FS20	PRE	0.07	0.04	0.91	23.1	0.019	0.084	9.7	113.		19.0		63.	40.90
			POST	0.00	0.28	0.60	24.7	0.023		7.4	112.					
	9/23/75	T 20	PRE	0.42	0.21	2.03	37.8	0.066	0.230	7.5	117.	8.4	14.0	38.3	53.	41.00
			POST	0.00	0.49	2.31	28.1	0.070		7.3	116.					
	9/23/75	FS20	PRE	0.21	0.00	2.00	34.6	0.066	0.155	7.5	117.		14.0		53.	41.00
			POST	0.00	0.35	1.05	24.1	0.059		7.2	96.					
	10/21/75	T 4	PRE	0.11	0.11	1.54	36.0	0.070	0.160	7.3	125.	8.9	10.0	11.7	56.	36.03
			POST	0.00	0.42		39.5	0.048		7.1	125.					
	10/21/75	FS 4	PRE	0.11	0.11	0.49	31.2	0.070	0.130	7.3	125.		10.0		56.	36.03
			POST	0.00	0.53		31.9	0.037		7.0	121.					

SITE: LOCATION OF SAMPLE, AS INDICATED WHERE EP16 = END PLUNGE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP16T	10/21/75	T 20	PRE	0.11	0.11	1.54	36.0	0.070	0.160	7.3	125.	8.9	10.0	11.7	56.	36.03
			POST	0.00	0.67		30.2	0.094		7.3	127.					
	10/21/75	FS20	PRE	0.11	0.11	0.49	31.2	0.070	0.130	7.3	125.		10.0		56.	36.03
			POST	0.00	0.46		27.7	0.082		7.4	125.					
	11/ 5/75	T 20	PRE	0.00	0.07	1.26	34.8	0.082	0.125	7.4	122.		9.0		11.	34.94
			POST													
	11/18/75	T 20	PRE	0.14	0.39	0.19	32.8	0.063	0.164	7.5	125.	10.1	6.0	12.2	56.	36.72
			POST	0.00	0.42	0.53	29.9	0.082		7.1	128.					
	11/18/75	FS20	PRE	0.14	0.39	0.75	30.6	0.063	0.152	7.5	125.		6.0		56.	36.72
			POST	0.00	0.39	0.96	24.2	0.063		7.1	116.					
	11/18/75	T 4	PRE	0.14	0.39	1.19	32.8	0.063	0.164	7.5	125.	10.1	6.0	12.2	56.	36.72
			POST		0.53	1.37	27.8	0.075		7.1	144.					
	12/18/75	T 20	PRE	0.07	0.32	1.09	0.0	0.086	0.201		145.		0.0		6.	41.16
			POST													
	1/ 8/76	T 20	PRE	0.42	0.70	1.54	36.7	0.218	0.243	6.9	162.	9.1	5.0	9.9	49.	39.85
			POST	0.00	1.19	1.33	30.8	0.272		7.1	134.					
	1/ 8/76	FS20	PRE	0.42	0.70	1.54	31.1	0.218	0.233	6.9	162.		5.0		49.	39.85
			POST	0.00	1.23	1.23	26.2	0.269		7.2	146.					
	1/ 8/76	T 4	PRE	0.42	0.70	1.54	36.7	0.218	0.243	6.9	162.	9.1	5.0	9.9	49.	39.85
			POST	0.32	0.45	1.51	32.8	0.272		6.9	135.					
	3/ 4/76	T 20	PRE	1.54	0.49	4.03	39.0	0.240	0.274	6.8	248.		0.0		48.	21.14
			POST	0.21	2.66	2.00	23.3	0.234		7.5	210.					
	3/ 4/76	FS20	PRE	1.54	0.49	4.34	43.5	0.240	0.262	6.8	248.		0.0		48.	21.14
			POST	0.35	1.86	1.96	24.1	0.199		7.5	216.					

SITE: LOCATION OF SAMPLE, AS EP12T WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP1aT	3/ 4/76	T 4	PRE	1.54	0.49	4.03	39.0	0.240	0.274	6.9	248.		0.0		48.	21.14
			POST	0.39	2.73	1.61	33.8	0.172		7.1	222.					
	4/13/76	T 20	PRE	0.12	0.14	1.33	25.3	0.116	0.423	7.1	105.	10.9	7.0	17.9	50.	45.19
			POST	0.51	1.64		1.0	0.113		7.0	101.					
	4/13/76	F*20	PRE	0.12	0.14	0.84	31.0	0.116	0.173	7.1	105.		7.0		50.	45.19
			POST	0.59	2.15		1.0	0.113		6.5	101.					
	4/27/76	T 20	PRE	0.81	1.07	1.23	33.3	0.035	0.102	7.8	118.	11.1	10.0	17.6	22.	45.01
			POST													
	5/10/76	T 20	PRE	0.04	0.67	1.12	34.8	0.037	0.090	7.9	114.		10.0		22.	45.21
			POST													
EP1aM	12/18/75	T 20	PRE	0.00	0.67	1.23	0.0	0.144	0.319		152.		1.0		6.	41.16
			POST													
	5/10/76	T 20	PRE	0.07	0.49	1.19	33.8	0.066	0.105	7.8	111.		9.5		22.	45.21
			POST													
EP1aB	8/ 6/75	T 20	PRE	0.11	0.11	1.12	36.1	0.097	0.182	7.4			23.0		68.	42.32
			POST	0.07	0.42	0.91	25.6	0.096		7.4	121.					
	8/ 6/75	F*20	PRE	0.14	0.14	0.91	33.0	0.097	0.190	7.4			23.0		68.	42.32
			POST	0.04	0.32	1.02	24.9	0.063		7.2	120.					
	8/11/75	T 20	PRE	0.25	0.00	0.81	0.0	0.030	0.066	7.5		4.1	23.0	20.3	10.	41.83
			POST													
	9/ 3/75	T 20	PRE	0.32	0.18	0.84	25.2	0.055	0.270	7.2	117.	5.0	18.0	22.5	63.	40.90
			POST	0.00	0.42	0.42	34.9	0.067		7.0	120.					
	9/ 3/75	F*20	PRE	0.32	0.18	0.87	24.9	0.055	0.089	7.2	117.		18.0		63.	40.90
			POST	0.00	0.32	0.46	30.3	0.069		7.3	120.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EPU PLOING SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP1c8	9/23/75	T 20	PRE	0.26	0.04	2.00	36.5	0.078	0.197	7.5	117.	8.2	14.0	17.5	53.	41.00
			POST	0.00	0.49	0.98	28.1	0.068		7.1	91.					
	9/23/75	FS20	PRE	0.19	0.00	1.72	32.6	0.078	0.161	7.5	117.		14.0		53.	41.00
			POST	0.00	0.32	0.67	22.7	0.032		7.8	111.					
	10/21/75	T 4	PRE	0.14	0.14	1.47	38.4	0.103	0.180	7.3	122.	5.5	10.0	14.7	56.	36.03
			POST	0.00	0.63	1.19	34.4	0.072		7.1	123.					
	10/21/75	FS 4	PRE	0.14	0.14	1.23	31.2	0.103	0.137	7.3	122.		10.0		56.	36.03
			POST	0.00	0.41	0.81	26.6	0.063		7.0	119.					
	10/21/75	T 20	PRE	0.14	0.14	1.47	38.4	0.103	0.180	7.3	122.	5.5	10.0	14.7	56.	36.03
			POST	0.00	0.67	2.17	27.7	0.098		7.2	126.					
	10/21/75	FS20	PRE	0.14	0.14	1.23	31.2	0.103	0.137	7.3	122.		10.0		56.	36.03
			POST	0.00	0.63	1.19	29.4	0.083		7.2	125.					
	11/18/75	T 20	PRE	0.11	0.28	1.24	35.0	0.102	0.175	7.4	142.	9.5	6.0	16.0	56.	36.72
			POST	0.00	0.60	1.12	29.2	0.081		7.2	141.					
	11/18/75	FS20	PRE	0.11	0.28	1.02	31.2	0.102	0.152	7.4	142.		6.0		56.	36.72
			POST	0.00	0.46	0.74	29.2	0.079		7.1	134.					
	11/18/75	T 4	PRE	0.00	0.29	1.24	35.0	0.102	0.175	7.4	142.	9.5	6.0	16.0	56.	36.72
			POST		0.49	0.32	30.6	0.086		7.0	141.					
	12/18/75	T 20	PRE	0.07	0.42	1.30	0.0	0.111	0.315		154.		2.0		6.	41.16
			POST													
	4/13/76	T 20	PRE	0.20	0.21	1.37	31.0	0.106	0.212	7.2	107.		5.5		50.	45.19
			POST	0.21	1.05		7.7	0.110		6.9	94.					
	4/13/76	FS20	PRE	0.20	0.21	0.84	28.1	0.106	0.192	7.2	107.		5.5		50.	45.19
			POST	0.10	0.98		7.0	0.105		6.8	93.					

