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Water Quality Control Through Single Crop Agriculture No. 4

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WATER QUALITY CONTROL THROUGH SINGLE CROP AGRICULTURE

No. 4

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ABSTRACT

A study was conducted to determine effects on water quality from flooded paddies used for the commercial culture of wild rice, Zizania aquatica. Water samples were taken from flooded impoundments on fertilized and unfertilized peat and mineral soils of northern Minnesota. Weekly changes in the chemical and physical parameters of the water entering the paddies, within selected paddies, and seepage water leaving the paddies were monitored throughout the summer. Sampling was increased in the receiving waters and discharge ditches during late summer draining of the paddies. No chemical changes were observed in the receiving waters until the fall drawdown occurred when increases in dissolved solids, total Kjeldahl-nitrogen, and total phosphorus occurred in the Clearwater River. Algal assay tests indicated that the increase in nutrients at peak discharge was sufficient to increase algal populations.

Studies of new and older developments indicated less nutrient release occurred from older paddies and mineral soils. Major soil disturbances were followed by increased turbidity and nutrient release. Consumptive water use was determined to be 20-22 inches per acre (51-56 cm/ha). The quantities of nutrients released from rice paddies were not significantly greater than would be expected in normal runoff in the area and much less than the amounts released from most agricultural endeavors.

This final report was submitted in fulfillment of Project Number 16080 FQV and Grant Number 802168 by the Center for Environmental Studies at Bemidji State College under the partial sponsorship of the Environmental Protection Agency. Field work was completed as of October 1, 1973.

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ACKNOWLEDGMENTS

The Tribal Council of the Red Lake Band of Chippewa Indians, the manager and directors of Clearwater Rice Incorporated, Messrs. James and Valmer Halama, and Lester Bohs are acknowledged with sincere thanks for the use of their paddies and management records. The support of the project by the Water Quality Control Branch, Environmental Protection Agency, and the help provided by Richard E. Thomas, the Grant Project Officer, are acknowledged with sincere thanks.

SECTION I

CONCLUSIONS

Significant increases in total phosphorus, Kjeldahl nitrogen and other parameters were observed in the Clearwater River concomitantly with the major discharge of commercial wild rice paddies. However, increases of the same magnitude were observed for these parameters following periods of heavy rain. The phosphorus release was greatest from first-year paddies applying balanced NPK fertilizers but decreased in the effluents from older fertilized paddies and was significantly less in paddies only applying nitrogen. The fertilizer phosphates appear to accumulate in the upper few inches of soil and are readily mobilized with any soil disturbance. No relationship between fertilizer use and the release of Kjeldahl nitrogen could be established. The release of Kjeldahl nitrogen appears to be associated with water flow over and through peat soils. Turbidity and filterable solids were released in greater concentrations from first-year paddies. Part of this increase was due to the erosion of poorly constructed discharge ditches. As the ditch banks stabilized there was a decrease in turbidity and filterable solids. The increased nutrient loading observed in the Clearwater River over that attributed to paddies was partially the result of the erosion of paddy ditches below the sampling sites. Stream flow and turbulance was great enough to prevent the settling of organic material between sampling sites on the river.

Phosphorus loading from the mineral paddies near Kelliher was not statistically significant but the increase of Kjeldahl-nitrogen in the Battle River was partially attributable to rice paddy effluents. Data from this site were too limited to adequately explain these phenomena.

Increases in phosphorus were noted in the discharge from the mineral-peat paddy development near Waskish. At this site there was no significant difference in the concentration of Kjeldahl-nitrogen and the other parameters between inlet and discharge water.

During the spring and summer growing season the seepage from commercial wild rice paddies did not appear to pose a threat to the receiving streams in the areas studied. Nevertheless, attempts should be made to recover and recycle this water since it represents a measurable water loss that must otherwise be made up from the inlet streams.

Algal assays indicated that sufficient nutrients entered the receiving streams during the discharge period to promote extensive algal growth. However, similar increases in potential productivity occurred naturally after heavy rains in the area. Due to the short duration of paddy discharges and the time of release it is doubtful that rice paddy effluents contribute significantly to the eutrophication of the receiving streams studied. Increased productivity could occur if the paddy water were discharged directly or indirectly into small lakes, particularly those of the soft water type.

The industry's major threat to the water courses is the overdeveloping of an area with regard to water supply. During years of little spring runoff or long summer drought the flow of rivers and streams could be reduced so that the needs of rice farmers and other developments along the river could not be met.

SECTION II

RECOMMENDATIONS

Uniform management practices have not been established in this new and developing industry. Considerable experimentation with paddy design, water level control, planting time, fertilizer application, and equipment utilization is being conducted by and for the industry. As a result of these studies changes may be made which will significantly affect water quality in the production areas. Based on current trends and management practices the following recommendations are made:

1. Extensive fertilizer trials should be conducted on peat soils to determine the effect phosphorus fertilizers have on wild rice yields. Until such a study is conducted phosphorus fertilizers should be used with caution on commercial wild rice paddies.

2. Prior to the thinning of rice paddies, water levels should be controlled so that no release of water occurs during thinning or within the following week.

3. The rate at which water is released could be reduced by extending the fall draindown period. This would minimize soil disturbances within the paddies and reduce erosion of the discharge ditches. When feasible the discharge should be made over flat land and slowly returned to the receiving stream.

4. More effort should be devoted to the construction and maintenance of dikes and discharge ditches to reduce erosion.

5. Paddy developments should be designed to return water lost through seepage back to the paddies.

6. Appropriate State and Federal agencies should carefully balance water appropriation permits with available water supply. These agencies should cooperate with the rice producers in formulating procedures for equitably distributing water resources during drought periods.

7. The development of paddies should be restricted along water courses low in alkalinity, hardness, and dissolved solids. No developments should be allowed on the shores of soft-water lakes.

SECTION III

INTRODUCTION

OVERVIEW OF THE PROBLEM

Wild rice (Zizania aquatic L.) has grown naturally in many lakes and streams in Minnesota for centuries. With the first successful attempts at cultivating wild rice in paddies in 1960 a new industry was born.

The rapid growth of the wild rice industry and the intimate association of this incipient industry with the aquatic environment have caused concern for the lakes and streams of northern Minnesota. Low lying bogs, grassland, and, to a lesser degree, forestland riparian to lakes and streams have been cleared, leveled, ditched, roto-tilled, diked, and put in rice production. As spring breakup occurs the paddies are flooded to a depth of six to twelve inches (15 to 30cm) and maintained until early August. Of major concern is the summer seepage water, occasional overflow water, and paddy water discharged during August to dry the paddies. Seed germination occurs as the water reaches 3-5^{o}C with the first visible submerged ribbon-like leaves appearing near the first of May. By mid-May the floating stage is reached. At this time mechanical thinning of paddies that have been in production two or more years occurs to prevent the rice from becoming too thick. By early June the first leaves become upright and the paddy takes on the appearance of a grassy field. The develop-

ment of the rice panicles is apparent by mid-July. During early August the paddies are drained to allow the soil to become dry enough to be mechanically harvested with combines. In the study area, the rice ripens over a two-week period starting in late August. Most harvesting is now done with modified white rice combines. Since wild rice is a shattering grain, the rice kernels fall to the ground as they ripen; up to 50 percent of the rice is lost in this manner as ripening occurs. The fallen kernels act as seed for succeeding years greatly overseeding the paddy. Once better strains of wild rice are developed, yields will increase and problems of overseeding in the older paddies will be reduced.

Most of the present rice production is located in northern Minnesota on low, flat land west and east of Red Lake, in the Leech Lake area and in Aitkin County, although commercial developments are also found in northern Wisconsin and Canada at this time. The potential for out-of-state production follows the natural stands of wild rice east from Minnesota to the Atlantic coast and southward into Florida. The rapid development of this industry in Minnesota saw an increase from 900 acres (360 ha) to 17,000 acres (6,900 ha) during the years 1969-1972.[1] Poor market conditions, cost of new development, the increased prices for upland grains, the lack of a good disease-resistant nonshattering seed, and the introduction of crop rotation have slowed development. During 1974 Minnesota's acreage was estimated to be 13,000 acres (5,300 ha).[2] As market conditions improve, the industry will continue to develop on low, flat land with adequate water supplies to maintain flooded paddies until early August.

GENERAL DESCRIPTION OF THE STUDY AREA

Clearwater River Basin

The sites monitored from 1970 to 1973 consisted of four commercial wild rice developments located in north central Minnesota. Two of these developments, Clearwater Rice, (1971-1973) and the Ki-Wo-Say paddies, (1970-1973) are located in the Clearwater River basin. The remaining sites were located near Upper Red Lake in northern Beltrami County. One was two miles (3.2 km) northeast of Waskish, (1971-73) and the other was four miles (6.4 km) west of Kelliher along Highway 38, (1973).

The Clearwater Rice development consisted of two major paddy systems of 600 and 1,000 acres (240 and 400 ha) located on opposite sides of the Clearwater River. The total acreage of the complex was close to 2,000 acres (810 ha) when including two other operations directly bordering Clearwater Rice. Portions of the 600 acre (240 ha) tract have been cultivated since 1968 and have been the site of intensive investigation. The paddies were constructed on sapric peat ranging in depth from 16 to 40 inches (41 to 101 cm) over a sandy loam base. Samples were collected on a weekly basis from the Clearwater River above the paddies, from selected paddies, and from a 2,200-foot (670 m) ditch containing some bog runoff and seepage water from adjacent paddies. During the August discharge period, daily samples were taken from the main drainage ditches to the river.

The Ki-Wo-Say paddies are located near the southwestern border of the Red Lake Indian Reservation adjacent to the Clearwater River approximately 10 miles (16 km) downstream from the Clearwater Rice development. There is no specific classification for the peat soils on

which the Ki-Wo-Say paddies were constructed but they were similar in texture and organic composition to the soils at Clearwater Rice. The peat varies in depth from 4 to 6 feet (1.2 to 1.8 m) over a clay base. By 1973, 160 of the planned 180 acres (65 of 73 ha) were in production. Samples were collected weekly from the Ki-Wo-Say Wild Life Area bog, which was the source of water for all the paddies; from one paddy; and from the outlet ditch which contained seepage water from five paddies. During the August 1973 drawdown, the ditch was monitored daily.

The Clearwater River was monitored at 3 major sites. One site was above all rice producing areas, one was 4 miles (6.4 km) below Clearwater Rice at the Highway 10 bridge, and one 10 miles (16 km) below the Ki-Wo-Say paddies at the Polk County Highway 2 bridge. During 1973, samples were collected weekly until the drawdown period when samples were taken daily. Prior to 1973, the Polk County site was only monitored during the 1972 discharge period. By 1973 approximately 4,000 acres (1,600 ha) of rice were in production between the Polk County site and the one located above Clearwater Rice. Estimates of water flow during drawdown were made during 1973 at the three major river sampling sites. The Clearwater River was the main source of water for all paddies in the area. All water lost through surface seepage, overflow and fall draining of the paddies returned to the Clearwater River.

In rice growing areas, the gradient of the river is very flat as is the surrounding land. Starting in 1951, the U.S. Army Corp of Engineers did extensive ditching and channelizing of the river and surrounding area to develop farmland. The overall quality of the river water is suitable for recreation and municipal use but little or no recrea-

tional development has taken place nor is any anticipated at this time.

Stations monitoring waterflow have been maintained at Leonard, 15 miles (24 km) above the study area, and at Plummer, approximately 30 miles (48 km) below the study area. At Leonard, the stream drained 153 square miles (396 km^2) of area and had a minimum discharge of 2 cubic feet (56.6 l) per second with an average discharge of 61.7 C. F.S. (1,747 l/sec) during a period from 1935 to 1945. At Plummer, the watershed was 512 square miles (1,300 km^2) with a minimum stream discharge of 7.9 C.F.S. (223.6 l/sec) and an average discharge of 178 C.F.S. (5,039 l/sec) from 1940 to 1973. The average flow of the Clearwater River during the rice growing season from April through July was 320 C.F.S. (9,060 l/sec).[3]

The climate of the Clearwater watershed is moderate with an average temperature of approximately 39 degrees, (3.9°C). Average monthly temperatures range from a low of 3.3 degrees (-16°C) for January to a high of 69.2 degrees (20.7°C) for August. The April to August growing season average is 53 degrees (11.7°C). The average annual rainfall in the region since 1890 has been 22 inches (56 cm). Of this amount 19.4 inches (49 cm) was lost; largely through evapotranspiration. With adequate moisture, evapotranspiration losses could be as high as 22.6 inches (57.4 cm).[4] A U.S. Army Corp of Engineers survey stated annual evaporation losses from one square mile (259 ha) of lake or reservoir would be 1.8 cubic feet (51 l) per second or 25 inches (64 cm) per year. Even with these losses "there appears to be adequate flow in the river during normal years for irrigation."[3]

Red Lake Basin

The paddy system studied near Waskish, was located in an area of primarily organic soils. The burning of portions of the peat and subsequent agriculture resulted in the formation of small areas of mineral soils. The mineral paddy investigated in this study was classified as belonging to the Chilgren series; a mixture of gley over grey wooded soils.[5] This and adjacent paddies received their water from peat bogs by means of drainage ditches. The discharge from these paddies ultimately entered the Tamarac River which flows into Upper Red Lake, as shown in Figure 1, a general map of the study area. For detailed maps of the paddies and sampling sites the reader is referred to the 1971 report, Water Quality Control Through Single Crop Agriculture.[6] When mineral paddies were removed from production at Waskish, similar paddies were added 4 miles (6.4 km) west of Kelliher along the Battle River. Samples were collected weekly from the Battle River above the paddies and within two paddies. During the August drawdown, discharge and river samples were taken daily.