SITE: LOCATION OF SAMPLE. AS = "P12T" WHERE EP12 = CAU PLEINC SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP16B	4/27/76	T 20	PRE	0.98	0.67	1.26	30.0	0.045	0.096	8.0	104.	9.4	9.5	19.7	22.	45.01
			POST													
	5/10/76	T 20	PRE	0.14	0.74	1.09	33.1	0.078	0.105	7.9	110.		9.5		22.	45.21
			POST													
EP2CT	10/ 7/74	T 20	PRE	0.00	0.00	1.76	50.2	0.062	0.147				11.1		113.	37.05
			POST	0.04	0.56	0.70	29.1	0.092			110.					
	10/25/74	T 20	PRE	0.00	0.33	1.73	44.1	0.067	0.199				9.0		99.	35.48
			POST	0.00	0.46	0.88	29.9	0.110		7.3	109.					
	3/11/75	T 20	PRE	0.04	0.04	1.58	0.0	0.069	0.139				24.0		10.	41.83
			POST													
	11/ 5/75	T 20	PRE	0.00	0.07	1.47	30.1	0.075	0.125	7.4			9.0		11.	34.94
			POST													
	12/ 2/75	T 20	PRE	0.11	1.16	0.60	43.4	0.139	0.206	7.3	117.		0.0		50.	39.19
			POST	0.00	0.53	0.77	30.1	0.061		6.9	105.					
	12/ 2/75	F*20	PRE	0.11	0.98	0.35	38.4	0.139	0.170	7.3	117.		0.0		50.	39.19
			POST	0.00	0.46	0.70	30.8	0.061		6.9	108.					
	12/ 2/75	T 4	PRE	0.11	1.16	0.60	43.4	0.139	0.206	7.3	117.		0.0		50.	39.19
			POST	0.25	0.25	0.91	32.8	0.068		6.9	100.					
	12/18/75	T 20	PRE	0.00	0.04	0.81	0.0	0.014	0.087		138.		0.0		6.	41.16
			POST													
	1/ 8/76	T 20	PRE	0.25	0.35	1.12	29.8	0.033	0.050	7.1	136.	9.0	0.0	8.3	49.	39.85
			POST	0.00	0.53	0.26	38.4	0.054		7.4	141.					
	1/ 8/76	F*20	PRE	0.25	0.35	0.96	31.9	0.033	0.050	7.1	136.		0.0		49.	39.85
			POST	0.00	0.56	0.59	31.4	0.045		6.8	172.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EIU PILOT SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL NO. F = NO MEASURE) FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
F* = NO MEASURE FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREE CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET. VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP2GT	1/ 8/76	T 4	PRE	0.25	0.35	1.12	21.6	0.033	0.050	7.1	136.	9.0	0.0	8.3	49.	39.85
			POST	0.32	0.15	0.61	33.3	0.041		6.9	135.					
	2/ 6/76	T 20	PRE	0.42	0.81	1.02	26.5	0.154	0.219	6.8	118.		0.0		47.	32.22
			POST	0.00	0.35	0.70	26.1	0.171		7.0	132.					
	2/ 6/76	FS20	PRE	0.42	0.81	0.46	24.2	0.154	0.239	6.8	118.		0.0		47.	32.22
			POST	0.00	1.36	0.70	26.1	0.162		7.0	104.					
	2/ 6/76	T 4	PRE	0.42	0.81	1.02	26.5	0.154	0.219	6.8	118.		0.0		47.	32.22
			POST	0.67	0.70	1.23	33.4	0.184		6.8	142.					
	2/26/76	T 20	PRE	2.31	2.31	2.54	40.8	0.000	0.224				3.0		17.	23.76
			POST													
	5/10/76	T 20	PRE	0.35	0.63	1.26	33.5	0.037	0.067	8.0			9.0		22.	45.21
			POST													
	1/ 7/77	T 20	PRE	0.07		1.75	34.2	0.057	0.112	0.0			1.0		48.	25.80
			POST				22.7									
	1/ 7/77	FM20	PRE	0.07		0.00	32.7	0.057	0.000				1.0		48.	25.80
			POST				21.5									
EP2GM	12/18/75	T 20	PRE	0.07	0.07	0.95	0.0	0.068	0.156		141.		2.0		6.	41.16
			POST													
	2/ 6/76	T 20	PRE	0.35	0.67	1.02	26.5	0.081	0.120	6.8			0.0		47.	32.22
			POST	0.00	0.49	0.56	29.2	0.088		6.9	154.					
	2/26/76	T 20	PRE	2.07	2.07	2.41	41.5	0.000	0.241				1.0		17.	23.76
			POST													
	5/10/76	T 20	PRE	0.46	0.56	1.19	29.0	0.054	0.069	7.9			9.0		22.	45.21
			POST													

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
G = 1 METER GRAVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET. VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP26B	12/16/75	T 20	PRE	0.04	0.25	0.91	0.0	0.094	0.204		145.		4.0		6.	41.16
			POST													
	2/ 6/76	T 20	PRE	0.56	1.05	1.30	30.7	0.040	0.118	6.7			0.0		47.	32.22
			POST	0.00	0.70	0.56	33.4	0.110		7.0	174.					
	2/26/76	T 20	PRE	1.65	1.89	2.17	40.1	0.000	0.217				3.0		17.	23.76
			POST													
	5/10/76	T 20	PRE	0.14	0.77	1.26	28.6	0.045	0.108	7.8			11.0		22.	45.21
			POST													
EP22T	5/10/76	T 20	PRE	0.25	0.63	1.16	28.2	0.033	0.081	7.9	92.		8.5		22.	45.21
			POST													
EP23T	10/ 7/74	T 20	PRE	0.00	0.28	1.73	48.9	0.050	0.136		104.		10.6		113.	37.05
			POST	0.04	0.46	0.91	24.1	0.090			110.					
	10/25/74	T 20	PRE	0.00	0.01	1.61	37.4	0.048	0.143		116.		9.0		99.	35.48
			POST	0.00	0.67	1.02	27.9	0.100		7.3	113.					
	11/20/74	T 20	PRE	0.00	0.00	1.00	44.9	0.047	0.080				2.0		139.	35.15
			POST	0.10	0.42	0.91	27.4	0.048		6.9	114.					
	11/20/74	F 20	PRE	0.00	0.00	1.00	41.2	0.047	0.000				2.0		139.	35.15
			POST	0.07	0.18	0.84	27.4	0.025		6.9	112.					
	11/20/74	T 4	PRE	0.00	0.00	1.00	44.9	0.047	0.080				2.0		139.	35.15
			POST	0.00	0.91	0.59	15.7	0.048		7.6	121.					
	11/20/74	F 4	PRE	0.00	0.00	1.00	41.2	0.047	0.000				2.0		139.	35.15
			POST	0.00	0.32	0.98	29.0	0.046		7.1	128.					
	12/20/74	T 20	PRE	0.00	0.14	1.19	38.2	0.034	0.086		95.		1.0		118.	32.21
			POST	0.00	0.38	0.80	24.2	0.046		7.4	115.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP23T	12/20/74	F*20	PRE	0.00	0.14	0.00	36.7	0.034	0.000		95.		1.0		118.	32.21
			POST	0.00	0.21	0.70	25.7	0.061		7.2	117.					
	12/20/74	T 4	PRE	0.00	0.14	1.19	33.2	0.034	0.086		95.		1.0		118.	32.21
			POST	0.07	0.10	1.10	32.0	0.054		7.0	115.					
	12/20/74	F* 4	PRE	0.00	0.14	0.00	36.7	0.034	0.000		95.		1.0		118.	32.21
			POST	0.35	0.07	0.98	30.4	0.047		7.0	115.					
	1/29/75	T 20	PRE	0.35	0.10	0.96	40.3	0.051	0.180				0.0		130.	22.78
			POST	0.00	0.18	0.98	35.9	0.068		7.4	170.					
	1/29/75	F*20	PRE	0.35	0.10	0.00	0.0	0.051	0.000				0.0		130.	22.78
			POST	0.00	0.18	0.91	37.4	0.066		7.3	180.					
	1/29/75	T 4	PRE	0.35	0.10	0.96	40.3	0.051	0.180				0.0		130.	22.78
			POST	0.11	0.07	1.23	38.2	0.085		7.4	170.					
	1/29/75	F* 4	PRE	0.35	0.10	0.00	0.0	0.051	0.000				0.0		130.	22.78
			POST	0.14	0.11		36.7	0.066		7.2	165.					
	5/ 6/75	T 4	PRE	0.91	0.56	1.89	36.0	0.036	0.210	6.6	151.		9.0		63.	45.29
			POST													
	5/ 6/75	T 20	PRE	0.91	0.56	1.89	36.0	0.036	0.210	6.6	151.		9.0		63.	45.29
			POST	0.04	1.30	0.63	17.0	0.105		6.6	124.					
	5/ 6/75	F*20	PRE	0.91	0.56	0.00	0.0	0.036	0.140		151.		9.0		63.	45.29
			POST	0.04	1.23	0.63	17.8	0.117		7.1	118.					
	6/18/75	T 20	PRE	0.53	0.67	1.23	29.7	0.039	0.072	7.3	109.	7.4	18.0	19.3	99.	44.84
			POST	0.00	1.12	0.67	19.4	0.048		7.3	105.					
	6/18/75	F*20	PRE	0.53	0.67	1.26	26.7	0.039	0.000		109.		18.0		99.	44.84
			POST	0.00	0.88	0.74	20.7	0.042		7.4	107.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. F5 = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS STAGE
EP2JT	7/15/75	T 20	PRE	0.14	0.25	1.02	41.5	0.014	0.095	8.5	106.	9.0	22.0	25.9	72. 44.32
			POST	0.00	0.70	0.67	22.0	0.024		7.5	109.				
	7/15/75	F*20	PRE	0.14	0.25	0.77	23.8	0.014	0.045		106.		22.0		72. 44.32
			POST	0.00	0.46	0.74	29.3	0.024		7.5	107.				
	7/28/75	T 20	PRE	0.04	0.14	1.86	0.0	0.019	0.069		109.		27.0		6. 43.19
			POST												
	7/28/75	T 20	PRE	0.04	0.14	1.86	0.0	0.019	0.069		109.		27.0		6. 43.19
			POST												
	8/ 6/75	T 20	PRE	0.14	0.18	3.05	38.4	0.062	0.175	9.0	101.		25.0		68. 42.32
			POST	0.11	1.26	0.58	24.9	0.061		7.1	118.				
	8/ 6/75	F*20	PRE	0.00	0.11	0.48	21.5	0.062	0.086	9.2	101.		25.0		68. 42.32
			POST	0.18	0.14	0.60	22.4	0.006		7.3	110.				
	8/11/75	T 20	PRE	0.00	0.00	1.44	0.0	0.014	0.080	9.4		9.4	25.0	98.5	10. 41.83
			POST												
	9/ 3/75	T 20	PRE	0.04	0.14	1.86	23.0	0.019	0.224	9.9	109.	8.7	18.5	17.0	63. 40.90
			POST	0.00	0.63	0.49	24.8	0.048		7.3	112.				
	9/ 3/75	F*20	PRE	0.04	0.14	0.67	21.7	0.019	0.069	9.9	109.		18.5		63. 40.90
			POST	0.00	0.42	0.25	28.7	0.049		7.3	112.				
	9/23/75	T 20	PRE	0.25	0.00	1.89	32.6	0.032	0.187	7.6	108.	8.3	14.0	19.8	53. 41.00
			POST	0.00	0.49	0.88	23.8	0.044		7.2	113.				
	9/23/75	F*20	PRE	0.28	0.00	1.12	30.6	0.032	0.180	7.6	108.		14.0		53. 41.00
			POST	0.00	0.39	0.67	22.7	0.024		7.2	112.				
	10/21/75	T 4	PRE	0.04	0.07	2.17	33.8	0.025	0.150	7.4	116.	9.2	11.0	11.9	56. 36.03
			POST	0.00	0.42	1.26	33.6	0.041		6.9	111.				

SITE: LOCATION OF SAMPLE, AS "P12T" WHERE EP12 = ECU POLING SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATION AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP23T	10/21/75	FS 4	PRE	0.04	0.07	1.19	31.2	0.025	0.076	7.4	116.		11.0		56.	36.03
			POST	0.00	0.28	0.98	32.7	0.039		7.0	110.					
	10/21/75	T 20	PRE	0.04	0.07	2.17	38.8	0.025	0.150	7.4	116.	9.2	11.0	11.9	56.	36.03
			POST	0.00	0.74	1.02	23.5	0.054		7.1	116.					
	10/21/75	FS20	PRE	0.04	0.07	1.19	31.2	0.025	0.076	7.4	116.		11.0		56.	36.03
			POST	0.00	0.53	1.54	26.0	0.043		7.2	108.					
	11/ 5/75	T 20	PRE	0.00	0.04	0.95	31.7	0.036	0.081	7.4	112.		9.0		11.	34.94
			POST													
	11/18/75	T 20	PRE	0.00	0.18	1.26	35.0	0.034	0.056	7.8	115.	10.8	6.0	9.9	56.	36.72
			POST	0.00	0.28	0.67	21.4	0.038		7.2	106.					
	11/18/75	FS20	PRE	0.00	0.18	0.84	28.4	0.034	0.048	7.8	115.		6.0		56.	36.72
			POST	0.00	0.21	0.63	23.5	0.027		7.2	103.					
	11/18/75	T 4	PRE	0.00	0.18	1.26	35.0	0.034	0.056	7.8	115.	10.8	6.0	9.9	56.	36.72
			POST		0.21	0.88	27.8	0.036		7.1	112.					
	2/ 6/76	T 20	PRE	0.56	1.02	1.12	26.5	0.121	0.163	7.2	121.	4.4	0.0	4.0	47.	32.22
			POST	0.00	1.16	0.88	31.3	0.100		7.2	139.					
	2/ 6/76	FS20	PRE	0.56	1.02	0.98	29.6	0.121	0.158	7.2	121.		0.0		47.	32.22
			POST	0.00	1.12	0.67	27.1	0.112		6.7	141.					
	2/ 6/76	T 4	PRE	0.56	1.02	1.12	26.5	0.121	0.163	7.2	121.	4.4	0.0	4.0	47.	32.22
			POST	0.42	0.74	1.19	34.5	0.130		6.9	139.					
	3/ 4/76	T 20	PRE	0.74	0.56	3.47	31.4	0.154	0.199	6.7	210.		0.0		48.	21.14
			POST	0.35	2.14	0.91	18.5	0.133		7.5	184.					
	3/ 4/76	FS20	PRE	0.74	0.56	3.22	33.3	0.154	0.199	6.7	210.		0.0		48.	21.14
			POST	0.39	2.07	1.19	19.3	0.160		7.8	181.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #200 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP23T	3/ 4/76	T 4	PRE	0.74	0.56	3.47	31.4	0.154	0.199	6.7	210.		0.0		48.	21.14
			POST	0.81	1.96	1.51	24.1	0.162		7.2	178.					
	4/13/76	T 20	PRE	0.19	0.10	1.40	23.2	0.138	0.262	6.9	94.	8.0	5.0	6.6	50.	45.19
			POST	0.17	0.77		4.6	0.138		6.9	77.					
	4/13/76	T 20	PRE	0.19	0.10	1.40	23.2	0.138	0.262	6.9	94.	8.0	5.0	6.6	50.	45.19
			POST	0.17	0.77		6.2	0.133		7.0	79.					
	4/13/76	F*20	PRE	0.19	0.10	0.91	54.9	0.138	0.192	6.9	94.		5.0		50.	45.19
			POST	0.14	0.74		5.4	0.133		6.9	77.					
	4/27/76	T 20	PRE	0.98	0.81	1.23	40.8	0.034	0.114	7.4	94.	11.0	8.5	13.1	22.	45.01
			POST													
	5/10/76	T 20	PRE	0.21	0.63	1.44	30.2	0.035	0.106	7.9	94.		8.5		22.	45.21
			POST													
EP23M	10/ 7/74	T 20	PRE	0.00	0.35	1.69	50.7	0.052	0.125		108.		10.8		113.	37.05
			POST	0.00	0.70	0.70	26.6	0.140			106.					
	10/25/74	T 20	PRE	0.00	0.00	1.57	39.9	0.060	0.150		119.		9.0		99.	35.48
			POST	0.00	0.77	0.95	27.2	0.160		7.2	112.					
	11/20/74	T 20	PRE	0.00	0.00	1.10	37.4	0.055	0.096				2.0		139.	35.15
			POST	0.00	0.14	1.05	27.4	0.072		7.1	126.					
	11/20/74	F*20	PRE	0.00	0.00	0.00	33.7	0.055	0.000				2.0		139.	35.15
			POST	0.00	0.18	0.84	27.4	0.249		6.9	112.					
	11/20/74	T 4	PRE	0.00	0.00	1.10	37.4	0.055	0.096				2.0		139.	35.15
			POST	0.11	0.70	1.08	31.4	0.057		7.1	111.					
	11/20/74	F* 4	PRE	0.00	0.00	0.00	33.7	0.055	0.000				2.0		139.	35.15
			POST	0.00	0.18	0.88	24.2	0.043		7.1	111.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP23M	12/20/74	T 20	PRE	0.00	0.00	1.50	37.4	0.048	0.107		94.		1.0		118.	32.21
			POST	0.00	0.46	0.81	28.9	0.046		7.2	116.					
	12/20/74	FS20	PRE	0.00	0.00	0.00	34.4	0.048	0.000		94.		1.0		118.	32.21
			POST	0.00	0.18	0.81	28.9	0.046		7.0	116.					
	12/20/74	T 4	PRE	0.00	0.00	1.50	37.4	0.048	0.107		94.		1.0		118.	32.21
			POST	0.14	0.14	1.12	31.9	0.054		6.7	118.					
	12/20/74	FS 4	PRE	0.00	0.00	0.00	34.4	0.048	0.000		94.		1.0		118.	32.21
			POST	0.00	0.11	0.98	31.9	0.050		7.0	115.					
	7/15/75	T 20	PRE	0.10	0.14	1.23	27.7	0.017	0.048	8.2	106.	7.9	22.0	39.3	72.	44.32
			POST	0.00	0.88		20.6	0.029		7.4	110.					
	7/15/75	FS20	PRE	0.10	0.14	0.77	23.8	0.017	0.027		106.		22.0		72.	44.32
			POST	0.00	0.70	0.56	21.3	0.024		7.3	106.					
	8/ 6/75	T 20	PRE	0.07	0.04	1.16	34.4	0.013	0.083		103.		23.0		68.	42.32
			POST	0.11	0.53	0.63	21.1	0.021		7.2	112.					
	8/ 6/75	FS20	PRE	0.18	0.04	0.84	21.5	0.013	0.064	8.3	104.		23.0		68.	42.32
			POST	0.04	0.28	0.81	21.7			7.2	111.					
	8/11/75	T 20	PRE	0.21	0.04	0.91	0.0	0.030	0.189	7.6		4.4	23.0	22.4	10.	41.83
			POST													
	2/ 6/76	T 20	PRE	0.46	0.74	1.12	24.7	0.135	0.164	7.0	120.		0.0		47.	32.22
			POST	0.00	1.22	0.63	22.7	0.120		7.2	109.					
	2/ 6/76	FS20	PRE	0.46	0.74	1.05	27.2	0.135	0.160	7.0	120.		0.0		47.	32.22
			POST	0.00	1.44	0.70	27.1	0.110		7.0	113.					
	2/ 6/76	T 4	PRE	0.46	0.74	1.12	24.7	0.135	0.164	7.0	120.		0.0		47.	32.22
			POST	0.42	0.66	1.09	30.3	0.126		6.9	139.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP23M	4/13/76	T 20	PRE	0.20	0.14	1.58	23.9	0.137	0.220	7.2	92.		5.0		50.	45.19
			POST	0.21	0.91		4.6	0.092		7.0	75.					
	4/13/76	F*20	PRE	0.20	0.14	1.19	26.1	0.137	0.213	7.2	92.		5.0		50.	45.19
			POST	0.24	1.05		3.9	0.095		6.9	75.					
	5/10/76	T 20	PRE	0.21	0.56	1.19	27.4	0.031	0.093	8.0	96.		8.5		22.	45.21
			POST													
EP23B	10/ 7/74	T 20	PRE	0.00	0.71	1.54	47.7	0.065	0.120		105.		10.8		113.	37.05
			POST	0.00	0.70	0.74	26.6	0.092			108.					
	10/25/74	T 20	PRE	0.00	0.00	1.71	43.1	0.056	0.063		116.		9.0		99.	35.48
			POST	0.07	0.67	1.02	26.5	0.145		7.2	113.					
	11/20/74	T 20	PRE	0.00	0.25	1.05	52.4	0.048	0.099				2.0		139.	35.15
			POST	0.00	0.35	0.98	26.7	0.084		7.0	115.					
	11/20/74	F*20	PRE	0.00	0.25	0.00	33.7	0.048	0.000				2.0		139.	35.15
			POST	0.03	0.25	0.98	26.7	0.040		6.9	115.					
	11/20/74	T 4	PRE	0.00	0.25	1.05	52.4	0.048	0.099				2.0		139.	35.15
			POST	0.00	0.32	0.91	29.5	0.050		7.0	111.					
	11/20/74	F* 4	PRE	0.00	0.25	0.00	33.7	0.048	0.000				2.0		139.	35.15
			POST	0.00	0.25	0.91	28.2	0.051		6.9	111.					
	12/20/74	T 20	PRE	0.00	0.03	1.42	43.6	0.061	0.140		98.		1.0		118.	32.21
			POST	0.00	0.28	1.05	25.1	0.068		7.4	114.					
	12/20/74	F*20	PRE	0.00	0.03	0.00	35.9	0.061	0.000		98.		1.0		118.	32.21
			POST	0.00	0.31	0.84	26.6	0.078		7.2	119.					
	12/20/74	T 4	PRE	0.00	0.03	1.42	43.6	0.061	0.140		98.		1.0		118.	32.21
			POST	0.00	0.21	0.73	31.9	0.081		6.8	117.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP2JB	12/20/74	FS 4	PRE	0.00	0.03	0.00	36.9	0.061	0.000		98.		1.0		118.	32.21
			POST	0.00	0.28	1.01	31.9	0.062		6.8	118.					
	1/29/75	T 20	PRE	0.14	0.84	0.98	53.1	0.027	0.127				0.0		130.	22.78
			POST	0.00	0.39	0.74	25.4	0.095		7.3	190.					
	1/29/75	FS20	PRE	0.14	0.84	0.00	0.0	0.027	0.000				0.0		130.	22.78
			POST	0.11	0.35	0.98	38.7	0.107		7.4	195.					
	1/29/75	T 4	PRE	0.14	0.84	0.98	53.1	0.027	0.127				0.0		130.	22.78
			POST	0.00	0.42	0.88	33.7	0.094		7.3	195.					
	1/29/75	FS 4	PRE	0.14	0.84	0.00	0.0	0.027	0.000				0.0		130.	22.78
			POST	0.14	0.14		36.7	0.078		7.1	200.					
	5/ 6/75	T 4	PRE	0.94	0.46	1.78	27.8	0.053	0.179	6.3	123.		6.0		63.	45.29
			POST													
	5/ 6/75	T 20	PRE	0.94	0.46	1.78	27.8	0.053	0.179	6.3	123.		6.0		63.	45.29
			POST	0.14	1.23	0.46	20.7	0.106								
	5/ 6/75	FS20	PRE	0.94	0.46	1.78	0.0	0.053	0.147		123.		6.0		63.	45.29
			POST	0.04	1.65	0.60	23.0	0.105								
	6/18/75	T 20	PRE	0.56	0.60	1.19	25.3	0.054	0.089	7.2	109.	6.0	17.0	29.0	99.	44.84
			POST	0.04	1.12	0.67	20.4	0.052		7.4	106.					
	6/18/75	FS20	PRE	0.56	0.60	1.05	26.7	0.054	0.000		109.		17.0		99.	44.84
			POST	0.00	1.12	0.81	24.1	0.052		7.6	109.					
	7/15/75	T 20	PRE	0.10	0.14	1.61	32.3	0.104	0.125	7.1		2.1	19.0	18.5	72.	44.32
			POST	0.00	0.99	0.60	20.6	0.061		7.7	112.					
	7/15/75	FS20	PRE	0.10	0.14	1.02	23.8	0.104	0.230				19.0		72.	44.32
			POST	0.00	0.53	0.63	24.6	0.060		7.3	114.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP238	8/ 6/75	T 20	PRE	0.56	0.21	1.44	28.4	0.228	0.291				21.0		68.	42.32
			POST	0.11	0.74	0.88	23.7	0.190		7.2	119.					
	8/ 6/75	FS20	PRE	0.60	0.11	1.61	22.3	0.228	0.298				21.0		68.	42.32
			POST	0.04	0.84	0.77	23.6	0.204		7.2	122.					
	8/11/75	T 20	PRE	0.63	0.04	1.40	0.0	0.075	0.133	7.1		0.0	21.0	28.7	10.	41.83
			POST													
	9/ 3/75	T 20	PRE	0.25	0.14	1.23	21.7	0.085	0.238	7.2	119.	0.5	18.0	17.5	63.	40.90
			POST	0.00	0.49	0.47	26.4	0.056		7.3	110.					
	9/ 3/75	FS20	PRE	0.25	0.14	0.81	21.7	0.085	0.151	7.2	119.		18.0		63.	40.90
			POST	0.00	0.53	0.35	27.9	0.219		4.3	111.					
	9/23/75	T 20	PRE	0.32	0.00	1.79	33.9	0.039	0.125	7.5	111.	8.3	14.0	14.1	53.	41.00
			POST	0.00	0.49	0.70	25.0	0.038		7.4	118.					
	9/23/75	FS20	PRE	0.18	0.00	2.03	30.0	0.039	0.115	7.5	111.		14.0		53.	41.00
			POST	0.00	0.32	0.91	23.8	0.050		7.3	135.					
	10/21/75	T 4	PRE	0.07	0.04	1.47	36.0	0.068	0.170	7.2	116.	8.2	11.0	10.8	56.	36.03
			POST	0.00	0.39	0.39	31.1	0.038		6.9	114.					
	10/21/75	FS 4	PRE	0.07	0.04	0.95	28.8	0.068	0.076	7.2	116.		11.0		56.	36.03
			POST	0.00	0.39	0.43	29.4	0.036		7.0	112.					
	10/21/75	T 20	PRE	0.07	0.04	1.47	36.0	0.068	0.170	7.2	116.	8.2	11.0	10.8	56.	36.03
			POST	0.00	0.56	0.95	28.6	0.050		7.0	114.					
	10/21/75	FS20	PRE	0.07	0.04	0.85	28.8	0.068	0.076	7.2	116.		11.0		56.	36.03
			POST	0.00	0.56	0.14	26.0	0.045		7.0	116.					
	11/18/75	T 20	PRE	0.00	0.11	1.12	30.6	0.043	0.071	7.5	114.	10.0	6.0	6.8	56.	36.72
			POST	0.00	0.32	0.74	24.9	0.047		7.3	112.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = EAU PLEINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
B = 1 METER ABOVE BOTTOM. C = COMPOSITE OF TOP, MID AND BOTTOM DEPTHS.
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP23B	11/18/75	FS20	PRE	0.00	0.11	0.95	31.7	0.043	0.140	7.5	114.		6.0		56.	36.72
			POST	0.00	0.21	0.49	24.2	0.026		7.0	108.					
	11/18/75	T 4	PRE	0.00	0.11	1.12	30.6	0.043	0.071	7.5	114.	10.0	6.0	6.8	56.	36.72
			POST		0.25	0.84	29.2	0.030		7.0	120.					
	2/ 6/76	T 20	PRE	0.32	0.77	1.02	23.9	0.119	0.153	6.9	124.		0.0		47.	32.22
			POST	0.00	1.22	0.84	32.4	0.208		7.2	141.					
	2/ 6/76	FS20	PRE	0.32	0.77	0.53	32.8	0.119	0.240	6.9	124.		0.0		47.	32.22
			POST	0.00	1.50	1.16	24.0	0.168		7.0	147.					
	2/ 6/76	T 4	PRE	0.32	0.77	1.02	24.9	0.119	0.153	6.9	124.		0.0		47.	32.22
			POST	0.14	0.98	1.02	31.3	0.166		6.8	149.					
	3/ 4/76	T 20	PRE	0.88	0.63	3.64	60.8	0.185	0.222	6.7	236.	0.5	2.0	13.3	48.	21.14
			POST	0.46	2.38	1.33	20.1	0.190		7.3	165.					
	3/ 4/76	FS20	PRE	0.88	0.63	3.43	60.8	0.185	0.218	6.7	236.		2.0		48.	21.14
			POST	0.42	2.52	1.54	23.3	0.189		7.3	178.					
	3/ 4/76	T 4	PRE	0.88	0.63	3.64	60.8	0.185	0.222	6.7	236.	0.5	2.0	13.3	48.	21.14
			POST	0.35	2.21	1.58	23.3	0.191		7.2	202.					
	4/13/76	T 20	PRE	0.22	0.16	1.47	23.9	0.133	0.234	7.2	92.		5.0		50.	45.19
			POST	0.14	1.05		3.1	0.123		6.9	79.					
	4/13/76	FS20	PRE	0.22	0.16	0.98	28.2	0.133	0.213	7.2	92.		5.0		50.	45.19
			POST	0.17	1.19		6.2	0.129		6.9	78.					
	5/10/76	T 20	PRE	0.35	0.56	1.37	29.4	0.062	0.104	8.0	96.		8.5		22.	45.21
			POST													
EP23C	11/21/74	T 20	PRE	0.00	0.00	1.05	44.9	0.050	0.090		101.		2.0		139.	35.06
			POST	0.00	0.39	0.77		0.087		7.1	114.					