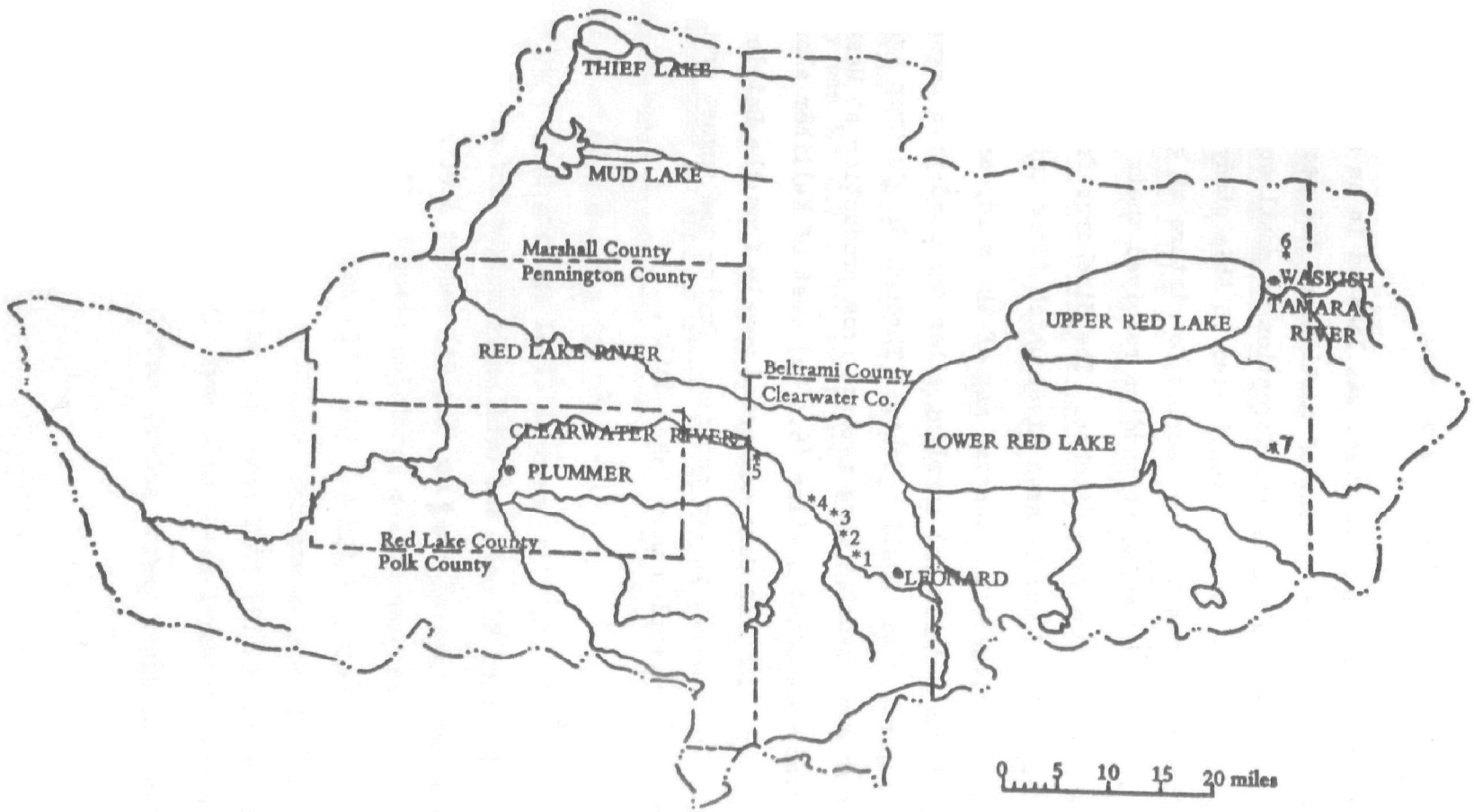

Figure 1. A map of the Red Lake River Watershed showing the general location of sampling sites. 1 is a station located upstream from all rice paddies on the Clearwater River. 2 marks the location of the fertilized organic paddies of Clearwater Rice. 3 locates a river station below 2,000 acres. 4 locates the unfertilized Ki-Wo-Say paddies. 5 is a river station below 4,000 acres of paddies. 6 marks the location of the mineral paddies near Waskish. 7 marks the location of the mineral paddies near Kelliher.

LOCATION AND DESCRIPTION OF SAMPLE SITES

Site 100 (CWB-1) was located on the Clearwater River above any paddy developments. Samples were collected from the river near the bridge on Clearwater County Highway FAS 11, 1.5 miles (2.4 km) above the pumping station for Clearwater Rice, Inc.

Site 101 was located at the pumping station for the Clearwater Rice Inc. This site was sampled in 1971 and 1972 prior to the development of additional paddies on the west side of the Clearwater River.

Site 105 was a 40-acre (16 ha) paddy located on sapric peat soil. The paddy was only sampled in 1973, but had been in production since 1968. This paddy annually received a fall application of 18-18-17 NPK fertilizer at the rate of 250 to 300 pounds per acre (280-336 kg/ha) and a July treatment of ammonium nitrate at 50-100 pounds per acre (56-112 kg/ha).

Site 115 was a 20-acre (8.1 ha) rice paddy located just to the east of site 105. Both paddies shared in common a 1,300 foot (396 m) dike. Site 115 received the same fertilizer treatment as site 105.

Site 125 (SKP-3) was a 20-acre (8.1 ha) rice paddy located to the east of site 115. This paddy shared a 1,300 foot (396 m) dike in common with site 115. Site 125 received the same fertilizer treatment as site 105. This paddy had been regularly sampled since 1971 because of its accessibility.

Site 140 (SKM-D) was a discharge ditch one quarter of a mile west of

Site 140 (cont.)
site 105. This ditch which contained only water during the discharge period drained sites 105, 115, 125, plus an additional 300 acres (120 ha) of similarly managed paddies. This ditch emptied into the Clearwater River approximately 1.75 miles (2.8 km) downstream from site 100.

Site 145 (SKP-E) was an 80-acre (33 ha) paddy on sapric peat soil located approximately one-half mile (.8 km) north of site 105. This paddy had been in production since 1969 and had been receiving fall applications of NPK fertilizers and July applications of ammonium nitrate. Seepage water from the south dike entered a 2,200 foot (670 m) ditch, site 160.

Site 155 (SKP-W) was a 20-acre (8.1 ha) paddy on the south side of the 2,200 foot (670 m) ditch. This ditch received both seepage and discharge from site 155. This paddy, in production since 1969, was managed in a manner similar to site 105.

Site 160 (SK4-D) was located near the mouth of a 2,200 foot (670 m) ditch bordered by fertilized peat paddies. This ditch cut through the shallow peat into a sandy loam soil. The spoils from the ditch were used to construct the adjacent paddy dikes for sites 145 and 155. Water flowing in the ditch was a combination of seepage, bog drainage, and paddy effluents. This ditch emptied into the Clearwater River 2 miles (3.2 km) below site 100.

Site 200 was located on Ruffy Brook, one source of water for approximately 1,000 acres (405 ha) of paddies developed in 1972.

Site 200 (cont.)

Samples were collected near the bridge on Clearwater County FAS 11, one-half mile (.8 km) south of the paddies.

Site 210 was located on Ruffy Brook below the paddies and approximately .25 miles (.4 km) above the confluence with the Clearwater River. At this point Ruffy Brook contained part of its normal flow, seepage water, and during the fall discharge the effluent from approximately 400 acres (162 ha) of new paddies.

Site 215 was a 200-acre (81 ha) paddy on the west side of the Clearwater River adjacent to Clearwater County CSAH 5. This paddy in its first-year of production had received a fall application of NPK fertilizer and an aerial application of ammonium nitrate in July.

Site 220 was located on a discharge ditch which drained a number of first year paddies on the west side of Clearwater River. This ditch contained only paddy effluents which flowed into Ruffy Brook below site 210.

Site 300 (CWB-2) was located on the Clearwater River approximately 4 miles (6.4 km) below the 2,000 acres (810 ha) of paddies. Samples were collected near the bridge on Clearwater County 10 at the southwest corner of the Red Lake Indian Reservation.

Site 400 (WLA) was located near a culvert that contained water flowing from a 6,000-acre (2,400 ha) marsh called the Ki-Wo-Say Wildlife Area. The marsh on peat soil was drained in the

Site 400 (cont.)

fall and flooded in the spring with water from the Clearwater River and run-off water from surrounding forested areas. The culvert drain from the marsh served as the source of water for the unfertilized peat soil paddies on the southwest corner of the Red Lake Indian Reservation.

Site 405 (3P) was located in an unfertilized 20-acre (8.1 ha) paddy on the Red Lake Indian Reservation. This paddy constructed on heavy peat was put into production in 1970.

Site 410 (3D) was located in a 1,200 foot (370 m) drainage ditch which bordered the west side of site 405 and two other 20-acre (8.1 ha) paddies. In 1973 an additional 60 acres (24 ha) of paddies were put into production on the west side of the ditch. During the summer the ditch contained seepage from the paddies which was monitored by measuring the level over a v-notch weir. Paddy discharge entered the ditch during August drawdown.

Site 500 was located on the Clearwater River below the point where discharge from site 410 entered.

Site 600 (CWB-3) was located on the Clearwater River approximately 17 miles (27 km) downstream and northwest of site 100. Samples were collected near the bridge on Polk County Highway CSAH 2, 12 miles (19.3 km) north of Gully, Minnesota. It was estimated that there were 4,000 acres (1,600 ha) of paddies in production between sites 100 and 600 in 1973.

Site 700 was located on the South Branch of the Battle River. Samples were taken near the bridge on Beltrami County Highway CSAH 36, 4 miles (6.4 km) west of Kelliher, Minnesota. This site was located near the source of water for the mineral paddies.

Site 700-A was located on the South Branch of the Battle River. Samples were taken near the bridge on Beltrami County Highway CSAH 38, 4.5 miles (7.2 km) west of Kelliher, Minnesota. This site was located three miles (4.8 km) downstream and west of the mineral paddies.

Site 705 was in a 40 acre (16 ha) paddy located on a sandy loam soil of the Nebish-Rockwood type. This paddy was placed in production in 1973. The discharge from this flowed through a ditch, site 710, to the South Branch of the Battle River.

Site 710 was on a discharge ditch which drained site 705. This ditch only contained water after heavy rains and during the fall discharge period.

Site 715 was in a paddy near the south bank of Hartman Creek. The soil in this paddy was a mineral soil of the Nebish-Rockwood type. The discharge from this 20-acre (8.1 ha) paddy flowed indirectly into the Battle River.

Site 801 (V3C) was located in a drainage ditch which crossed Beltrami County Highway CSAH 40, 2.75 miles (4.4 km) north and east of Waskish, Minnesota. This ditch supplied the water for

Site 801 (cont.)

the series of paddies. This ditch carried drainage from the large bog north of Waskish on Upper Red Lake.

Site 805 (V3P) was located on a paddy consisting of mineral soil of the Chilgren series which received its water from site 801. The paddy was in its second year of production and was first fertilized in 1972 with 6-24-24 at the rate of 200 pounds per acre (224 kg/ha).

Site 810 (V5C) was located on the drainage ditch 1 mile (1.6 km) below site 801. The water at site 810 was a mixture of paddy seepage, stream water which flowed through a paddy, bog seepage, and paddy overflow. The major influence on discharge in the ditch was bog soil since less than 20 acres (8 ha) of the 160 - 190-acre (64-77 ha) development was on mineral soil.

Site 900 was located on the Tamarac River near the bridge on Minnesota State Highway 72 in the village of Waskish. It was estimated that the Tamarac River received the effluent from approximately 1,500 acres (600 ha) of rice paddies.

PROJECT OBJECTIVE

The main objective of this project is to provide information, based upon valid scientific data, that will assist the development of the wild rice industry in such a manner as to minimize harmful ecological effects. Changes in the quality of water discharged from the wild rice impoundments will be studied and recommendations will be made on methods of farming and water discharge that will minimize potential problems.

SECTION IV

METHODS

CHEMICAL AND PHYSICAL DETERMINATIONS OF WATER QUALITY

Field collections started with spring break-up in mid-April on the rivers and discharge ditches which carried water to and from the commercial developments. As selected paddies were flooded, usually before the end of May, they were added as sampling sites. At each of these sites, samples were taken on a weekly basis. In late summer, during the period of paddy draindown, sampling was increased; and major sites, such as the discharge ditches and the Clearwater River, were monitored daily. Two 1-liter samples were collected in Plastic Cubitainers* at each site; one was preserved with 5 milliliters of chloroform and the other with 40 milligrams of mercuric chloride. Dissolved oxygen and temperature measurements were made in the field with a Model 54 Yellow Springs Instrument. Alkalinity and pH measurements were made with a Beckman Electroscan 30 immediately upon return to the laboratory. Alkalinity measurements were not taken if the sample was more than 24 hours old.[7] At the same time turbidometric determinations were made with a Hach Model 2100 A turbidimeter.[7] The determination of total Kjeldahl nitrogen employed the micro-colormetric procedures with Nesslerization as outlined by the EPA Methods For Chemical Analysis of Water and Wastes, while ammoniacal

*Trade name

nitrogen was determined by Nesslerization of a distillate as recommended in Standard Methods for the Examination of Water and Waste Water, 13 ed. Calcium and magnesium were analyzed by means of atomic absorption in accordance with EPA methods; with flame emission being used for potassium. Filterable and dissolved solids were determined by EPA methods, while the phenoldisulfonic acid method outlined in Standard Methods for the Examination of Water and Waste Water, 13 ed., was used for nitrate determinations.

Soluble phosphorus was determined by using the single reagent method as recommended by the EPA. The samples were unfiltered and 20 milliliters of isobutanol was used to concentrate the complex. The accuracy of the soluble phosphorus concentrations is doubtful because of interferences observed in the determinations. The procedure employed for the total phosphorus analysis followed the EPA methodology with the exception that the samples were not neutralized since their pH was consistently between pH 7 and 8 and potassium persulfate was used in lieu of ammonium persulfate. The phosphomolybdate complex was extracted with isobutanol to increase sensitivity.

QUALITY CONTROL

Precision and accuracy checks were made on the analyses for total phosphorus, total Kjeldahl-nitrogen, and ammonia-nitrogen using reference samples supplied by the Environmental Protection Agency, Analytical Quality Control Laboratory. The results obtained by our laboratory are compared with the known concentrations in Table 1.

Table 1. ANALYTICAL QUALITY CONTROL SAMPLES

Parameter	Known Concentration	Concentration Reported
Total P	.17	.18 ± .003
NH_3-N	1.70	1.65 ± .11
TKN	1.70	1.65 ± .11

Internal precision was maintained by replicate analyses of sample aliquots performed routinely. Accuracy determinations employed spiking techniques to determine recovery percentages.

STREAM FLOW

Measurement of water volumes in the seepage and discharge ditches were made by monitoring the flow over a 90-degree v-notch weir with a Stevens Type F water level recorder. Cross sections of the Clearwater River were made at three sites with the aid of surveying instruments. Stream velocities were estimated by timing a float over a measured section of the river. These measurements were used to determine water budgets for the paddies and nutrient loading rates.

ALGAL ASSAY

Selenastrum capricornutum, supplied by National Eutrophication Laboratory, was used as the algal assay test organism. The tests and replicates were conducted in compliance with the Algal Assay Bottle Test as developed by the National Eutrophication Research Program.[9] Measurements of standing crops of algae were made by direct counting with a Levy Heamocytometer and microscope during 1972. Measurements made during 1973 employed an Electro Zone Cello-scope particle counter.

SOIL CHEMISTRY

All soil analyses were carried out at field moisture conditions except pH, total phosphate, and textural analysis. The soil pH was determined at the moisture saturation point with a glass electrode and calomel reference electrode. Total phosphate was analyzed according to the acid-free vanadate-molybdate method of Tandon et al.[10] Textural analysis of the mineral soil was carried out according to the hydrometer method outlined by Shirlaw,[11] and the semimicro technique of Jackson was used to determine the cation exchange capacities.[12] Available phosphate concentrations were determined by the extraction method suggested by Truog.[13] Color was developed in the filtered extract by the sulfomolybdate acid method of Jackson.[12] Inorganic phosphate was fractionated according to the method of Chang and Jackson,[14] while the analytical procedures for the iron, aluminum, and calcium phosphates were those suggested by Jackson.[12]

SECTION V

RESULTS

INTRODUCTION

The results have been divided into ten sections which summarize selected data from various phases of this project. A detailed summary of the chemical analyses from all sampling sites is reported in tabular form in the appendix of this paper. Those tables separately summarize data from the summer growing season and the fall discharge period.

The concentrations of the chemical parameters are reported as milligrams per liter (mg/l), while turbidity measurements are reported as Formazin Turbidity Units, (FTU). Where applicable, confidence limits (C.L.) at the ninety-five percent (95%) certainty level for the mean are reported. Because of a limited number of observations (N) at some sites the confidence limits of the mean were calculated by multiplying a tabled "t" value times the standard error of the mean. The values reported are the mean ($\bar{x}$) plus and minus ($\pm$) the standard error of the mean ($\sqrt{\text{variance}/N}$) times t (.05).[15]

PHOSPHORUS

Soluble and total phosphorus concentrations were determined at all sites in the study area. Analytical problems with soluble phosphorus

were detected when some values exceeded total phosphorus concentrations. The major problems were found in a fertilized organic soil paddy, site 125 and a drainage ditch, site 160, carrying seepage water from fertilized organic soil paddies. At these sites soluble phosphorus concentrations were usually greater than total phosphorus concentrations. Though both soluble and total phosphorus values are reported and discussed the soluble values exhibited greater uncertainty in some cases.