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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC CONC	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP24C	12/20/74	T 20	PRE	0.00	0.06	1.37	39.3	0.048	0.111		96.		1.0		118.	32.21
			POST	0.00	0.46	0.56		0.063		7.3	116.					
EP24T	5/10/76	T 20	PRE	0.21	0.70	1.44	31.4	0.033	0.091	8.0			8.5		22.	45.21
			POST													
EP26T	12/19/74	T 20	PRE	0.00	0.04	1.05	40.5	0.051	0.088		110.		0.0		118.	32.36
			POST	0.00	0.42	0.91	25.7	0.039		6.6	120.					
	12/19/74	FS20	PRE	0.00	0.04	0.00	39.2	0.051	0.000		110.		0.0		118.	32.36
			POST	0.00	0.42	0.88	27.3	0.071		7.4	130.					
	12/19/74	T 4	PRE	0.00	0.04	1.05	40.5	0.051	0.088		110.		0.0		118.	32.36
			POST	0.21	0.07	1.16	31.2	0.074		6.9	81.					
	12/19/74	FS 4	PRE	0.00	0.04	0.00	38.2	0.051	0.000		110.		0.0		118.	32.36
			POST	0.04	0.10	1.16	31.2	0.052		6.9	116.					
	1/29/75	T 20	PRE	0.56	0.00	1.36	27.3	0.086	0.153				0.0		130.	22.78
			POST	0.07	0.35	0.77	29.8	0.068		7.2	180.					
	1/29/75	FS20	PRE	0.56	0.00	0.00	0.0	0.086	0.000				0.0		130.	22.78
			POST	0.00	0.32	0.77	38.6	0.069		7.2	220.					
	1/29/75	T 4	PRE	0.56	0.00	1.36	27.3	0.086	0.153				0.0		130.	22.78
			POST	0.25	0.14	1.16	33.0	0.074		7.2	180.					
	1/29/75	FS 4	PRE	0.56	0.00	0.00	0.0	0.086	0.000				0.0		130.	22.78
			POST	0.21	0.11		35.0	0.065		7.2	180.					
	7/16/75	T 20	PRE	0.14	0.21	1.02	27.7	0.038	0.041				19.0		72.	44.24
			POST	0.00	0.70	0.46	19.3	0.039		7.5	111.					
	7/16/75	FS20	PRE	0.14	0.21	0.77	22.3	0.038	0.040				19.0		72.	44.24
			POST	0.00	0.63	0.42	19.3	0.025		7.6	108.					

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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP26T	7/30/75	T 20	PRE	0.04	0.14	0.81	0.0	0.016	0.064		133.		24.0		5.	43.03
			POST													
	8/ 6/75	T 20	PRE	0.18	0.14	1.05	31.5	0.038	0.117	7.5			23.0		68.	42.32
			POST	0.14	0.49	1.44	19.2	0.045		7.5	112.					
	8/ 6/75	FS20	PRE	0.21	0.21	0.81	31.5	0.038	0.122	7.3			23.0		68.	42.32
			POST	0.07	0.35	0.84	19.2	0.027		7.5	112.					
	8/12/75	T 20	PRE	0.11	0.00	1.37	0.0	0.012	0.094				23.0		9.	41.70
			POST													
	8/12/75	T 20	PRE	0.11	0.00	1.37	0.0	0.012	0.094				23.0		9.	41.70
			POST													
	8/25/75	T 20	PRE	0.04	0.14	1.19	26.6	0.016	0.351	8.1		7.5	23.0	11.2	73.	40.52
			POST	0.00	1.05	0.84	23.3	0.087		7.3	116.					
	8/25/75	FS20	PRE	0.04	0.14	0.61	23.0	0.016	0.064	8.1			23.0		73.	40.52
			POST	0.00	0.35	0.35	24.8	0.038		7.4	139.					
	9/24/75	T 20	PRE	0.28	0.00	1.58	31.3	0.034	0.115	6.9			14.0		53.	40.81
			POST	0.00	0.49	0.74	22.7	0.013		7.1	110.					
	9/24/75	FS20	PRE	0.04	0.14	0.95	30.6	0.034	0.091	6.9			14.0		53.	40.81
			POST	0.00	0.18	0.74	22.7	0.014		7.5	108.					
	10/21/75	T 4	PRE	0.11	0.11	1.61	33.6	0.023	0.117	7.5	120.	10.1	12.0	15.8	56.	36.03
			POST	0.00	0.53	0.46	35.1	0.041		7.2	116.					
	10/21/75	FS 4	PRE	0.11	0.11	1.02	23.8	0.023	0.076	7.5	120.		12.0		56.	36.03
			POST	0.00	0.53	0.56	31.1	0.036		7.0	116.					
	10/21/75	T 20	PRE	0.11	0.11	1.61	33.6	0.023	0.117	7.5	120.	10.1	12.0	15.8	56.	36.03
			POST	0.00	0.91	0.67	27.7	0.098		7.2	120.					

SITE: LOCATION OF SAMPLE, AS "EP12T" WHERE EP12 = LAU PLAINE SITE 12. T = DEPTH OF 0.5 METERS. M = MID DEPTH.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC. COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP2ET	10/21/75	FS20	PRE	0.11	0.11	1.02	28.8	0.023	0.076	7.5	120.		12.0		56.	36.03
			POST	0.00	0.63	0.35	22.7	0.053		7.2	117.					
	11/ 5/75	T 20	PRE	0.04	0.11	1.19	31.7	0.044	0.051	7.9			10.0		11.	34.94
			POST													
	1/ 7/76	T 20	PRE	0.28	0.39	1.05	32.9	0.049	0.078	7.1	150.		0.0		49.	40.02
			POST	0.00	0.91	0.42	28.2	0.068		7.1	124.					
	1/ 7/76	FS20	PRE	0.28	0.39	0.32	29.6	0.049	0.076	7.1	150.		0.0		49.	40.02
			POST	0.00	0.88	5.05	25.1	0.068		7.3	122.					
	1/ 7/76	T 4	PRE	0.28	0.39	1.05	32.9	0.049	0.078	7.1	150.		0.0		49.	40.02
			POST	0.25	0.65	0.65	31.0	0.069		7.2	126.					
	2/ 5/76	T 20	PRE	0.04	0.74	1.23	35.5	0.083	0.164	6.7			0.0		47.	32.51
			POST	0.00	1.30	0.88	25.0	0.125		7.3	143.					
	2/ 5/76	FS20	PRE	0.04	0.74	0.95	35.5	0.083	0.121	6.7			0.0		47.	32.51
			POST	0.00	1.12	0.60	25.0	0.109		6.9	143.					
	2/ 5/76	T 4	PRE	0.04	0.74	1.23	35.5	0.083	0.164	6.7			0.0		47.	32.51
			POST	0.35	0.70	1.09	31.3	0.106		6.7	148.					
	2/17/76	T 20	PRE	0.63	0.74	1.12	25.0	0.113	0.162	6.8			2.0		53.	27.55
			POST	0.07	1.12	0.88	35.4	0.122		7.5	145.					
	2/17/76	T 4	PRE	0.63	0.74	1.12	25.0	0.113	0.162	6.8			2.0		53.	27.55
			POST	0.28	1.05	1.12	26.8	0.116		7.4	147.					
	2/26/76	T 20	PRE	1.33	1.33	1.99	40.1	0.000	0.199				2.5		17.	23.76
			POST													
	3/ 4/76	T 20	PRE	0.95	0.74	2.28	35.2	0.163	0.242	6.8		5.5	0.0	11.5	46.	21.14
			POST	0.21	1.68	3.43	42.2	0.191		7.8	193.					