All phosphorus values are reported as mg/l phosphorus (P). Site 100, on the Clearwater River above the fertilized rice paddies, exhibited little variation in the soluble phosphorus concentrations throughout the growing seasons of 1971, 1972, and 1973. The mean soluble phosphorus concentration was 0.060 $\pm$ .065 mg/l while total phosphorus concentrations ranged from a minimum of .019 to .270 mg/l with a mean of .094 $\pm$ .014 mg/l. Summer data collected at site 300, on the Clearwater River located 4 miles (6.4 km) below 2,000 acres (810 ha) of Clearwater Rice and associated paddies indicated that the mean phosphorus levels were slightly higher in this portion of the stream with .031 mg/l soluble phosphorus and .098 mg/l total phosphorus. Limited midsummer data from additional downstream sites indicated a leveling in the summer phosphorus levels. The mean soluble phosphorus concentration at site 500 located immediately below the Ki-Wo-Say paddy discharge was .015 $\pm$ .010 mg/l while the total phosphorus concentration was .122 $\pm$ .059 mg/l. The July concentrations were slightly greater at site 600, located below about 4,000 acres (1,600 ha) of rice cultivation. The July concentrations at site 600 were .064 $\pm$ .048 mg/l soluble phosphorus and .140 $\pm$ .093 mg/l total phosphorus Table 2 summarizes the phosphorus data for the Clearwater River.

Table 2. MEAN SUMMER CONCENTRATIONS OF SOLUBLE AND TOTAL PHOSPHORUS ON THE CLEARWATER RIVER (mg/l ± 95% C.L.)

Site	Mean Soluble Phosphorus	N	Mean Total Phosphorus	N
100	.060 ± .065	50	.094 ± .014	49
300	.031 ± .009	38	.098 ± .016	40
500	.015 ± .010	6	.122 ± .059	6
600	.064 ± .048	3	.140 ± .093	4

During the summer months there was no active discharge from the rice paddies. A number of small streams and ditches contained drainage and seepage water from rice paddies that entered the Clearwater River.

One such source was a 2,200 foot (670 m) ditch, site 160, bordered on each side by rice paddies. The water in this ditch was primarily seepage water from the paddies and a small amount of bog drainage. During the summers of 1971, 1972, and 1973 the soluble phosphorus concentrations fluctuated between .005 and .629 mg/l with a mean value of .113 ± .127 for the three seasons. Analytical problems with soluble phosphorus raised some questions about its significance at high concentrations. The mean total phosphorus concentrations .248 ± .096 mg/l were slightly higher for the three summers. Concentrations of .095 ± .041 mg/l soluble phosphorus and .122 ± .021 mg/l total phosphorus, were observed in the discharge ditch near the Ki-Wo-Say Wildlife Area. This 1,200 foot (365 m) ditch, site 410, had paddies on both sides for the entire length and was sampled periodically prior to discharge from 1970 through 1973. These data are summarized in Table 3.

Table 3, MEAN SUMMER CONCENTRATIONS OF SOLUBLE AND TOTAL PHOSPHORUS ON TWO DRAINAGE DITCHES ENTERING THE CLEARWATER RIVER (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N
160	.195 ± .089	42	.248 ± .096	41
410	.095 ± .041	47	.122 ± .021	47

The rice paddies in the Clearwater River area were generally discharged during the first week of August. This marked the second portion of the sampling season when increased sampling occurred. The Clearwater River was monitored during the discharge periods of 1971, 1972, and 1973. At site 100, above the rice paddies, the mean soluble phosphorus and total phosphorus concentrations remained low at .039 and .084 mg/l, respectively. During the discharge periods, at site 300, a noticeable increase was observed in the concentrations of soluble and total phosphorus. Limited data from the downstream sites, 500 and 600 also showed increases, which appeared to correlate with the increased acreages of rice. Table 4 summarizes the phosphorus concentrations observed in the Clearwater River during discharge for the years 1971, 1972, and 1973. The majority of all the samples were taken during 1973. Paddy effluents were discharged into drainage ditches during the fall drawdown. Sites 160 and 410 were monitored during this period as well as two additional paddy outlets, sites 140 and 220. Site 140 received water from approximately 400 acres (160 ha) of fertilized rice paddies while site 160 received the discharge from 80 acres (32 ha). Site 220 drained a portion of a new development of approximately 1,400 acres (570 ha) of fertilized rice paddies. Site 410 drained 100 acres (40 ha) of unfertilized rice paddies below the

Ki-Wo-Say Wildlife Area owned by the Red Lake Band of Chippewa Indians.

Table 4. THE MEAN CONCENTRATIONS OF PHOSPHORUS OBSERVED IN THE CLEARWATER RIVER DURING DISCHARGE (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N
100	.039 ± .020	17	.084 ± 018	17
300	.170 ± .055	21	.339 ± .095	21
500	.139 ± .343	3	.253 ± .418	3
600	.337 ± .064	17	.442 ± .111	17

When compared with site 100, the increased levels of soluble phosphorus observed at sites 140 and 220 were statistically significant. The same degree of significance can be attributed to the greater levels of total phosphorus at sites 140, 160, and 220. At site 410, the small increase in total phosphorus above the Wildlife Area, site 400, was not statistically significant.

Table 5. MEAN PHOSPHORUS CONCENTRATIONS IN RICE PADDY EFFLUENTS (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N
140	.328 ± .081	14	.353 ± .100	14
160	.118 ± .078	17	.320 ± .081	16
220[a]	.975 ± .440	7	.987 ± .322	8
410	.105 ± .134	19	.104 ± .045	19

[a]drains paddies in the first year of production.

Data presented in Tables 5 and 6 indicate the mean phosphorus concentrations observed in the paddy effluents approximate the

concentrations observed in the paddies just prior to discharge, except for soluble phosphorus at the Ki-Wo-Say, site 405. Increases in phosphorus concentrations in the discharge to levels above that observed in the paddy water appeared to correlate with increases in suspended solids and turbidity.

Table 6. PHOSPHORUS CONCENTRATIONS OBSERVED IN RICE PADDIES IN THE CLEARWATER RIVER DRAINAGE BASIN PRIOR TO DISCHARGE (mg/l)

Site	Soluble P	Total P	
105	.190	.200	20 July 73
115	.184	.275	26 July 73
125	2.180	1.450	28 July 71
125	.370	.460	26 July 72
125	.050	.113	26 July 73
145	.140	.300	26 July 73
155	.182	.280	9 Aug. 72
155	.074	.240	2 Aug. 73
215[a]	.790	1.60	9 Aug. 73
405	.054	----	28 July 71
405	.016	.075	2 Aug. 72
405	.028	.117	26 July 73

[a]A paddy in the first year of production.

The phosphorus concentrations observed in the Battle River, west of Kelliher, were higher than those observed in the Clearwater River Basin. Samples collected from the Battle River, site 700, during the summer growing season exhibited little variation in soluble phosphorus ranging from 0.019 to .052 mg/l with a mean value of .034 mg/l. The total phosphorus values observed during the summer of 1973 were slightly more ranging about the mean of .126 mg/l from 0.75 to .25 mg/l. The concentrations of both soluble and total phosphorus increased during the August discharge period to .071 and .168 mg/l, respectively.

Phosphorus concentrations observed at site 710, the ditch draining 120 acres (48 ha) of new mineral paddies, were lower than levels observed in the Battle River throughout the discharge period. These comparisons are depicted in Table 7.

Table 7. PHOSPHORUS CONCENTRATIONS ASSOCIATED WITH RICE PADDIES ON MINERAL SOIL. (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N	
700	0.034 ± .008	11	0.126 ± .034	11	summer
700 A	.071 ± .009	3	.168 ± .054	15	fall
710	0.015 ± .008	14	0.116 ± .032	13	fall

The third study area located near Waskish consisted of a series of paddies where the soil was a very thin layer of peat over a mineral soil. The water used to fill the paddies was diverted from ditches draining a large peat bog. The major source of water, site 801, was sampled above the rice paddies during the growing season and the discharge period. The mean soluble phosphorus was .032 mg/l for the summer months increasing to .059 mg/l for the fall. The total phosphorus concentration rose slightly from .103 to .110 mg/l. Site 810, located about one mile downstream from site 801, contained, in addition to bog drainage, seepage from approximately 190 acres (77 ha) of paddies. During the discharge period, the effluent from the paddies was monitored at site 810. During the summer there was a significant contribution of both soluble and total phosphorus to the ditch via the paddy seepage with the mean values being .128 and .184 mg/l for the soluble and total concentrations. However, the amount of phosphorus

added to the stream by the discharge from the paddies did not significantly increase the downstream concentrations in the discharge ditch.

Table 8. MEAN PHOSPHORUS CONCENTRATIONS IN THE RED LAKE WATERSHED AT WASKISH, MINNESOTA (mg/l ± 95% C.L.)

Site	Mean Soluble P	N	Mean Total P	N	
801	.032 ± .009	30	.103 ± .022	30	summer
801	.059 ± .064	10	.110 ± .103	9	fall
805	.138 ± .124	32	.153 ± .057	30	paddy
810	.128 ± .046	35	.184 ± .039	35	summer
810	.069 ± .029	15	.175 ± .078	15	fall
900	.046 ± .025	5	.070 ± .049	5	summer
900	.068 ± .017	19	.097 ± .039	19	fall

From the data in table 8, it appears that the discharge of rice paddies into the Tamarac River, site 900, did not significantly alter the baseline phosphorus values. It was estimated that the Tamarac River received the discharge from 1,500 acres (600 ha) of ricelands.

NITROGEN DYNAMICS

Two forms of nitrogen were monitored throughout the course of this study, ammonia-nitrogen and total Kjeldahl-nitrogen. Nitrate-nitrogen determinations were made at most sites during 1971 and 1972, but were discontinued in 1973 as they had appeared rather constant. Nitrate-nitrogen values are recorded in the appendix.

The ammonia-nitrogen levels in the waters flooding fertilized rice paddies on the peat soils in Clearwater County generally remained

less than 1 mg/l over the three growing seasons. During periods of radical soil disturbance, associated with thinning operations in late May and early June, and with the aerial application of nitrogen fertilizers in July, ammonia-nitrogen levels exceeded 1 mg/l but rapidly returned to baseline levels. The total Kjeldahl-nitrogen levels in the same paddies were more variable. The mean annual concentrations ranged from 1.5 to 4 mg/l. Fluctuation in Kjeldahl-nit rogen closely followed changes in ammonical-nitrogen values and were highest during the thinning periods. Table 9 summarizes the mean concentrations of both ammonia-nitrogen and total Kjeldahl-nitrogen in the paddies.

Table 9. MEAN CONCENTRATIONS OF AMMONIA-NITROGEN AND KJELDAHL-NITROGEN IN FERTILIZED PEAT PADDIES ALONG THE CLEARWATER RIVER (mg/l ± 95% C.L.)

Site	Mean NH_3-N	N	Mean TKN-N	N
105	.266 ± .203	11	2.196 ± .466	11
115	.616 ± .677	17	1.924 ± .209	17
125	.538 ± .162	52	1.707 ± .186	52
145	.216 ± .114	15	1.952 ± .499	18
155	.306 ± .155	17	2.604 ± .935	18
215[a]	.402 ± .222	9	4.427 ± 1.031	9

[a] A paddy in the first year of production.

Site 405 is a paddy on the Ki-Wo-Say development which only received one application of ammonium-nitrate fertilizer in 1972. Data from this site shows that the ammonia-nitrogen levels were not significantly different from the concentrations observed on the fertilized paddies, but the Kjeldahl-nitrogen level was lower. The mean ammonical-nitrogen concentration for the study period in the Ki-Wo-Say paddy

was .521 ± .136 mg/l, while the total Kjeldahl-nitrogen level was 1.667 ± .165 mg/l.

Throughout the growing season from April to the end of July the seepage from the paddies collected at sites 160 and 410 contained as much or more ammonia and less Kjeldahl-nitrogen than the adjacent paddies. At site 160 the mean ammonia-nitrogen concentration for the summer months was .428 ± .117 mg/l and the Kjeldahl-nitrogen level was 1.149 ± .140 mg/l. At the Ki-Wo-Say paddy, site 405, the ammonia-nitrogen concentration for the summer months averaged .521 ± .136 mg/l compared to .578 ± .108 mg/l for the adjacent ditch, site 410. The Kjeldahl-nitrogen values for the paddy and the ditch were less divergent, 1.667 ± .165 and 1.647 ± .143 mg/l, respectively.

The nitrogen levels observed in the paddy effluents during discharge closely approximated the levels observed in the paddies during the summer months. A summary of nitrogen levels observed during drawdown is found in Table 10.

Table 10. MEAN NITROGEN CONCENTRATIONS IN PADDY EFFLUENTS (mg/l ± 95% C.L.)

Site	Mean Ammonia Nitrogen	N	Mean Kjeldahl Nitrogen	N
140	.141 ± .098	13	1.497 ± .220	13
160	.335 ± .196	16	1.541 ± .267	16
210[a]	.444 ± .119	16	3.371 ± .537	16
220[a]	.598 ± .675	10	4.102 ± .522	10
410	.455 ± .152	21	1.639 ± .282	21

[a] Draining first year paddies.

The rice paddy effluents did not appear to significantly effect the ammonical-nitrogen concentrations in the Clearwater River during the discharge period. Increases in the Kjeldahl-nitrogen levels over the summer baseline levels, however, were observed at all stations except at site 100 which is above the rice paddies. These changes are evident from the data in Table 11.

Table 11. COMPARISONS OF SUMMER AND FALL NITROGEN CONCENTRATIONS IN THE CLEARWATER RIVER (mg/l ± 95% C.L.)

	Site	Mean NH_3-N	N	Mean Kjeldahl	N
summer	100	.184 ± .046	46	.665 ± .086	47
fall	100	.267 ± .104	16	.608 ± .144	14
summer	300	.264 ± .082	35	.774 ± .125	40
fall	300	.269 ± .089	24	1.341 ± .245	24
summer	500	.090 ± .130	6	.605 ± .133	6
fall	500	.283 ± .404	3	1.647 ± 1.311	3
summer	600	.274 ± .354	4	1.080 ± .216	4
fall	600	.321 ± .093	17	2.296 ± .315	17

The nitrogen dynamics associated with mineral paddies near Kelliher, Minnesota, were similar to that observed in the Clearwater Basin. The mean ammoniacal-nitrogen level increased slightly from the summer value of .124 ± .094 to .138 ± .078 mg/l in the Battle River, site 700-A, which was the receiving stream for the rice paddies. One of the mineral paddies, site 705, averaged .174 ± .107 mg/l ammonia for the summer. A significant increase from .644 ± .157 to 1.544 ± .233 mg/l Kjeldahl-nitrogen occurred during the discharge period. The effluent from the mineral paddy averaged 1.311 ± .184 mg/l Kjeldahl-nitrogen at site 710.

Nitrogen levels in the bog drainage ditches which supply water to the paddies in the Waskish area were higher than the concentrations seen in the Clearwater Basin. The mean summer concentrations in the supply ditches of ammonia-nitrogen and total Kjeldahl-nitrogen for site 801 were .554 ± .181 and 1.66 ± .226 mg/l, respectively. During August, the concentrations of both ammonia and Kjeldahl-nitrogen increased in the supply ditch, site 801, to .741 ± .400 and 2.072 ± .455 mg/l respectively. In this area the higher nitrogen levels at site 805 in the paddy did not appear to influence the concentrations of nitrogen at site 810 in the discharge ditch or at site 900 in the Tamarac River which is in the receiving stream. These data are summarized in Table 12.

Table 12. MEAN NITROGEN CONCENTRATIONS AT SITES IN THE WASKISH AREA (mg/l ± 95% C.L.)