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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS STAGE
SP26T	4/13/76	T 20	PRE	0.25	0.07	1.44	27.5	0.077	0.286	7.2		10.9	6.0	5.7	50. 45.19
			POST	0.17	0.81		4.6	0.148		7.0	75.				
	4/13/76	FS20	PRE	0.25	0.07	0.91	33.6	0.077	0.189	7.2			6.0		50. 45.19
			POST	0.21	1.19		5.4	0.067		7.0	76.				
	5/10/76	T 20	PRE	0.35	0.56	3.19	42.9	0.031	0.135	7.9					22. 45.21
			POST												
STP A	2/18/75	T 20	PRE	0.14	19.64	1.75	82.4	1.350	3.875				3.0		111. 18.09
			POST	1.95	15.65	3.50		4.225		6.6					
	2/18/75	FS20	PRE	0.14	19.64	0.00	57.7	1.350	3.350				3.0		111. 18.09
			POST	1.75	16.10	3.50		3.860		1.7					
	2/18/75	T 4	PRE	0.14	19.64	1.75	82.4	1.350	3.875				3.0		111. 18.09
			POST	19.74	0.49	22.65		0.419		6.9	800.				
	2/18/75	FS 4	PRE	0.14	19.64	0.00	57.7	1.350	3.350				3.0		111. 18.09
			POST	18.20	2.21			0.418		7.1	520.				
HA 4W	4/15/75	T 20	PRE	0.21	0.91	0.98	26.8	0.120	0.280				2.0		54. 34.33
			POST	0.84	2.64	0.96	31.1	0.156		6.7	114.				
	4/15/75	FS20	PRE	0.21	0.91	0.00	0.0	0.120	0.000				2.0		54. 34.33
			POST	0.84	1.17	1.05	31.1	0.120		6.7	114.				
	4/15/75	T 4	PRE	0.21	0.91	0.98	0.0	0.120	0.280				2.0		54. 34.33
			POST												
HA11W	2/26/76	T 20	PRE	2.63	0.31	4.45	78.2	0.360	0.560	8.1		6.2	1.0	5.9	44. 23.76
			POST	0.00	3.61	3.15	82.2	0.340		7.3	220.				
	2/26/76	FS20	PRE	2.63	0.31	4.32	75.0	0.360	0.550	8.1			1.0		44. 23.76
			POST	0.00	3.61	3.26	63.4	0.374		7.3	214.				

SITE: LOCATION OF SAMPLE. AS "HA 4W" WHERE HA 4 = AT OR NEAR HAMANN CREEK SITE 4. W = SEMI-WOODED OR PASTURED RUNOFF.
M = MANURE SPREAD ON PLOWED FIELD. P = PLOWED FIELD. B = 150 METERS BELOW SAMPLE SITE.
STP A = ACTIVATED SLUDGE SEWAGE TREATMENT PLANT EFFLUENT AT STRATFORD. WELCO, HLUSO AND ABSOM = RUNOFF FROM WELCOME, HALVERSON AND ABBOTSFORD DUMPS.

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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
HA11W	2/26/76	T 4	PRE	2.63	0.31	4.45	78.2	0.360	0.580	8.1		6.2	1.0	5.9	44.	23.76
			POST	2.77	0.32	5.71	85.8	0.327		7.6	234.					
HA N	3/24/76	T 20	PRE	0.74	0.00	49.84	375.9	0.244	4.600	7.2					49.	33.05
			POST	0.00	16.10	9.18	210.4	3.600		7.3	362.					
	3/24/76	F*20	PRE	0.74	0.00	49.70	324.4	0.244	4.580	7.4					49.	33.05
			POST	0.00	15.96	7.64	142.7	3.250		7.1	380.					
	3/24/76	T 4	PRE	7.35	0.00	49.84	375.9	0.244	4.600	7.2					49.	33.05
			POST	10.78	0.07	22.79	285.9	5.600		7.3	395.					
HA13N	3/24/76	T 20	PRE	0.88	0.10	34.72	224.6	1.640	4.300	7.0					49.	33.05
			POST	0.00	4.87	11.73	265.2	1.925		6.8	158.					
	3/24/76	F*20	PRE	0.88	0.10	32.09	177.1	1.640	3.940	7.0					49.	33.05
			POST	0.00	4.90	10.78	260.8	1.525		6.9	165.					
	3/24/76	T 4	PRE	5.25	0.10	34.72	224.6	1.640	4.300	7.0					49.	33.05
			POST	5.78	0.95	6.98	265.9	1.575		7.0	202.					
HA13B	3/24/76	T 20	PRE	0.88	0.18	3.04	39.3	0.225	0.374	7.1			1.0	993.9	49.	33.05
			POST	0.00	2.80	1.90	29.6	0.324		6.4	92.					
	3/24/76	F*20	PRE	0.88	0.18	2.98	40.6	0.225	0.356	7.3			1.0		49.	33.05
			POST	0.00	2.74	0.14	27.8	0.308		6.5	92.					
HA11P	3/24/76	T 20	PRE	0.66	0.14	7.49	120.9	0.103	0.755	7.1			1.0		49.	33.05
			POST	0.00	3.08	4.56	116.5	0.370		6.5	70.					
	3/24/76	F*20	PRE	0.66	0.14	4.27	67.3	0.103	0.570	7.1			1.0		49.	33.05
			POST	0.00	2.46	3.66	78.3	0.454		6.5	70.					
HA 4P	3/24/76	T 20	PRE	5.25	1.19	6.40	65.2	0.024	0.520	7.2					49.	33.05
			POST	0.00	2.35	5.60	83.9	0.163		6.9	85.					

SITE: LOCATION OF SAMPLE, AS "HA 4W" WHERE HA 4 = AT OR NEAR HAMANN CREEK SITE 4. W = SEMI-WOODED OR PASTURED RUNOFF.
N = MANURE SPREAD ON PLOWED FIELD. P = PLOWED FIELD. B = 150 METERS BELOW SAMPLE SITE.
STP A = ACTIVATED SLUDGE SEWAGE TREATMENT PLANT EFFLUENT AT STRATFORD. WELCO, HLUSD AND ABSDN = RUNOFF FROM WELCOME, HALVERSON AND ABBOTSFORD DUMPS.

TYPE: T = TOTAL BOD. F3 = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.

** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
HA 4P	3/24/76	FS20	PRE	5.25	1.19	5.95	53.4	0.024	0.503	7.3					49.	33.05
			POST	0.00	2.49	4.87	73.0	0.145		6.9	84.					
	3/24/76	T 4	PRE	0.74	1.19	6.40	65.2	0.024	0.520	7.2					49.	33.05
			POST	0.14	1.89	5.01	87.8	0.149		6.7	85.					
WELCO	3/28/76	T 20	PRE	2.94	0.11	3.82	89.3	0.862	1.440						48.	42.12
			POST	0.00	3.99	3.30	55.7	2.175		7.0	164.					
HLUSD	3/28/76	T 20	PRE	0.74	0.35	5.92	86.9	0.280	0.471						48.	42.12
			POST	0.00	2.03	1.89	50.4	0.334		7.0	118.					
ABSDM	3/28/76	T 20	PRE	1.72	0.11	7.81	318.8	0.062	0.227						48.	42.12
			POST	0.00	2.80	7.56	191.2	0.372		7.7	2488.					
HA 1T	12/19/74	T 20	PRE	0.00	1.33	0.38	7.6	0.009	0.017		285.		0.0		118.	32.36
			POST	0.00	1.23	0.28	7.6	0.027		7.5	278.					
	12/19/74	FS20	PRE	0.00	1.33	0.00	10.0	0.009	0.000		285.		0.0		118.	32.36
			POST	0.00	1.30	0.35	9.1	0.018		7.5	280.					
	12/19/74	T 4	PRE	0.00	1.33	0.38	7.6	0.009	0.017		285.		0.0		118.	32.36
			POST	0.00	1.37	0.21	6.8	0.014		7.5	272.					
	12/19/74	FS 4	PRE	0.00	1.33	0.00	10.0	0.009	0.000		285.		0.0		118.	32.36
			POST	0.00	1.40	0.28	7.6	0.012		7.6	280.					
	4/15/75	T 20	PRE	0.32	0.66	1.12	30.9	0.138	0.280	7.3			2.0		54.	34.33
			POST	0.32	0.98	0.67	20.8	0.141		6.5	100.					
	4/15/75	FS20	PRE	0.32	0.66	0.00	27.3	0.138	0.000				2.0		54.	34.33
			POST	0.18	1.26	0.60	24.7	0.128		6.6	110.					
	4/15/75	T 4	PRE	0.32	0.66	1.12	30.9	0.138	0.280	7.3			2.0		54.	34.33
			POST		1.09	0.74	22.8	0.127		6.6	98.					