	Site	Mean NH_3-N	N	Mean Kjeldahl-N	N
summer	801	.554 ± .181	31	1.662 ± .226	31
fall	801	.741 ± .400	10	2.072 ± .455	9
paddy	805	.595 ± .167	27	2.188 ± .177	32
summer	810	.552 ± .166	31	1.940 ± .294	33
fall	810	.662 ± .415	13	2.111 ± .297	12
summer	900	.299 ± .229	5	1.556 ± .402	5
fall	900	.148 ± .069	19	1.627 ± .169	19

PH, ALKALINITY, HARDNESS AND METAL IONS

pH Levels

The pH values observed in the Clearwater River and associated paddies were remarkably similar and fairly constant throughout the summer. The Clearwater River was slightly basic averaging 8.1 ± .1 pH units

for all river stations for the study period. The pH observed in the paddies was slightly less, averaging 8.0 ± .1, while the paddy effluents ranged between 7.0 and 8.2 pH units. No major variations in pH were noted during the study and the slight variation appeared to coincide with changes in precipitation.

Limited data from the mineral paddies in the Kelliher area indicated that similar general conditions prevailed. In the Waskish complex, slightly lower pH values were observed at all stations. The mean pH values for the inlet, site 801; the paddy, site 805; and the outflow, site 810 were 7.6, 7.7, and 7.5, respectively.

Alkalinity and Hardness

The alkalinity and hardness in the Clearwater River Basin did not appear to be adversely affected by the discharge from the rice paddies during the study period. There was an increase in both the alkalinity and hardness at the site below the rice paddies during the fall discharge. However, the mean alkalinity during the fall was less than that observed during the summer months.

It was expected that there would be a significant increase in both alkalinity and hardness in the river, since the levels found in the paddies and their discharge ditches were significantly higher in most instances ranging from 250 to 325 mg/l for both parameters. The exception was the Ki-Wo-Say Wildlife Area and paddy complex where the alkalinity and hardness were low relative to the Clearwater River. The seepage and effluent from the Ki-Wo-Say paddies exhibited higher mean alkalinity and hardness than the river as shown in Table 13.

Table 13. MEAN SEASONAL ALKALINITY AND HARDNESS LEVELS IN THE CLEARWATER RIVER BASIN (mg/l ± 95% C.L.)

Site	Season	Mean Alkalinity	Mean Hardness
100-101	summer	228 ± 6	217 ± 9
	fall	207 ± 9	193 ± 9
125	summer	260 ± 20	251 ± 16
160	summer	274 ± 9	253 ± 11
	fall	303 ± 63	274 ± 22
215[a]	summer	321 ± 27	313 ± 44
300	summer	215 ± 10	211 ± 8
	fall	215 ± 27	232 ± 11
400	summer	162 ± 11	157 ± 9
	fall	158 ± 16	168 ± 9
405	summer	182 ± 17	199 ± 21
410	summer	276 ± 24	299 ± 33
	fall	250 ± 43	257 ± 45

[a] First-year paddy.

Due to the necessity of storing samples from the Kelliher area for one to three days before analysis, little can be discussed about the alkalinity of the Battle River or adjacent paddies. The limited hardness data for the area point to a moderate increase in hardness in the river as a result of paddy discharges.

The summer alkalinity in the paddy in the Waskish complex, site 805, decreased with respect to the inlet ditch, site 801, while the average value for the same period in the discharge ditch, site 810, approximated the inlet concentration. The mean alkalinities for the inlet, paddy and the outflow were 214, 186, and 216 mg/l, respectively. A similar trend was observed with respect to mean hardness with inlet, paddy, and outflow concentrations of 216, 205, and 216 mg/l.

Calcium

The mean calcium levels in the Clearwater River increased moderately from 42 mg/l at site 100, located above the rice paddies, to 56 mg/l at site 600, below 4,000 acres (1,600 ha), during the fall discharge. The effluent from the paddies reflected the concentrations observed in the paddies themselves with levels ranging from 65-75 mg/l in the fertilized paddies to about 50-55 mg/l for the unfertilized paddies.

The calcium levels in the discharge fror the mineral paddies at Kelliher averaged 55 mg/l (site 710) while the summer mean for the Battle River (site 700) was 52 mg/l.

There was no significant change in the calcium ion concentrations at the Waskish paddy sites (801, 805, and 810) throughout the season. Refer to the appendix for mean values by site for calcium.

Magnesium

Magnesium concentrations in the Clearwater River increased downstream through the rice growing region with summer mean concentrations increasing from 23 mg/l at site 100 above the rice paddies to 31 mg/l at site 600, located below 4,000 acres (1,600 ha) of rice.

During the discharge period, increases of from 3 to 5 mg/l were observed at the downstream sites. The inlet water for the Ki-Wo-Say paddies site 400, and the paddies sampled, site 405, exhibited magnesium concentrations in the range of 15-16 mg/l for the summer months. The discharge and seepage from the paddies showed respective increases to 24 and 28 mg/l. Magnesium ion concentrations at the Waskish sites 801, 805, and 810 averaged 19 mg/l for the summer months. A slight

increase to 21 mg/l occurred during the fall at site 801 in the inlet ditch and site 805 in the paddy. However, a decrease to 17 mg/l was recorded at site 810 in the discharge ditch. Refer to the appendix for mean value data.

Potassium

Potassium levels varied from 2 to 5 mg/l in the Clearwater River basin for the season. The concentrations in the river were high during the spring, decreased during the summer, and increased to higher levels in the fall. Two to threefold increases in potassium ion concentrations were observed in fertilized paddies when they were flooded or radically disturbed during thinning operations. These levels decreased to river levels throughout the summer.

Though variable, the average potassium ion concentrations in the Ki-Wo-Say area were less than those observed in the Clearwater River.

In the mineral paddy at Waskish, the concentration of potassium vacillated from .5 to 4 mg/l for the study period rising to 6.5 mg/l during thinning operations. The concentration in the discharge ditch, though slightly higher on occasion, was not significantly different than the inlet water. Mean values by site are reported in the appendix.

DISSOLVED, FILTERABLE AND VOLATILE SOLIDS

Dissolved Solids

The dissolved solids in the Clearwater River above the paddies, site 100, though varying from about 150 to 290 mg/l during the three summers, averaged 245 $\pm$ 10 mg/l. During the discharge period, site

300, below 2,000 acres (810 ha) averaged 298 ± 19 mg/l while the mean value for site 600, located below 4,000 acres (1,600 ha), was 403 ± 39 mg/l. The fall mean represented an increase of about 50 mg/l over the summer mean for sites 300 and 600. The mean dissolved solids discharged from the older organic paddies, sites 140 and 160, was 330 mg/l. A much greater contribution was made by the first year paddies where the mean values observed in the discharge ditches, sites 210 and 220, exceeded 470 mg/l.

The dissolved solids were rather low in the Ki-Wo-Say marsh and paddies averaging 198 and 243 mg/l, respectively, for sites 400 and 405, but the leachate from the paddies averaged nearly twice the amount found in the paddy. The dissolved solids were significantly reduced in the combined seepage-drainage ditch (site 410) with the discharge of the paddy. A similar trend was observed in the Battle River which received the effluent from the mineral paddies near Kelliher.

At the Waskish paddy (805) the mean concentration of dissolved solids of 202 mg/l was significantly less than that observed in the inlet water (site 801) or the discharge (site 810) which had mean levels of 311 and 325 mg/l, respectively.

Filterable Solids

Due to the consistency of flooded peat soils, great fluctuations in filterable solids were observed in the rice paddies. Levels of 300 to 400 mg/l were recorded during thinning operations, but these rapidly decreased to mean levels of 20 to 30 mg/l for most of the growing season. During discharge, paddy effluents varied from 16 to 87 mg/l filterable solids with the higher concentrations in the discharges from the first-year paddies.

The greatest change in mean filterable solids that occurred in the Clearwater River was observed at site 300. Here the fall levels increased significantly from the mean summer value of 13.6 ± 3.8 to 35.5 ± 13.3 mg/l. An increase from a July average of 9 to 22 mg/l was observed at site 600 during the same time period.

At the Waskish sites, during discharge, there was a decrease in filterable solids from 17 mg/l in the inlet stream, site 801, to 11 mg/l at the discharge site 810. The Tamarac River, the receiving stream for these effluents, averaged less filterable solids during the discharge period than during the summer months, 6 vs 12 mg/l.

Volatile Solids

The volatile solids in the Clearwater River comprised a rather constant 40 percent of the total dissolved solids, rising and falling with the dissolved solids. Increases in mean volatile solids from less than 100 mg/l above the paddies (site 100) to 135 mg/l (site 300) and 193 mg/l (site 600) were observed during the fall draindown. The mean volatile solids discharged from older paddies at the Clearwater Rice development averaged 172 mg/l at site 140, and 158 mg/l at site 160. The discharge from the first year paddies flowing past sites 210 and 220 maintained mean levels of volatile solids of 227 and 215 mg/l, respectively.

The mean concentration of volatile solids, during discharge, from the Ki-Wo-Say paddies was 18 mg/l less than the mean level of 159 mg/l recorded in the same ditch during the summer months.

Limited data from the Kelliher area indicated little change in volatile solids concentrations occurred in the Battle River as a result of rice paddy discharges. A slight decrease from the summer mean was noted in the fall.

With the exception of occasional pulses, no significant changes in mean volatile solids were observed at Waskish between the inlet water at site 801 and the discharge ditch, site 810, either during the growing season or the fall draindown. The concentration of volatile solids in the Tamarac River remained a rather constant 100 mg/l for the study period.

PHYSICAL FACTORS - TURBIDITY, TEMPERATURE AND DISSOLVED OXYGEN

Turbidity

The Clearwater River is aptly named because the turbidity above the paddies at sampling site 100, averaged about 3 FTU for the study period. The turbidities below the rice paddies in the channelized portion of the river averaged 6 FTU at site 300 and 9 FTU at site 600. It is difficult to determine if the moderate increases in turbidity recorded during the fall were a result of paddy discharges or of the 3.3 inches (8.3 cm) of rain which fell during the discharge period in 1972 or the 2.4 inches (6.0 cm) that fell during the same period in 1973. With the exception of marked increases associated with flooding and thinning, the turbidities observed on both the fertilized and unfertilized peat paddies were generally less than the inlet waters. The turbidities of the major discharge and seepage ditches remained near the levels recorded in the receiving streams in the summer; but, during the discharge period, levels in excess of 50 FTU were recorded.

Turbidities of the inlet water for mineral paddies at Waskish (site 801) exceeded 20 FTU in the early spring but decreased to about 1.5 FTU for the summer months. The turbidity of the paddy studied, site 805, was generally less than that observed in the inlet ditch. During the final stages of discharge, turbidity levels in excess of 20 FTU were observed but they quickly returned to normal as flows decreased.

Temperature

The temperatures observed in the rice paddies, discharge ditches, and receiving streams varied on a diurnal basis. On the average the temperature of the paddy and discharge water was generally 1 to 4°C less than the receiving streams in the early morning; increasing to a maximum of 1 to 2°C above the temperature of the receiving stream during afternoon samplings. For the period of maximum discharge no fluctuations in river temperature were noted.

Dissolved Oxygen

The Clearwater River was consistently supersaturated with dissolved oxygen and no diurnal variation was noted. The water in the rice paddies had lower dissolved oxygen tensions ranging from less than 1 mg/l to saturation. These variations resulted from plant photosynthesis, respiration and wind generated aeration. The upper portion of paddy had consistently higher dissolved oxygen readings than the water just above soil surfaces in peat paddies. The discharges from these paddies did not appear to affect the oxygen tensions in the receiving streams as they were well aerated by the time they reached the stream. Similar observations were recorded in the other study areas.

ALGAL ASSAYS

Algal assays were conducted on a preliminary basis at selected sites along the Clearwater River in 1972.[16] The study was expanded in 1973 to include additional sites. All values are reported as means with plus or minus 2 standard deviations. Results shown in figure 2, indicate that the maximum standing crop of the test organism, Selenastrum capricornutum remained rather constant at sites 100 and 300 until late June of 1972.

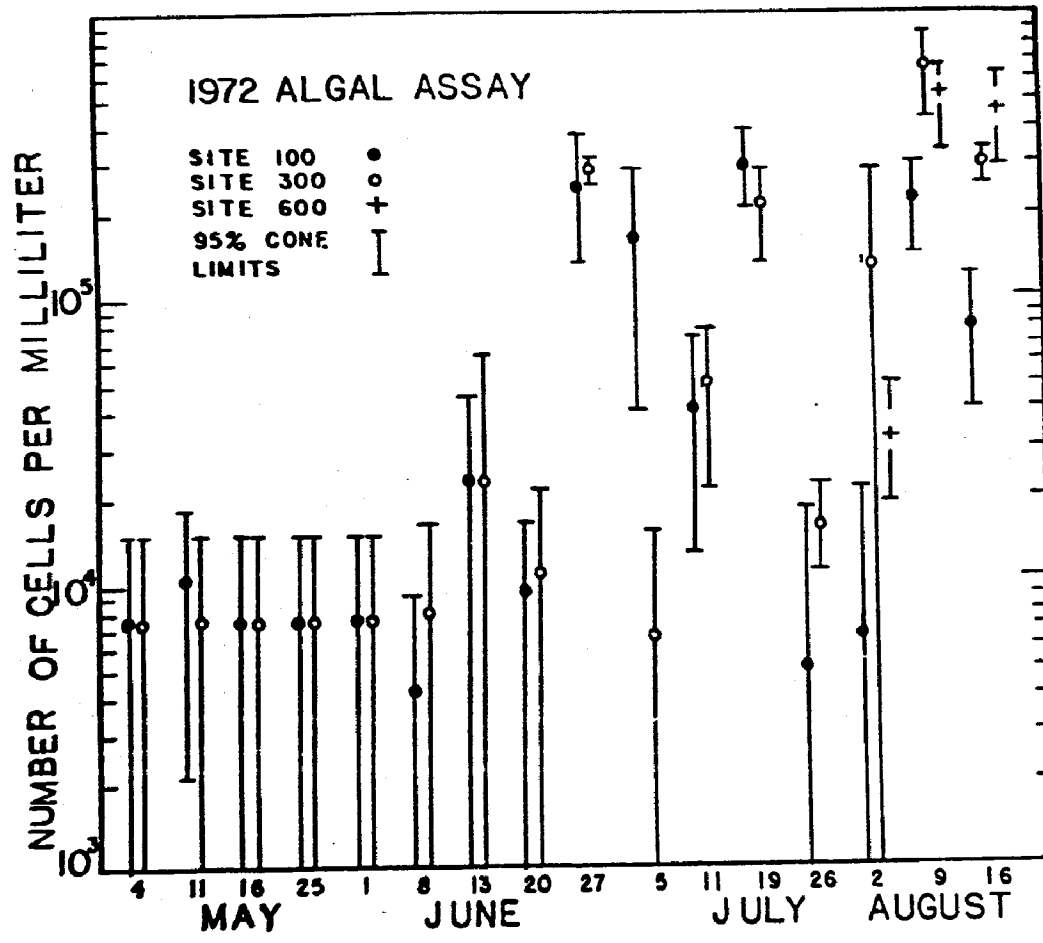

Figure 2. Standing crops of algae produced in Clearwater River water in 1972

The increased productivity recorded prior to the beginning of paddy discharges, which began on August 2, appeared to be induced by the heavy rains recorded during the same period, figure 3.

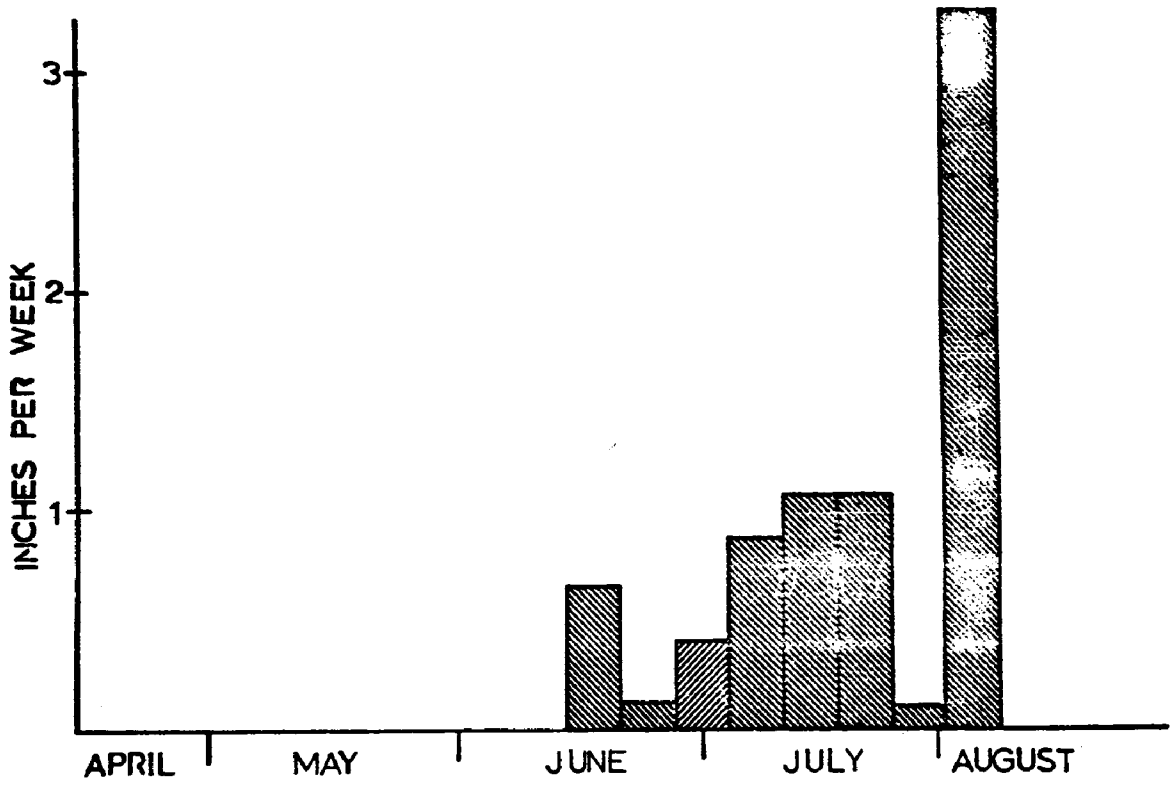

Figure 3. Weekly precipitation recorded at the Ki-Wo-Say paddies on the Clearwater River (1972).

Though significant increases above the potential productivity of site 100 occurred during the discharge period at sites 300 and 600 in early August of 1972, the run-off from the 3.3 inches (8.4 cm) of rain which fell during this period undoubtedly influenced the results. Figure

4, summarizing the results of the 1973 assays conducted on the Clearwater River water, shows that at site 600 the potential productivity remains quite constant throughout the summer and fall, uninfluenced by either heavy rains or paddy discharge. It appeared that during the latter stages of paddy discharge, after August 8, the increased nutrients from paddy effluents may have been responsible for the

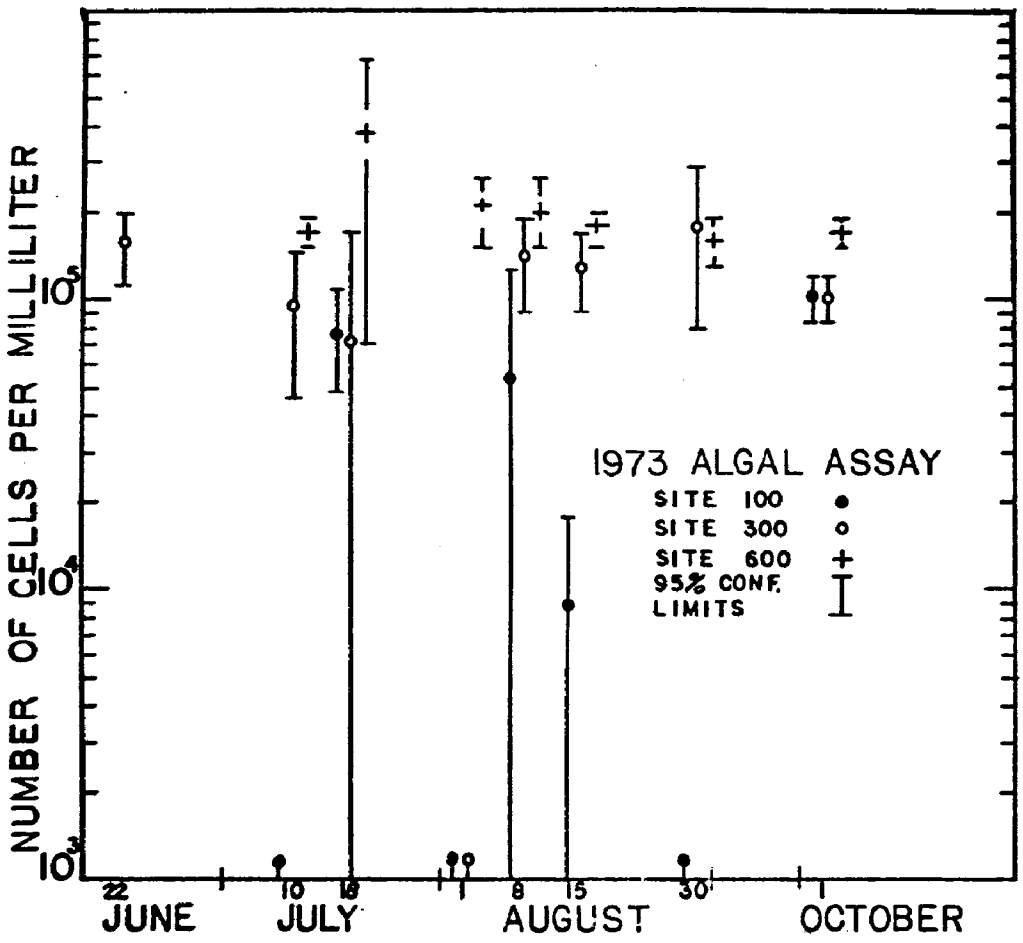

Figure 4. Standing crops of algae produced in Clearwater River water in 1973.

increases observed in the standing crop of algae produced by the samples from site 300 compared to site 100 located above the paddies.

The maximum standing crop of the test organism, produced in water from site 600, was less than 20 percent of the crop produced in the synthetic algal media indicating some form of nutrient limitation, 5.4×10^5 cells/ml vs 6.3×10^6 for 1972 and 3.7×10^5 vs 1.8×10^6 for 1973. Preliminary investigation led to the conclusion that the river at site 100 was phosphorus limiting during the early summer but subsequent data summarized in Table 14 indicates that nitrogen was limiting at all sites in both the Clearwater River and the paddy discharges when drawdown occurred.

Table 14. MAXIMUM STANDING CROPS OBTAINED AT SELECTED SITES WITH THE SAMPLE COLLECTED 8 AUGUST 1973 AND WITH SPIKES OF PHOSPHORUS AND NITROGEN. ALL VALUES TIMES 10^5 cells/ml.

Site	Sample	Plus .125 mg/l P	Plus .5 mg/l N
300	1.41 ± 0.53	1.27 ± 0.35	3.28 ± 1.49
600	2.03 ± 0.56	1.92 ± 1.34	4.38 ± 2.07
160	1.49 ± 1.00	1.15 ± 0.61	4.45 ± 0.29
140	1.19 ± 0.31	.90 ± 0.46	4.50 ± 1.71

Limited data from the Battle River, site 700, near Kelliher indicated a considerable amount of variation in maximum standing crops. From data shown in Table 15, it is evident that the paddy assayed, site 705, was limited early in the season but potential productivity increased significantly to levels higher than the river prior to discharge.

Table 15. MAXIMUM STANDING CROPS OF ALGAE PRODUCED AT SITES 700 AND 705 NEAR KELLIHER, MINNESOTA. ALL VALUES TIMES 10^4 cell/ml.

Date	Site 700	Site 705
22 June 73	12.20 ± 0.05	.69 ± 1.90
13 July 73	6.32 ± 1.76	8.72 ± 6.27
18 July 73	11.70 ± 2.39	35.10 ± 9.20
1 Aug. 73	1.89 ± 0.95	discharge begun

The bog drainage in the Waskish area, site 801, produced a high standing crop in June, but the potential productivity decreased throughout the remainder of the season. The potential productivity of the discharge ditch, site 810, remained higher than site 801 for the entire season, indicating enrichment by the seepage and discharge from the paddies. Though the highest standing crop produced in the Waskish area occurred at site 810, as seen in Table 16, a 2.5 fold increase in the standing crop occurred when the August 8 water samples were spiked with 0.50 mg/l nitrogen indicating nitrogen limitation. The nutrients in the rice paddy effluents may be responsible for the increased standing crop produced in the Tamarac River water samples, site 900, on August 8 but their effect was short-lived as subsequent samples were less productive.

Samples were collected from Red Lake one-half mile (.8 km) from the mouth of the Tamarac River and at the outlet of Lower Red Lake. Assays of these samples indicated that the potential productivity of Red Lake was not influenced by rice paddy discharges at this time. The mean standing crops produced at these sites did not vary significantly from those produced by the Tamarac River water during summer

and fall. The last assays were conducted on water collected October 1, 1973.

Table 16. STANDING CROPS OF ALGAE PRODUCED AT THREE SITES AT WASKISH, MINNESOTA. ALL VALUES TIMES 10^4 cells/ml.

Date	Site 801	Site 810	Site 900
22 June 73	21.90 ± 2.00	25.6 ± 5.90	7.81 ± 1.48
10 July 73			12.10 ± 2.00
18 July 73	2.41 ± 1.20	7.98 ± 0.52	9.15 ± 2.86
1 Aug. 73	2.76 ± 2.28	.63 ± 0.31	3.73 ± 1.06
8 Aug. 73	0.88 ± 1.36	25.60 ± 9.50	15.00 ± 0.40
11 Aug. 73			6.41 ± 1.71
15 Aug. 73	0.27 ± 0.73	24.00 ± 6.50	2.27 ± 1.55
30 Aug. 73			8.57 ± 2.73
1 Oct. 73			2.22 ± 1.28

WATER BUDGETS

Water budgets were estimated for the Clearwater paddies from rainfall records, pumping records, estimates of spring bonus water, seepage and discharge water measurements. Each year pumping began about April 1 and continued through mid-July. In 1973 a dry spring reduced the rate of pumping and it was mid-May before complete flooding was achieved. Additional water was added only to replace seepage and evaporation losses during the growing season.

Spring bonus water, estimated to be 1.2 inches per acre (3.1 cm/ha), entered the paddies via runoff into the central supply ditch from surrounding land during April and early May of 1973. Pumping records show that 18.6 inches per acre (47.3 cm/ha) of water were added to the 620 acres (251 ha) from the Clearwater River by electrical lift pumps.[18]

Paddy seepage and August drawdown water returned to the river via a number of ditches. The only site where seepage could be effectively measured during the growing season was the 2,200 foot (670 m) ditch between a series of paddies, site 160. The entire flow in this ditch was assumed to be seepage since plugging of a culvert by the Clearwater Rice foreman, prevented bog water from entering the ditch. Measurements indicated that seepage was less during April and May, than in June and July, because of late flooding. Due to the number of discharge ditches, flow data during the August draindown were estimated.

A monthly water budget is shown in Table 17. The 1973 estimates of 21.1 inches per acre (53.6 cm/ha) of consumptive water use is in close agreement with the 1972 estimate of 20.6 inches per acre (52.32 cm/ha).[6] The seepage and discharge loss for the two years was nearly identical; the major difference was that the spring of 1973 was drier. During 1973 an additional 2.6 inches per acre (6.6 cm/ha) was pumped from the river. This plus the 1.4 inches (3.6 cm) of rain offset the additional runoff (bonus water) intercepted in 1972.

Low water levels and paddy design prevented estimates of water budgets at Waskish and the Ki-Wo-Say.

Table 17. CONSUMPTIVE WATER USE FOR A 620 ACRE DEVELOPMENT REPORTED AS INCHES PER ACRE

	March	April	May	June	July	August	Totals
Bonus water			1.2*				1.2
Pump water	.5	4.3	7.6	2.5	3.7		18.6
Rainfall		.9*	1.7	2.1	4.2		8.9
Seepage loss		-.30*	-.37	-.46	-.45		-1.6
Discharge water						- 6.0[a]	-6.0
						Total	21.1

[a] estimated

FLOW RATES FOR THE CLEARWATER RIVER

Flow rates for the Clearwater River were estimated from July 26 through August 21, 1973, at 3 sites: above all paddies, site 100; below 2,000 acres (800 ha), site 300; and below 4,000 acres (1,600 ha), site 600. The average flow for the period from July 26 to August 21 was 112 C.F.S. (3,200 l/sec) at site 100, 125 C.F.S. (3,570 l/sec) at site 300 and 175 C.F.S. (5,300 l/sec) at site 600. Flow rates shown in figure 5, indicate major discharges began August 2. Maximum flows of 325 C.F.S. (9,200 l/sec) at site 300 and 432 C.F.S. (12,200 l/sec) were observed August 10. By August 18, flow rates had returned to pre-discharge levels. Based on a mean flow of 175 C.F.S. (5,300 l/sec) at site 600 the increased flows, from August 2 to August 18, represented a total discharge of 2,700 acre feet (3,600 m^3) for the 4,000 acres (1,600 ha) of rice paddies.

This method of measuring stream flow was crude and no attempt was made to account for the additional flow resulting from the 2.4 inches (6.0 cm) of rain which fell from August 2 to August 9.

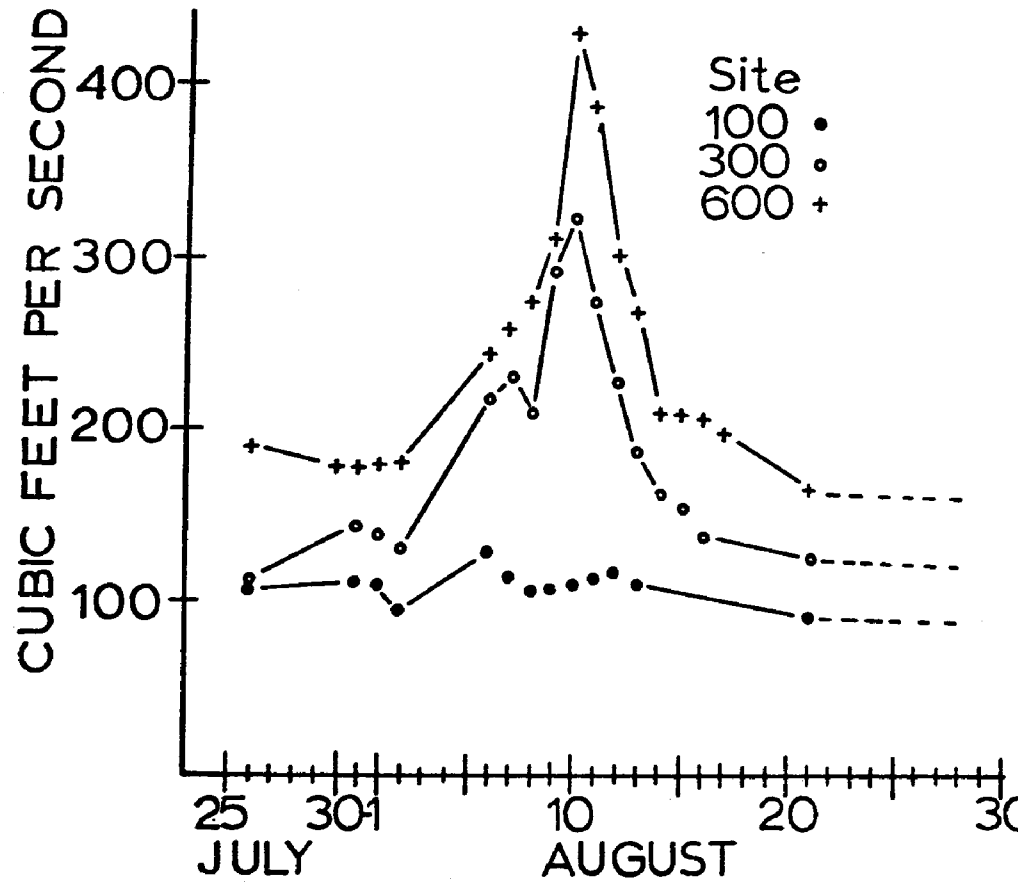

Figure 5. Flow Rates Measured at Three Sites on the Clearwater River in 1973

NUTRIENT LOADING

Loading From Paddy Seepage

Calculations of stream loading were done on a seasonal basis. The season was divided into growing seasons from April through the end of July and the discharge period in early August. The water discharged during the growing season was mainly seepage water. The weight of the material that is reported is the difference between the total weight of that parameter discharged and the amount found

in an equal volume of inlet water. The reported value then represents the contribution attributed to the respective paddies. The growing season data were calculated from weekly analyses and total weekly flow while discharge data was calculated from daily analyses and daily volumes. Results are shown in Table 18.