SITE: LOCATION OF SAMPLE. AS "HA 4W" WHERE HA 4 = AT OR NEAR HAMANN CREEK SITE 4. W = SEMI-WOODED OR PASTURED RUNOFF.
M = MANURE SPREAD ON PLOWED FIELD. P = PLOWED FIELD. B = 150 METERS BELOW SAMPLE SITE.
STP A = ACTIVATED SLUDGE SEWAGE TREATMENT PLANT EFFLUENT AT STRATFORD. WELCO, HLUSD AND ABSDM = RUNOFF FROM WELCOME, HALVERSON AND ABBOTSFORD DUMPS.

TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.

** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
HA 1T	4/15/75	FS 4	PRE	0.32	0.66	0.00	27.3	0.138	0.000				2.0		54.	34.33
			POST		1.09		22.5	0.134		6.5	100.					
	7/29/75	T 20	PRE	0.04	0.53	0.42	0.0	0.055	0.084	8.0			27.0		6.	43.19
			POST													
	1/ 6/76	T 20	PRE	0.18	1.51	0.84	8.2	0.035	0.040	7.5			0.0	6.0	49.	40.23
			POST	0.00	1.37	0.60	12.2	0.037		7.4	250.					
	1/ 6/76	FS20	PRE	0.18	1.51	0.67	5.9	0.035	0.040	7.5			0.0		49.	40.23
			POST	0.00	1.54	1.16	13.4	0.035		7.9	229.					
	1/ 6/76	T 4	PRE	0.18	1.51	0.84	8.2	0.035	0.040	7.5			0.0	6.0	49.	40.23
			POST	0.28	1.56	0.81	12.8	0.043		7.5	244.					
	2/26/76	T 20	PRE	1.97	0.20	2.38	38.8	0.140	0.220	8.0		11.3	2.0	1.9	44.	23.76
			POST	0.00	2.77	2.00	59.3	0.144		7.6	260.					
	9/11/76	T 20	PRE	0.04	0.21	2.21	26.1	0.013	0.038	7.9			7.0		22.	45.18
			POST													
HA 2T	2/20/76	T 20	PRE	1.10	0.23	1.26	36.0	0.026	0.092	7.8			5.0	11.2	44.	23.76
			POST	0.00	1.65	1.75	21.3	0.058		7.5	437.					
	3/ 3/76	T 20	PRE	0.84	1.02	4.06	21.8	0.042	0.086	7.3			5.0		48.	21.65
			POST	0.63	1.72	0.91	15.3	0.082		7.5	397.					
HA 4T	4/15/75	T 20	PRE	0.32	0.42	0.00	30.1	0.162	0.330	7.1			2.0		54.	34.33
			POST	0.28	1.24	0.49	24.7	0.173		7.1	115.					
	4/15/75	FS20	PRE	0.32	0.42	0.00	28.9	0.162	0.000				2.0		54.	34.33
			POST	0.04	0.95	0.46	24.7	0.096		6.4	125.					
	4/15/75	T 4	PRE	0.32	0.42	0.00	30.1	0.162	0.330	7.1			2.0		54.	34.33
			POST		0.91	0.74	23.0	0.113		6.4	75.					

SITE: LOCATION OF SAMPLE, AS "HA 1T" WHERE HA 1 = HAMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELM (EL), GAU PLEINE (GP), FERNWOOD (FE), FREEMAN (FR), NOISEY (NO), PORKY (PO),
RANDALL (RA), ROCK (RO), ROCKY RUN (RR), WINDING (WI).
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
HA 1T	4/15/75	FS 4	PRE	0.32	0.42	0.00	28.9	0.162	0.000				2.0		54.	34.33
			POST	0.14	0.60		22.5	0.096		6.3	120.					
HA1CT	2/26/76	T 20	PRE	1.76	0.73	2.80	42.8	0.092	0.176	8.2			1.0	2.6	44.	23.76
			POST	0.00	2.94	2.24	21.8	0.096		7.6	355.					
	2/26/76	FS20	PRE	1.76	0.73	2.56	39.4	0.092	0.153	8.2			1.0		44.	23.76
			POST	0.00	2.93	1.96	21.3	0.093		7.6	358.					
	2/26/76	T 4	PRE	1.76	0.73	2.80	42.8	0.092	0.176	8.2			1.0	2.6	44.	23.76
			POST	1.82	0.60	3.92	33.0	0.089		7.7	370.					
	3/ 3/76	T 20	PRE	1.93	0.56	3.78	53.1	0.172	0.286	7.4			0.0	1.5	48.	21.65
			POST	0.21	2.84	1.65	25.5	0.196		7.4	270.					
HA11T	4/15/75	T 20	PRE	0.32	0.60	1.30	32.6	0.117	0.272	7.1			2.0		54.	34.33
			POST	0.00	1.26	0.74	20.7	0.098		6.7	90.					
	4/15/75	FS20	PRE	0.32	0.60	0.00	30.7	0.117	0.000				2.0		54.	34.33
			POST	0.00	1.26	0.50	21.7	0.125		6.7	91.					
	4/15/75	T 4	PRE	0.32	0.60	1.30	32.6	0.117	0.272	7.1			2.0		54.	34.33
			POST	0.00	1.16	0.50	22.5	0.120		6.8	88.					
	4/15/75	FS 4	PRE	0.32	0.60	0.00	30.7	0.117	0.000				2.0		54.	34.33
			POST	0.00	1.16		22.5	0.116		6.5	90.					
	2/26/76	T 20	PRE	1.80	0.72	3.53	56.4	0.140	0.310	8.2		11.6	1.0	2.8	44.	23.76
			POST	0.00	2.98	2.35	37.4	0.204		7.6	260.					
	2/26/76	FS20	PRE	1.80	0.72	3.01	59.8	0.140	0.280	8.2			1.0		44.	23.76
			POST	0.04	2.59	2.73	42.6	0.365		7.5	268.					
	2/26/76	T 4	PRE	1.80	0.72	3.53	56.4	0.140	0.310	8.2		11.6	1.0	2.8	44.	23.76
			POST	1.86	0.63	4.27	50.4	0.182		7.7	275.					

SITE: LOCATION OF SAMPLE AS PER ITEM ABOVE HA 1 = HEMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELM (EL), FAIRPLAINS (FP), FERNWOOD (FE), FREEMAN (FR), HUISTY (HU), PORKY (PO),
RANDALL (RA), ROCK (RO), TUCKY (TU), WRIGHT (WR), WINDING (WI).
TYPE: T = TOTAL ROD. FS = ROD MEASURED FROM A TEST FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = ROD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT FOR AN SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
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APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
HA11T	3/ 3/76	T 20	PRE	2.31	0.35	4.52	65.3	0.244	0.261	7.4		8.8	0.0	2.9	48.	21.65
			POST	0.21	3.26	2.03	26.3	0.263		7.3	237.					
	3/24/76	T 20	PRE	0.80	0.21	2.84	54.7	0.258	0.430	7.1		11.3	1.0	187.9	49.	33.05
			POST	0.00	2.74	1.68	33.0	0.250		6.5	78.					
	3/24/76	F*20	PRE	0.80	0.21	2.84	40.5	0.256	0.375	7.2			1.0		49.	33.05
			POST	0.00	2.74	1.68	32.2	0.350		6.4	78.					
HA13T	3/24/76	T 20	PRE	0.80	0.24	1.68	26.2	0.115	0.232	7.2		10.5	1.0	10.4	49.	33.05
			POST	0.00	2.60	0.78	18.3	0.162		6.6	80.					
	3/24/76	F*20	PRE	0.80	0.24	1.66	25.6	0.115	0.230	7.2			1.0		49.	33.05
			POST	0.00	2.38	0.34	23.5	0.170		6.3	80.					
BU 1T	4/15/75	T 20	PRE	0.66	0.80	0.88	35.0	0.043	0.200	6.8			2.0		54.	34.33
			POST	0.00	0.64	0.55	27.0	0.910		6.4	80.					
DI 1T	4/15/75	T 20	PRE	0.46	0.80	1.54	36.7	0.263	0.420	7.1			2.0		54.	34.33
			POST	0.00	1.09	0.51	28.9	0.225		6.8	106.					
	2/15/76	T 20	PRE	1.05	2.52	1.75	10.9	2.050	3.400	7.5			0.2		46.	28.48
			POST													
DI 2T	2/15/76	T 20	PRE	1.02	2.70	1.96	13.6	1.045	1.550	7.5			0.1		46.	28.48
			POST													
DI 4T	2/15/76	T 20	PRE	0.39	1.65	0.98	11.6	0.127	0.171	7.4			0.0		46.	28.48
			POST													
EL 1T	4/15/75	T 20	PRE	0.52	1.68	1.50	36.8	0.555	0.682	7.0			2.0		54.	34.33
			POST	0.09	1.09	0.36	27.9	0.474		6.9	136.					
EL 2T	2/15/76	T 20	PRE	18.45	7.24	22.75	45.6	10.400	14.800	7.8			0.0		46.	28.48
			POST													

SITE: LOCATION OF SAMPLE, AS PER ITEM SHEET NO 1 = HANNA CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELM (EL), GAU PLAINS (GP), FERNWOOD (FE), FREEMAN (FR), NOISEY (NO), PORKY (PO),
RANDALL (RA), ROCK (RO), ROCKY RUN (RR), WIRDING (WI).
TYPE: T = TOTAL BOD. F = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
EP 1T	4/15/75	T 20	PRE	0.77	0.60	1.36	57.1	0.353	0.510	7.0			2.0		54.	34.33
			POST	0.05	1.09	0.64	35.4	0.204		6.6	92.					
EP 2T	4/15/75	T 20	PRE	0.49	0.46	1.86	45.9	0.195	0.350	6.9			2.0		54.	34.33
			POST	0.05	0.55	0.64	46.1	0.147		6.6	87.					
EP 3T	7/29/75	T 20	PRE	0.07	0.53	0.95	0.0	0.232	0.293				27.0		6.	43.19
			POST													
	5/11/76	T 20	PRE	0.11	0.07	0.35	35.6	0.061	0.103	7.7			9.0		22.	45.18
			POST													
FE 1T	4/15/75	T 20	PRE	0.21	0.63	1.05	30.2	0.076	0.186	7.2			3.0		54.	34.33
			POST	0.00	0.60	0.46	40.0	0.078		6.4	83.					
FR 1T	4/15/75	T 20	PRE	0.19	0.74	0.46	29.4	0.059	0.230				3.0		54.	34.33
			POST	0.00	0.69	0.42	24.2	0.077		6.5	85.					
NO 1T	4/15/75	T 20	PRE	0.35	0.63	1.02	38.4	0.179	0.290	6.9			2.0		54.	34.33
			POST	0.00	0.95	0.53	23.3	0.097		6.5	90.					
	4/15/75	FS20	PRE	0.35	0.63	0.00	32.6	0.179	0.000				2.0		54.	34.33
			POST	0.00	0.95	0.53	17.1	0.096		6.6	88.					
	4/15/75	T 4	PRE	0.35	0.63	1.02	38.4	0.179	0.280	6.9			2.0		54.	34.33
			POST	0.00	0.95	0.63	32.6	0.099		6.6	85.					
	4/15/75	FS 4	PRE	0.35	0.63	0.00	32.6	0.179	0.000				2.0		54.	34.33
			POST	0.00	0.95		31.0	0.096		6.5	86.					
	7/29/75	T 20	PRE	0.04	0.04	0.91	0.0	0.219	0.270	8.1			24.0		6.	43.19
			POST													
	1/ 6/76	T 20	PRE	0.14	1.05	0.67	12.0	0.069	0.090	7.5			0.0	8.0	49.	40.23
			POST	0.00	1.12	0.53	15.4	0.070		7.7	207.					

SITE: LOCATION OF SAMPLE. AS THE ITEM WHERE HA 1 = HAMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELM (EL), EAU PLAINE (EP), FENWOOD (FE), FREEMAN (FR), NOISEY (NO), PORKY (PO),
RANDALL (RA), ROCK (RC), ROCKY RUN (RR), WINDING (WI).
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
ND 1T	1/ 6/76	FS20	PRE	0.14	1.05	0.67	10.4	0.069	0.075	7.5			0.0		49.	40.23
			POST	0.00	1.05	0.60	14.7	0.082		7.7	211.					
	1/ 6/76	T 4	PRE	0.14	1.05	0.67	12.0	0.069	0.090	7.5			0.0	8.0	49.	40.23
			POST	0.07	1.15	0.07	17.3	0.088		7.4	230.					
	5/11/76	T 20	PRE	0.00	0.00	0.32	25.7	0.031	0.065	7.8			7.0		22.	45.18
			POST													
ND 2T	4/15/75	T 20	PRE	0.21	0.98	1.02	30.1	0.164	0.262	7.1			2.0		54.	34.33
			POST	0.35	1.68	0.92	23.2	0.162		6.6	100.					
	4/15/75	FS20	PRE	0.21	0.98	0.00	0.0	0.164	0.000				2.0		54.	34.33
			POST	0.00	1.06	0.70	30.9	0.126		6.7	98.					
	4/15/75	T 4	PRE	0.21	0.98	1.02	30.1	0.164	0.262	7.1			2.0		54.	34.33
			POST	0.00	1.12	1.12	23.2	0.990		6.6	94.					
	3/24/76	T 20	PRE	0.66	0.24	6.20	76.9	0.158	0.508	7.2			0.0		49.	33.05
			POST	0.00	1.58	1.82	59.1	0.300		6.9	73.					
	3/24/76	FS20	PRE	0.66	0.24	4.24	55.5	0.158	0.490	7.2			0.0		49.	33.05
			POST	0.00	1.09	3.82	53.0	0.233		7.0	70.					
	3/24/76	T 4	PRE	0.66	0.24	6.20	76.9	0.158	0.508	7.2			0.0		49.	33.05
			POST	0.21	0.81	4.10	105.2	0.282		6.7	70.					
PO 1T	4/15/75	T 20	PRE	0.10	0.42	0.84	30.9	0.120	0.230	6.9			2.5		54.	34.33
			POST	0.00	0.36		22.4	0.112		6.9	91.					
RA 1T	4/15/75	T 20	PRE	0.57	0.38	1.50	37.6	0.324	0.410	7.2			2.0		54.	34.33
			POST	0.00	0.64	0.60	31.6	0.274		6.9	109.					
RC 1T	4/15/75	T 20	PRE	0.18	0.70	1.19	29.6	0.064	0.145	7.1			2.0		54.	34.33
			POST	0.00	0.73	0.46	46.5	0.079		6.5	107.					

SITE: LOCATION OF SAMPLE, AS RHA 1T WHERE RA 1 = HERMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), JILL (JI), ELM (EL), SAN PLEINE (SP), FERNWOOD (FE), FREEMAN (FR), NOISEY (NO), PORKY (PO),
RANDALL (RA), ROCK (RC), ROCKY RUN (RR), WINDING (WI).

TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATION AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.

** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.

APPENDIX C continued.

SITE	DATE	TYPE	CHEM**	NH4-N	NO2+NO3-N	KJELDAHL N	COD	REACT P	TOTAL P	PH	SPEC COND	DO	TEMP	SUSP SOLID	DAYS	STAGE
RR 1T	4/15/75	T 20	PRE	0.24	0.63	0.94	27.8	0.059	0.123	6.8			3.0		54.	34.33
			POST	0.00	0.60	0.55	27.4	0.061		6.4	86.					
WI 1T	4/15/75	T 20	PRE	1.40	0.46	2.78	43.5	0.537	1.020	7.0			4.0		54.	34.33
			POST	0.00	1.82	1.02	41.9	0.461		7.1	135.					
	4/15/75	FS20	PRE	1.40	0.46	0.00	48.6	0.537	0.000				4.0		54.	34.33
			POST	0.00	1.96	0.98	29.5	0.450		6.9	130.					
	4/15/75	T 4	PRE	1.40	0.46	2.78	43.5	0.537	1.020	7.0			4.0		54.	34.33
			POST	1.19	0.89	1.19	34.9	0.435		6.9	125.					
	4/15/75	FS 4	PRE	1.40	0.46	0.00	48.6	0.537	0.000				4.0		54.	34.33
			POST	1.33	0.81		34.9	0.458		7.0	130.					
	2/15/76	T 20	PRE	0.61	0.77	1.26	23.8	0.440	0.740	7.2			0.2		46.	28.48
			POST													
WI 2T	4/23/75	T 20	PRE	0.00	0.00	1.99	41.8	0.125	0.400				4.0		67.	41.07
			POST	0.08	0.15	0.70	21.5	0.286		6.5	73.					
	4/23/75	FS20	PRE		0.00	0.00	0.0	0.125	0.000				4.0		67.	41.07
			POST	0.00	0.15	0.98	44.6	0.324		6.6	70.					
	4/23/75	T 4	PRE		0.00	0.00	0.0	0.125	0.000				4.0		67.	41.07
			POST	0.08	13.90	0.84	19.2	0.348		5.6	76.					
	4/23/75	FS 4	PRE	0.00	0.00	1.99	41.8	0.125	0.400				4.0		67.	41.07
			POST	0.28	0.14	0.31	44.4	0.168		6.6	77.					
	2/15/76	T 20	PRE	1.05	0.00	2.56	46.6	0.725	1.060	6.5			0.1		46.	28.48
			POST													

SITE: LOCATION OF SAMPLE, AS THE 1T INDICATES 1 = HIMANN CREEK SITE 1. T = SURFACE SAMPLE. ADDITIONAL SITES ARE:
BURNS (BU), DILL (DI), ELK (EL), GAUPLETONE (GP), FERNWOOD (FE), FREEMAN (FR), NOISEY (NO), PORKY (PO),
RANDALL (RA), ROCK (RO), PLOMY RUN (RR), WINDING (WI).
TYPE: T = TOTAL BOD. FS = BOD MEASURED FROM WATER FILTERED THROUGH A #300 SOIL SIEVE (APPROXIMATE 50 MICRON PORE SIZE).
FM = BOD MEASURED FROM WATER FILTERED THROUGH A MILLIPORE FILTER (APPROXIMATE 0.8 MICRON PORE SIZE).
20 OR 4 = INCUBATED AT 20 OR 4 DEGREES CENTIGRADE RESPECTIVELY.
** PRE AND POST CHEMISTRY IN MG/L EXCEPT PH AND SPECIFIC CONDUCTANCE. TEMPERATURE IN DEGREES CELSIUS.
DAYS = PERIOD OF BOD TEST INCUBATION. STAGE = RESERVOIR STAGE IN FEET, VERTICAL DATUM = 1100 FEET.