Prior to discharge 74 acre feet (90,000 m^3) of seepage water flowed through the 2,200 foot (670 m) discharge ditch, site 160. During the week of July 12 the concentrations of phosphorus and nitrogen increased sharply in the discharge ditch as a result of heavy rains. If these data were omitted from the values reported in Table 18 for total phosphorus the resultant factors would be significantly reduced. During the growing season total phosphorus, total Kjeldahl-nitrogen, ammonia-nitrogen, total dissolved solids, alkalinity, and calcium increased as the summer progressed, but no trends were evident in the discharge weights of potassium and magnesium.

Flooding of the Ki-Wo-Say paddies did not occur until the first week of June but monitoring of flows past site 410 in the seepage ditch began May 10. After flooding the flow of seepage averaged 1.3 acre feet (1,600 m^3) per week. The weights of phosphorus, and ammonia-nitrogen released from the Ki-Wo-Say paddies were similar to those found at site 160. Considering the smaller amount of water discharged at site 410, greater weights of metal ions, dissolved solids and alkalinity were released per acre foot of discharge.

At the Waskish paddies the seepage monitored at site 810 exhibited trends very similar to those observed at the Clearwater Rice paddies with the exception that more magnesium and less alkalinity were released per acre foot of seepage.

Table 18. THE POUNDS[a] OF SELECTED NUTRIENTS FOUND IN RICE PADDY SEEPAGE COMPARED TO THAT FOUND IN AN EQUAL VOLUME OF INTAKE WATER. WEIGHT IN POUNDS PER ACRE FOOT OF SEEPAGE.

Parameter	Site 160	Site 410	Site 810
Total-P	.33	.36	.28
TKN	1.9	4.7	1.3
Ammonia-N	.35	.54	.31
Total Dis. Solids	240	1280	50
Alkalinity ($CaCo_3$)	150	770	65
Calcium	31	170	18
Magnesium	-2.7	90	5
Potassium	1.4	15	1.8
Total Discharge	74 acre ft.	11 acre ft.	32 acre ft.

[a]Grams per cubic meter = Pounds per acre foot x .3676

Loading From Paddy Effluents

At site 160, the discharge flows were monitored from August 1 to August 9 when the dam holding the weir broke. During this period 34 acre feet (43,000 m^3) of water had been discharged. When compared to an equal volume of inlet water the paddies contributed .23 pounds per acre (.26 kg/ha) total phosphorus, 1.38 pounds per acre (1.56 kg/ha) total Kjeldahl-nitrogen and .14 pounds per acre (.16 kg/ha) ammonia-nitrogen. The data in Table 19 shows that while the paddies appeared to act as a sink for potassium and magnesium they released large amounts of calcium and dissolved solids. During the first seven days of the discharge period 2.4 inches (6.1 cm) of rainfall was recorded at site 160. This precipitation undoubtedly influenced the results at all sites along the Clearwater River.

Table 19. NUTRIENT ADDITIONS BY THREE RICE PADDY EFFLUENTS. LOADING AS POUNDS[a] PER ACRE DURING DISCHARGE.

Parameter	Site 160	Site 410	Site 810
Total-P	.23	-.08	.199
TKN-N	1.38	.85	.188
Ammonia-N	.14	-.56	-.113
Total Dis. Solids	130.	141.	178.
Calcium	24.	no data	no data
Magnesium	-1.6	5.12	-6.32
Potassium	-.132	.42	1.68
Acres of paddies	68	78	190

[a]Kilograms per hectare = pounds per acre x 1.12

The effluent from the unfertilized Ki-Wo-Say paddies flowing past site 410 carried less phosphorus and ammonia than was found in the inlet water. These paddies also released a large amount of dissolved solids, but did not act as traps for magnesium or potassium.

Data collected from site 810 indicated that the Waskish paddies removed ammonia-nitrogen and magnesium from the inlet water. Rainfall was also a problem at this site as 7.8 inches (20 cm) fell at the time of discharge, raising water flow in the creek.

Nutrient Loading In The Clearwater River

Stream flow measurements and chemical analyses were made on a frequent basis, see figure 5, during the major discharge period at three sites on the Clearwater River. Table 20, nutrient loads carried by the Clearwater River, was constructed by subtracting the weights of materials carried past site 100 from the total weights carried by an equal volume at site 600.

Table 20. ADDITIONAL NUTRIENT LOADS CARRIED BY THE CLEARWATER RIVER AT SITE 600 COMPARED TO AN EQUAL VOLUME OF WATER AT SITE 100 DURING DRAWDOWN, AUGUST 2 TO AUGUST 17. WEIGHT IN POUNDS[a] TIMES 10^3.

Parameter	Site 600
Total-P	4.6
TKN	23.3
Ammonia-N	2.1
Total Dis. Solids	2200.
Calcium	240.
Magnesium	83.
Potassium	17.

[a]kg = pounds x .4545

If the values reported in Table 20 for site 600 are divided by 4,000, the number of acres above that site, the quotient would estimate the contributions made by each acre of rice paddy. The results shown in table 21 exhibit a trend quite similar to that seen in table 19 for sites 160 and 410.

Table 21. NUTRIENT LOADING BY RICE PADDIES ALONG THE CLEARWATER RIVER. LOADING AS POUNDS[a] PER ACRE OF RICE LAND.

Parameter	Site 600
Total-P	1.1
TKN-N	5.8
Ammonia-N	.5
Total Dis. Solids	550.
Calcium	60.
Magnesium	21.
Potassium	4.2

[a]Kilograms per hectare = pounds per acre x 1.12

A comparison of tables 20 and 21 will reveal that the loading measured in the river is from 2.5 to 5 times the levels recorded in paddy effluents at sites 160, 410, and 810.

SOIL CHEMISTRY

The water logged soils of the rice paddies were studied to determine the levels of available soil phosphorus and the forms in which the phosphorus occurred. Fertilized and unfertilized organic soil paddies, site 125 and near site 405, constructed on sapric peat with layers of hemic peat as well as a mineral soil paddy, site 805, of the Chilgren series were examined in 1972.[19] Two additional mineral paddies (sites 705, 715) on soils classified as belonging to the Nebish-Rockwood series as well as an additional sapric peat paddy were included in 1973. The mineral paddies near Kelliher were originally open farmland located well above the water table. The peat paddies were developed from low bog grassland or grassland with mixed tamarack or small brush.

Prior to the flooding of the paddies in 1972 the general soil chemistry was studied. A summary of results is shown in Table 22.

Table 22. GENERAL CHARACTERISTICS OF THE PADDY SOILS

	pH	Total Phosphorus ppm/gram soil	Cation exchange meq/100 gram soil	Percent Organic Content
Mineral paddy	6.9	467	51	10.8
Organic unfert.	6.3	804	275	74.5
Organic fert.	6.6	1200	289	71.3

One year later under flooded conditions the same organic fertilized paddy had a cation exchange capacity of 159 meq/100g soil. However, 3 other organic paddies (sites 105, 115, 215) were found to have values of 273, 222, and 198 meq/100g soil, respectively. A new mineral paddy, site 705, and an older fertilized mineral paddy, site 715, had exchange capacities of 154 and 49. The moisture content of the flooded organic soils averaged 89 percent while mineral soils averaged 46 percent. Soil pH under flooded conditions ranged from 6.0 to 7.0 with a mean value of 6.7 for organic paddies, while the mineral paddies ranged from 6.7 to 7.2 with a mean value of 7.0.

During 1973 phosphorus fractions were extracted from the soils of six paddies. The analytical results for pH; available phosphorus; aluminum, iron, and calcium fractions; and total phosphorus appear in Table 63 in the appendix. Soil samples were taken from each site June 22, after the paddies had been flooded for one month; July 10, immediately after a major soil disturbance to simulate thinning; July 11, 24 hours after thinning; July 13, 72 hours after thinning; and on July 30. Variation in the results of soils analyzed at field moisture content made it difficult to attach significance to changes but general characteristics of soil are shown. Total phosphorus did not show up as concentrating in older organic paddies fertilized at 300 lbs/acre (336 kg/ha) of 18-18-17. This was also true for the fertilized paddy where application rates were unknown. Available phosphorus values ranged between 33 and 88 ppm/g soil for organic paddies if two larger values for disturbed soil were omitted. Aluminum phosphorus was found between 85 and 230 ppm/g soil and increased to a maximum for the late season sampling on organic soils in all cases. Iron phosphorus values were uniformly low and never exceeded 33 ppm/g soil

on mineral or organic soil sites. Calcium values ranged from 48 to 229 on organic soils during the time when no soil disturbance occurred. During the 1972 thinning of rice stands the mineral and organic paddies showed decreases in available phosphorus in the soil and increases in soluble phosphorus in the water. These results are shown in Table 23: Changes in soil and water phosphorus concentrations. In 1973 samples were studied at 1 minute, 24 hours, 72 hours, and 20 days after soil disturbance. Available phosphorus trends at six sites also show this decrease reaching a minimum at the 24-hour sampling period. These results can be seen in the appendix Table 63.

A close correlation with turbidity and soluble phosphorus levels for the thinning process was observed. Within sixty hours after thinning phosphorus and turbidity levels had returned to normal.

Table 23. CHANGES IN SOIL AND WATER PHOSPHORUS CONCENTRATIONS
SOIL = ppm/g soil WATER = mg/liter-P

	0 hours		0.1 hours		60 hours		158 hours	
	Soil	Water	Soil	Water	Soil	Water	Soil	Water
Fertilized Organic Soil	17.7	2.3[a]	9.8	3.0	8.3	2.7	17.3	2.3
Unfertilized Organic Soil	11.6	.02	7.6	.36	7.3	.02	9.8	.02
Mineral Soil	3.9	.04	2.0	.31	4.4	.04	4.1	.06

[a]Large value due to positive interference observed at this site. Total phosphorus values indicate soluble to be closer to .02 to .05 range.

Soil samples were taken from a uniform mixture of 8 inch (20 cm) cores. Comparison of 4 inch (10 cm) and 8 inch (20 cm) cores by Polfliet showed a marked increase in available phosphorus at the surface.[20]

Rather than looking at just available phosphorus the distribution of available aluminum, iron, calcium, and total phosphorus was determined at depths of 0-2.5 inches (0-6 cm), 2.5 - 8 inches (6-20 cm), and 8-12 inches (20-30 cm). The mineral paddy in production for several years showed increases in all forms of phosphorus with depth (See Table 24: Changes in soil phosphorus fractions with depth). Both the new and older organic paddies followed previously observed trends of decreases with depth for available phosphorus except for the middle portion of the first-year paddy.

Table 24. CHANGES IN SOIL PHOSPHORUS FRACTIONS WITH DEPTH. VALUES ARE REPORTED ppm/g.

	Avail. P	Al-P	Fe-P	Ca-P	Total-P	pH
Fertilized Mineral Soil Paddy (site 705)						
Upper[a]	27.	21	12	58	371	7.1
Middle[a]	3.6	34	40	140	492	7.1
Lower[a]	58.	100	35	161	510	7.0
First Year Organic Paddy - Fertilized (site 215)						
Upper	124	329	21	186	1258	6.8
Middle	446	247	12	149	1043	6.6
Lower	95	255	19	120	750	6.3
Organic Paddy (4 years production - fertilized) (site 125)						
Upper	124	134	13	118	1180	6.9
Middle	94	100	7	93	1250	6.9
Lower	59	124	12	46	1050	6.9

[a] Upper 0-2.5 inches (0-6.4 cm), middle 2.5-8 inches (6.4-20 cm), lower 8-12 inches (20-51 cm).

SECTION VI

DISCUSSION

The rapid expansion of the wild rice industry that has occurred since 1968 has slowed measurably. This temporary slowing has been caused by a combination of factors. The most important factor is a need to expand the limited market for the wild rice. Other contributing factors are the rising costs of land, increased costs of developing land for rice production, the costs of growing the crop and the high market value of other small grain crops. Speculators are seeking other agricultural investments while the present growers seem content to improve existing land to make management easier.

Costs for growing the crop should decrease as efforts to develop a nonshattering, disease resistant, seed succeed. Better seed and efforts by the industry to expand the market will encourage a gradual growth of the industry.

Increases in major nutrients were observed in the Clearwater River below large rice developments during the discharge periods in 1972 and 1973. Total phosphorus concentrations three times the summer mean of .140 mg/l were recorded below 4,000 acres (1,600 ha) of rice paddies. The increase in ammonia-nitrogen in the river during discharge was not statistically significant, while the twofold increase to 2.3 mg/l total Kjeldahl-nitrogen was. The marked increase in total

dissolved, filterable and volatile solids was also statistically significant. No significance could be attached to the small changes in turbidity, alkalinity, hardness, pH and metal ions that occurred in the Clearwater River.

The discharge from the paddies on mineral soil did not alter the phosphorus concentration of the South Branch of the Battle River; however, the total Kjeldahl-nitrogen concentrations increased from .64 to 1.54 mg/l. Little change was observed in the concentrations of other parameters, but filterable solids jumped significantly in the Battle River during discharge.

The drainage from the bog north of Upper Red Lake used to flood the Waskish paddies averaged .1 mg/l total phosphorus, .6 mg/l ammonia-nitrogen and 1.6 to 2.0 mg/l total Kjeldahl-nitrogen. Little, if any, change in the concentrations of the above parameters was observed in paddy effluents. Dissolved solids increased slightly and magnesium concentrations decreased but little change was observed in other parameters. The Tamarac River which receives the discharge from approximately 1,500 acres (600 ha) did not appear to be affected by rice paddy effluents.

Nutrient release from paddies in their first year of production was significantly greater than that observed in older paddies. Phosphorus and nitrogen levels were 2 to 4 times the levels found in the effluents from older paddies. This may have been due to the consistency of the peat soils. During the first growing season a great deal of fine floating material was evident in the new paddies, as well as higher concentrations of filterable solids and greater turbidity. This

suspension of fine particulates may be the major source of increased nutrients.

The discharge ditches from most paddies were simply channels cut from the paddy to the receiving stream. Very little if anything was done to stabilize the channel banks. During the first discharge considerable erosion occurs washing large volumes of peat into the watercourse. In subsequent years vegetation stabilizes the channel banks and erosion is reduced. The increased nutrients released from 1,000 acres (400 ha) of new paddies in 1973 may have partially accounted for the increased nutrient levels observed at site 600.

The seepage from rice paddies contains high concentrations of dissolved solids and moderate levels of nutrients leached from the paddy soils. Though seepage water represents a potential for considerable nutrient input into receiving streams, most paddy operators attempt to retain as much seepage as possible in their supply ditches. Rice paddies should be designed with a supply ditch near the center of the development and no ditches should be dug around the periphery. This would reduce seepage losses from the paddy system.

Estimates of nutrient loading, Table 18, made in the discharge ditches of older paddies are 2.5 - 5 times less than the estimates made at site 600, below 4,000 acres (1,600 ha) of rice paddies, Table 20. Three factors, two of which have already been mentioned, may account for this discrepancy.

1. The discharge from approximately 1,000 acres (400 ha) of first year paddies.

2. The additional nutrient input into the river resulting from the erosion of discharge ditches.

3. The runoff from the 2.4 inches (6.1 cm) of rain which fell during the discharge period in 1973. The 3.3 inches (8.4 cm) of rain which fell during the discharge period of 1972 may have resulted in an overestimate of phosphorus loading previously reported.[6]

Malathion tests were not run in 1973 due to the restricted application of this pesticide in the study area. Application time is governed by the appearance and concentration of rice worm (Apamea apamiformis). Most paddies were not sprayed as a result of low worm populations and those that were treated were sprayed after drawdown in late August. A new insect, the rice stalk borer (Chilo plejadellus) similar to the white rice stalk borer is becoming a problem. Since Malathion and Sevin appear ineffective against this organism,[20] new pesticides may be requested for approval to use on wild rice.

Insects will remain a problem for the industry and late season Malathion applications are expected to be the most common form of control.

Crop yields are improved on second year or older paddies by thinning the rice plants. Major soil disturbances occur in the top 6 inches (15 cm) of soil as thinning machinery moves over the flooded paddies. Fine particles from the soft peat soils become suspended increasing the turbidity, which returns to pre-thinning levels within 3 days. Soluble and total phosphorus were observed to follow the same trend as turbidity. Even though, interferences in the test for soluble phosphorus made exact values uncertain, it was felt that it followed the same trend as shown for total phosphorus in figure 6. The sharp increase in total phosphorus to 5.5 ppm resulting from thinning de-

creased to normal concentrations within 3 days. Both anaerobic soil conditions and phosphorus loosely sorbed to soil particles were thought to be factors.[21] Low iron concentrations in the soil indicated that the sorbed phosphorus may be the major source.

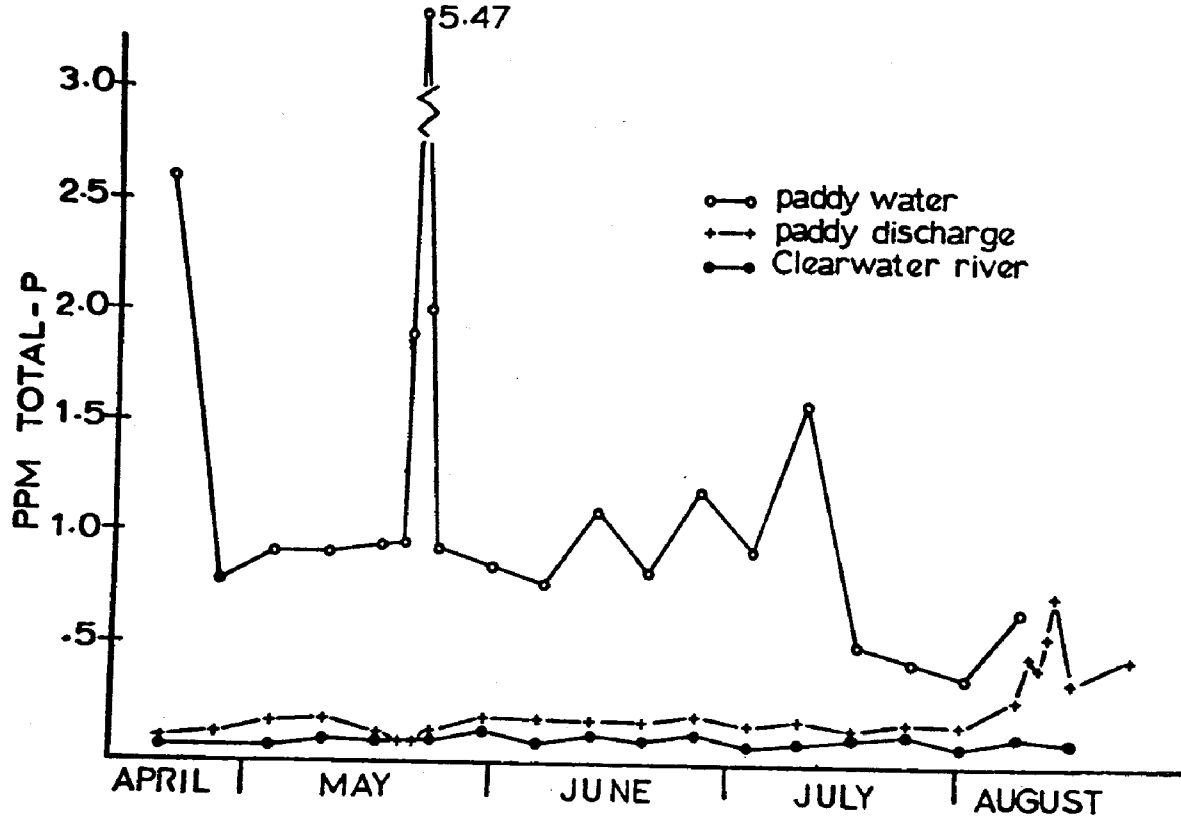

Figure 6. Seasonal phosphorus dynamics in an older fertilized paddy system on organic soil in Clearwater County, 1972.

Soil tests showed that available phosphorus concentrations reached a minimum 24 hours after thinning but returned to pre-thinning levels over the next 2 days. When major disturbances occur on newer paddies portions of the soil (bog mat) can float to the surface. In order to

protect the crop, water levels must be reduced to prevent movement of the soil mat. Lowering water levels prior to thinning would reduce this danger and prevent discharge at a time of high phosphorus levels.

Control of fall drawdown rates could reduce soil particles in the discharge. It would appear that slowing the drawdown rate, as surface soils became exposed along the edges of the inner ditches, would reduce filterable solids in the discharge. When drawdown is nearly complete increased levels of total phosphorus were observed in the final seepage from the paddy soil. At this time, the volume of water discharged is minimal and the total phosphorus concentrations rarely exceeded one milligram per liter.

Though similar increases were noted with major disturbances on mineral soils, the increases were not of the magnitude observed over peat. Studies conducted in 1972 showed that the greatest increases in total phosphorus concentrations in receiving streams occurred below fertilized paddies. These organic paddies had been fertilized annually with 18-18-17 NPK at the rate of 150 to 300 pounds per acre (168-336 kg/ha). This appeared to lead to an accumulation of total phosphorus in the upper 4 inches (10 cm) of soil.[19, 22] Tests conducted in 1973 on first year paddies confirmed this observation, but no accumulation was evident in the soils of older paddies. Either fertilizer applications were not at such a rate that would lead to accumulation in the upper portion of the soil or better removal of wood debris allowed rotovating of the soil to deeper levels after normal fall fertilizer application. The one fertilized mineral paddy studied showed increased levels of total phosphorus with depth. Smith, 1971, reported that if nitrogen levels were maintained on mineral

soils, that the addition of phosphorus did little to increase yields with phosphorus application.[23]

In general, results indicate phosphorus fertilizer applications could be reduced. However, the best answer to this question lies in the careful correlation of crop yield to fertilizer application. Research being done by the University of Minnesota[24] and records of rice producers will provide a better answer to this problem. The rising cost of fertilizers will encourage careful study of application rates and reduced usage is expected in the future as a result of economics alone.

Measurements of consumptive water use made in 1973 indicated 21.1 inches (53.6 cm) of water were needed per acre of rice land. E. Olke estimated water usage for the same development to be 21.9 inches (55.6 cm) based on data collected and expected evaporation losses.[2] Based on average weather conditions for the area in 1972 the average water usage predicted by three different theoretical measurements was 20.8 inches (52.8 cm) per acre.[4] This agrees closely with the field estimate of 20.6 inches (52.3 cm) made in 1972.[6] These values are in agreement with estimates made by paddy operators which vary from 18 to 24 inches (45-61 cm). Though year to year changes in weather conditions and differing soil types influencing seepage could cause deviations from the average, consumptive water use by rice paddies in northern Minnesota should range between 20 to 22 inches (50-56 cm).

Since the rice industry is a large water user care should be taken to restrict expansion of the industry to regions with an adequate water supply.

Algal assays conducted on Clearwater River water during the discharge periods of both 1972 and 1973 produced standing crops of algae significantly higher than most samples collected during non-discharge periods, figures 2 and 4. Samples collected at site 300 in July of 1972 after heavy rains also produced high standing crops of the test organism. During 1973 the standing crop of algae, produced in samples collected at site 600 on the Clearwater River, appeared to be unaffected by either heavy rains or rice paddy effluent.

Algal assays conducted at other sites, Kelliher and Waskish, indicate that there is considerable natural variation in the potential productivity in the area streams. Though increases in potential productivity resulting from rice paddy effluents were measured, the effect was short lived.

The results of the algal assays indicate that the Clearwater, Battle, and Tamarac Rivers were all nitrogen limited. Though increased levels of nitrogen and phosphorus from paddy effluents produced increased standing crops in samples from the receiving streams, the standing crop was only 20 percent of that produced in a synthetic medium indicating some other form of nutrient limitation or growth suppression. This may possibly be due to growth inhibition by lignin and humic compounds leached from the bogs which color the water in the area.[25]

Though the potential for major nutrient release from rice paddies during the growing season is high, good design, proper maintenance of water levels, and paddy dikes will prevent most accidents. As

the expansion of the industry slows and the paddy soils and discharge ditches stabilize, nutrient release from wild rice paddies may be similar to or less than that observed in many other agricultural endeavors.[20][27]

SECTION VII

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SECTION VIII

APPENDIX A

SUMMARY STATISTICS OF ANALYTICAL RESULTS BY SITE AND SEASON

APPENDIX A (cont.)

SITES	100 101
YEAR	70 TO 73
MONTH	3 4 5 6 7
DAY	NO RESTRAINT
HOUR	NO RESTRAINT
TYPE	NO RESTRAINT
BASIN	NO RESTRAINT
SUBBASIN	NO RESTRAINT
LOCATION	NO RESTRAINT
COUNTY	NO RESTRAINT
TOWNSHIP	NO RESTRAINT
LONGITUDE	NO RESTRAINT
LATITUDE	NO RESTRAINT
PARAMETER VALUE	NO RESTRAINT
DEPTH	NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.060	LIMITS	.065	LOW	-.005	HIGH .125
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.004	LIMITS	.000	LOW	.004	HIGH .004
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.094	LIMITS	.014	LOW	.080	HIGH .109
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.665	LIMITS	.086	LOW	.579	HIGH .751
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.184	LIMITS	.046	LOW	.139	HIGH .230
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.113	LIMITS	.033	LOW	.080	HIGH .146
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.786	LIMITS	.801	LOW	7.984	HIGH 9.587
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	3.295	LIMITS	.954	LOW	2.341	HIGH 4.249
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	245.208	LIMITS	10.388	LOW	234.820	HIGH 255.596
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	12.596	LIMITS	2.896	LOW	9.700	HIGH 15.491
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	96.676	LIMITS	6.489	LOW	90.188	HIGH 103.165
X18	PH LAB	PARAMETER 18.	MEAN	8.128	LIMITS	.071	LOW	8.057	HIGH 8.199
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	217.121	LIMITS	9.485	LOW	207.636	HIGH 226.607
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	228.540	LIMITS	5.789	LOW	222.751	HIGH 234.329
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	50.213	LIMITS	2.179	LOW	48.034	HIGH 52.392
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	22.107	LIMITS	.566	LOW	21.622	HIGH 22.753
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.273	LIMITS	.293	LOW	2.981	HIGH 3.566
X99	RIVER MILEAGE								
X100	TIME								

PARAMETER 19.	MEAN .060	MAX 1.6300	MIN .0040	VARIANCE .052	SAMPLE SIZE 50.
PARAMETER 20.	MEAN .004	MAX .0040	MIN .0040	VARIANCE .000	SAMPLE SIZE 1.
PARAMETER 22.	MEAN .094	MAX .2700	MIN .0190	VARIANCE .002	SAMPLE SIZE 49.
PARAMETER 23.	MEAN .665	MAX 2.3000	MIN .2800	VARIANCE .085	SAMPLE SIZE 47.
PARAMETER 24.	MEAN .184	MAX .5300	MIN .0200	VARIANCE .023	SAMPLE SIZE 46.
PARAMETER 25.	MEAN .113	MAX .2000	MIN .0500	VARIANCE .003	SAMPLE SIZE 14.
PARAMETER 2.	MEAN 8.786	MAX 13.8000	MIN 4.2000	VARIANCE 4.269	SAMPLE SIZE 28.
PARAMETER 3.	MEAN 3.295	MAX 14.5000	MIN .1000	VARIANCE 9.152	SAMPLE SIZE 41.
PARAMETER 29.	MEAN 245.208	MAX 288.0000	MIN 83.0000	VARIANCE 1271.317	SAMPLE SIZE 48.
PARAMETER 30.	MEAN 12.596	MAX 49.0000	MIN 1.0000	VARIANCE 96.724	SAMPLE SIZE 47.
PARAMETER 31.	MEAN 96.676	MAX 148.0000	MIN 36.0000	VARIANCE 345.438	SAMPLE SIZE 34.
PARAMETER 18.	MEAN 8.128	MAX 8.7000	MIN 7.3000	VARIANCE .062	SAMPLE SIZE 50.
PARAMETER 37.	MEAN 217.121	MAX 300.0000	MIN 53.0000	VARIANCE 1015.783	SAMPLE SIZE 46.
PARAMETER 36.	MEAN 228.540	MAX 260.0000	MIN 181.0000	VARIANCE 411.315	SAMPLE SIZE 50.
PARAMETER 38.	MEAN 50.213	MAX 61.0000	MIN 20.0000	VARIANCE 54.780	SAMPLE SIZE 47.
PARAMETER 39.	MEAN 22.107	MAX 28.0000	MIN 18.0000	VARIANCE 3.773	SAMPLE SIZE 48.
PARAMETER 41.	MEAN 3.273	MAX 5.2000	MIN 1.8000	VARIANCE 1.029	SAMPLE SIZE 49.

Table 25. Site 100-101 SUMMER

```
SITES                100     101

YEAR                  70 TO  73
MONTH                  8      8        10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT.

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT                    T TEST  (.05)
DEPTH              NO RESTRAINT

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)     PARAMETER 19.  MEAN     .039LIMITS     .020  LOW     .019  HIGH     .060
X20   TOTAL SOLUBLE PHOSPHORUS            PARAMETER 20.  MEAN     .000LIMITS     .000  LOW     .000  HIGH     .000
X22   TOTAL PHOSPHORUS                    PARAMETER 22.  MEAN     .084LIMITS     .018  LOW     .066  HIGH     .102
X23   KJEDAHL NITROGEN (MG/L)             PARAMETER 23.  MEAN     .608LIMITS     .144  LOW     .464  HIGH     .752
X24   AMMONIA NITROGEN (MG/L)             PARAMETER 24.  MEAN     .267LIMITS     .104  LOW     .163  HIGH     .371
X25   NITRATE - NITROGEN (MG/L)           PARAMETER 25.  MEAN     .110LIMITS     .075  LOW     .035  HIGH     .185
X02   DISSOLVED OXYGEN                    PARAMETER  2.  MEAN    8.217LIMITS     .856  LOW    7.360  HIGH    9.073
X03   TURBIDITY IN JACKSON UNITS          PARAMETER  3.  MEAN    2.764LIMITS    2.236  LOW     .528  HIGH    4.999
X29   TOTAL DISSOLVED SOLIDS (MG/L)       PARAMETER 29.  MEAN  218.143LIMITS   13.432  LOW  204.711  HIGH  231.575
X30   TOTAL FILTERABLE SOLIDS (MG/L)      PARAMETER 30.  MEAN   11.214LIMITS    4.889  LOW    6.325  HIGH   16.103
X31   TOTAL VOLATILE SOLIDS (MG/L)        PARAMETER 31.  MEAN   87.333LIMITS   10.040  LOW   77.293  HIGH   97.373
X18   PH LAB                              PARAMETER 18.  MEAN    8.137LIMITS     .141  LOW    7.997  HIGH    8.278
X37   HARDNESS FROM CA AND MG             PARAMETER 37.  MEAN  193.484LIMITS    9.263  LOW  184.220  HIGH  202.747
X36   ALKALINITY AS CACO3                 PARAMETER 36.  MEAN  206.571LIMITS    8.525  LOW  198.047  HIGH  215.096
X38   CALCIUM          MG/L               PARAMETER 38.  MEAN   41.929LIMITS    4.022  LOW   37.907  HIGH   45.950
X39   MAGNESIUM        MG/L               PARAMETER 39.  MEAN   22.526LIMITS    1.484  LOW   21.042  HIGH   24.011
X41   POTASSIUM        MG/L               PARAMETER 41.  MEAN    3.563LIMITS     .614  LOW    2.950  HIGH    4.177
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .039   MAX      .1250   MIN      .0050   VARIANCE      .002   SAMPLE SIZE   17.
PARAMETER 20.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE    0.
PARAMETER 22.   MEAN      .084   MAX      .1330   MIN      .0220   VARIANCE      .001   SAMPLE SIZE   17.
PARAMETER 23.   MEAN      .608   MAX     1.1600   MIN      .3400   VARIANCE      .062   SAMPLE SIZE   14.
PARAMETER 24.   MEAN      .267   MAX      .5300   MIN      .0350   VARIANCE      .038   SAMPLE SIZE   16.
PARAMETER 25.   MEAN      .110   MAX      .1800   MIN      .0200   VARIANCE      .002   SAMPLE SIZE    4.
PARAMETER  2.   MEAN     8.217   MAX     9.7000   MIN     7.5000   VARIANCE      .666   SAMPLE SIZE    6.
PARAMETER  3.   MEAN     2.764   MAX    11.5000   MIN      .1000   VARIANCE    11.075   SAMPLE SIZE   11.
PARAMETER 29.   MEAN   218.143   MAX   252.0000   MIN   164.0000   VARIANCE   541.363   SAMPLE SIZE   14.
PARAMETER 30.   MEAN    11.214   MAX    33.0000   MIN     4.0000   VARIANCE    71.720   SAMPLE SIZE   14.
PARAMETER 31.   MEAN    87.333   MAX   119.0000   MIN    58.0000   VARIANCE   249.697   SAMPLE SIZE   12.
PARAMETER 18.   MEAN     8.137   MAX     8.4000   MIN     7.9000   VARIANCE      .028   SAMPLE SIZE    8.
PARAMETER 37.   MEAN   193.484   MAX   223.9080   MIN   165.8730   VARIANCE   257.484   SAMPLE SIZE   14.
PARAMETER 36.   MEAN   206.571   MAX   220.0000   MIN   195.0000   VARIANCE    84.952   SAMPLE SIZE    7.
PARAMETER 38.   MEAN    41.929   MAX    60.0000   MIN    34.0000   VARIANCE    48.533   SAMPLE SIZE   14.
PARAMETER 39.   MEAN    22.526   MAX    27.0000   MIN    13.0000   VARIANCE     9.485   SAMPLE SIZE   19.
PARAMETER 41.   MEAN     3.563   MAX     5.8000   MIN     2.0000   VARIANCE     1.620   SAMPLE SIZE   19.
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Table 26. Site 100-101 FALL

```
SITES                105

YEAR                  70 TO  73
MONTH                  3      4      5      6      7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT                    T TEST  (.05)

DEPTH              NO RESTRAINT

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)     PARAMETER 19.  MEAN     .410LIMITS     .119  LOW     .291  HIGH     .529
X20   TOTAL SOLUBLE PHOSPHORUS            PARAMETER 20.  MEAN     .000LIMITS     .000  LOW     .000  HIGH     .000
X22   TOTAL PHOSPHORUS                    PARAMETER 22.  MEAN     .527LIMITS     .101  LOW     .426  HIGH     .629
X23   KJEDAHL NITROGEN (MG/L)             PARAMETER 23.  MEAN    2.196LIMITS     .466  LOW    1.730  HIGH    2.662
X24   AMMONIA NITROGEN (MG/L)             PARAMETER 24.  MEAN     .266LIMITS     .203  LOW     .063  HIGH     .469
X25   NITRATE - NITROGEN (MG/L)           PARAMETER 25.  MEAN     .000LIMITS     .000  LOW     .000  HIGH     .000
X02   DISSOLVED OXYGEN                    PARAMETER  2.  MEAN    5.520LIMITS    1.285  LOW    4.235  HIGH    6.805
X03   TURBIDITY IN JACKSON UNITS          PARAMETER  3.  MEAN   14.340LIMITS    8.734  LOW    5.606  HIGH   23.074
X29   TOTAL DISSOLVED SOLIDS (MG/L)       PARAMETER 29.  MEAN  415.364LIMITS   35.185  LOW  380.179  HIGH  450.548
X30   TOTAL FILTERABLE SOLIDS (MG/L)      PARAMETER 30.  MEAN    6.636LIMITS    5.558  LOW    1.078  HIGH   12.194
X31   TOTAL VOLATILE SOLIDS (MG/L)        PARAMETER 31.  MEAN  197.818LIMITS   26.527  LOW  171.291  HIGH  224.345
X18   PH LAB                              PARAMETER 18.  MEAN    8.000LIMITS     .173  LOW    7.827  HIGH    8.173
X37   HARDNESS FROM CA AND MG             PARAMETER 37.  MEAN  308.609LIMITS   19.268  LOW  289.341  HIGH  327.878
X36   ALKALINITY AS CACO3                 PARAMETER 36.  MEAN  333.273LIMITS   24.504  LOW  308.768  HIGH  357.777
X38   CALCIUM            MG/L             PARAMETER 38.  MEAN   74.800LIMITS    5.848  LOW   68.952  HIGH   80.648
X39   MAGNESIUM          MG/L             PARAMETER 39.  MEAN   29.545LIMITS    1.787  LOW   27.759  HIGH   31.332
X41   POTASSIUM          MG/L             PARAMETER 41.  MEAN   11.100LIMITS    2.113  LOW    8.987  HIGH   13.213
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .410   MAX     .8400   MIN      .1900   VARIANCE      .031   SAMPLE SIZE  11.
PARAMETER 20.   MEAN      .000   MAX     .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE  11.
PARAMETER 22.   MEAN      .527   MAX     .7600   MIN      .2000   VARIANCE      .023   SAMPLE SIZE  11.
PARAMETER 23.   MEAN     2.196   MAX    4.0400   MIN     1.4400   VARIANCE      .481   SAMPLE SIZE  11.
PARAMETER 24.   MEAN      .266   MAX    1.0700   MIN      .0750   VARIANCE      .092   SAMPLE SIZE  11.
PARAMETER 25.   MEAN      .000   MAX     .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE   0.
PARAMETER  2.   MEAN     5.520   MAX    6.8000   MIN     4.0000   VARIANCE     1.072   SAMPLE SIZE   5.
PARAMETER  3.   MEAN    14.340   MAX   30.5000   MIN     1.6000   VARIANCE   149.100   SAMPLE SIZE  10.
PARAMETER 29.   MEAN   415.364   MAX  495.0000   MIN   333.0000   VARIANCE  2743.254   SAMPLE SIZE  11.
PARAMETER 30.   MEAN     6.636   MAX   29.0000   MIN     2.0000   VARIANCE    68.455   SAMPLE SIZE  11.
PARAMETER 31.   MEAN   197.818   MAX  262.0000   MIN   104.0000   VARIANCE  1559.364   SAMPLE SIZE  11.
PARAMETER 18.   MEAN     8.000   MAX    8.4000   MIN     7.6000   VARIANCE      .066   SAMPLE SIZE  11.
PARAMETER 37.   MEAN   308.609   MAX  340.5820   MIN   265.9460   VARIANCE   725.614   SAMPLE SIZE  10.
PARAMETER 36.   MEAN   333.273   MAX  383.0000   MIN   278.0000   VARIANCE  1330.618   SAMPLE SIZE  11.
PARAMETER 38.   MEAN    74.800   MAX   85.0000   MIN    62.0000   VARIANCE    66.844   SAMPLE SIZE  10.
PARAMETER 39.   MEAN    29.545   MAX   33.0000   MIN    25.0000   VARIANCE     7.073   SAMPLE SIZE  11.
PARAMETER 41.   MEAN    11.100   MAX   14.9000   MIN     6.1000   VARIANCE     9.894   SAMPLE SIZE  11.
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Table 27. Site 105 SUMMER

SITES 115

YEAR 70 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

x19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	1.138	LIMITS	.326	LOW	.812	HIGH	1.465
x20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
x22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	1.310	LIMITS	.542	LOW	.768	HIGH	1.852
x23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.924	LIMITS	.209	LOW	1.715	HIGH	2.132
x24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.616	LIMITS	.677	LOW	-.061	HIGH	1.293
x25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
x02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	6.833	LIMITS	2.232	LOW	4.601	HIGH	9.065
x03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	25.071	LIMITS	9.635	LOW	15.436	HIGH	34.706
x29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	366.687	LIMITS	28.466	LOW	338.221	HIGH	395.154
x30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	19.562	LIMITS	11.532	LOW	8.031	HIGH	31.094
x31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	160.062	LIMITS	17.295	LOW	142.767	HIGH	177.358
x18	PH LAB	PARAMETER 18.	MEAN	8.159	LIMITS	.115	LOW	8.044	HIGH	8.274
x37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	284.453	LIMITS	16.286	LOW	268.167	HIGH	300.739
x36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	309.500	LIMITS	22.145	LOW	287.355	HIGH	331.645
x38	CALCIUM MG/L	PARAMETER 38.	MEAN	68.714	LIMITS	4.548	LOW	64.166	HIGH	73.262
x39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	26.533	LIMITS	1.288	LOW	25.245	HIGH	27.821
x41	POTASSIUM MG/L	PARAMETER 41.	MEAN	11.579	LIMITS	2.640	LOW	8.939	HIGH	14.219
x99	RIVER MILEAGE									
x100	TIME									

PARAMETER 19.	MEAN 1.138	MAX 2.1600	MIN .1450	VARIANCE .403	SAMPLE SIZE 17.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN 1.310	MAX 3.4000	MIN .2740	VARIANCE 1.035	SAMPLE SIZE 16.
PARAMETER 23.	MEAN 1.924	MAX 2.7400	MIN .9600	VARIANCE .165	SAMPLE SIZE 17.
PARAMETER 24.	MEAN .616	MAX 5.6500	MIN .0600	VARIANCE 1.733	SAMPLE SIZE 17.
PARAMETER 25.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN 6.833	MAX 9.2000	MIN 3.5000	VARIANCE 4.523	SAMPLE SIZE 17.
PARAMETER 3.	MEAN 25.071	MAX 58.0000	MIN 2.4000	VARIANCE 351.146	SAMPLE SIZE 16.
PARAMETER 29.	MEAN 366.687	MAX 432.0000	MIN 279.0000	VARIANCE 2855.029	SAMPLE SIZE 16.
PARAMETER 30.	MEAN 19.562	MAX 92.0000	MIN 5.0000	VARIANCE 468.529	SAMPLE SIZE 16.
PARAMETER 31.	MEAN 160.062	MAX 236.0000	MIN 101.0000	VARIANCE 1053.929	SAMPLE SIZE 16.
PARAMETER 18.	MEAN 8.159	MAX 8.5000	MIN 7.7000	VARIANCE .050	SAMPLE SIZE 17.
PARAMETER 37.	MEAN 284.453	MAX 334.1060	MIN 246.1070	VARIANCE 726.879	SAMPLE SIZE 13.
PARAMETER 36.	MEAN 309.500	MAX 387.0000	MIN 232.0000	VARIANCE 1727.867	SAMPLE SIZE 16.
PARAMETER 38.	MEAN 68.714	MAX 86.0000	MIN 58.0000	VARIANCE 62.066	SAMPLE SIZE 14.
PARAMETER 39.	MEAN 26.533	MAX 32.0000	MIN 23.0000	VARIANCE 5.410	SAMPLE SIZE 15.
PARAMETER 41.	MEAN 11.579	MAX 16.3000	MIN 3.6000	VARIANCE 20.920	SAMPLE SIZE 14.

Table 28. Site 115 SUMMER

SITES 125

YEAR 70 TO 73
MONTH 4 5 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	1.499	LIMITS	.374	LOW	1.125	HIGH	1.873
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.980	LIMITS	.000	LOW	.980	HIGH	.980
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.990	LIMITS	.240	LOW	.750	HIGH	1.229
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.707	LIMITS	.186	LOW	1.522	HIGH	1.893
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.538	LIMITS	.162	LOW	.377	HIGH	.700
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.072	LIMITS	.018	LOW	.054	HIGH	.090
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.737	LIMITS	.922	LOW	4.815	HIGH	6.659
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	6.726	LIMITS	2.576	LOW	4.150	HIGH	9.302
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	303.132	LIMITS	15.378	LOW	287.754	HIGH	318.510
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	24.923	LIMITS	20.085	LOW	4.838	HIGH	45.008
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	132.972	LIMITS	9.940	LOW	123.033	HIGH	142.912
X18	PH LAB	PARAMETER 18.	MEAN	7.981	LIMITS	.128	LOW	7.854	HIGH	8.109
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	251.232	LIMITS	16.732	LOW	234.500	HIGH	267.964
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	260.380	LIMITS	20.686	LOW	239.694	HIGH	281.066
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	61.400	LIMITS	4.297	LOW	57.103	HIGH	65.697
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.000	LIMITS	1.491	LOW	22.509	HIGH	25.491
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	7.688	LIMITS	1.075	LOW	6.613	HIGH	8.764
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	1.499	MAX	6.1600	MIN	.0170	VARIANCE	1.961	SAMPLE SIZE	56.
PARAMETER 20.	MEAN	.980	MAX	.9800	MIN	.9800	VARIANCE	.000	SAMPLE SIZE	1.
PARAMETER 22.	MEAN	.990	MAX	5.3800	MIN	.0980	VARIANCE	.746	SAMPLE SIZE	52.
PARAMETER 23.	MEAN	1.707	MAX	3.7600	MIN	.4000	VARIANCE	.474	SAMPLE SIZE	55.
PARAMETER 24.	MEAN	.538	MAX	2.9400	MIN	.0750	VARIANCE	.340	SAMPLE SIZE	52.
PARAMETER 25.	MEAN	.072	MAX	.1500	MIN	.0300	VARIANCE	.001	SAMPLE SIZE	18.
PARAMETER 2.	MEAN	5.737	MAX	11.2000	MIN	2.1000	VARIANCE	7.180	SAMPLE SIZE	35.
PARAMETER 3.	MEAN	6.726	MAX	39.0000	MIN	.3000	VARIANCE	74.896	SAMPLE SIZE	46.
PARAMETER 29.	MEAN	303.132	MAX	441.0000	MIN	165.0000	VARIANCE	3133.462	SAMPLE SIZE	53.
PARAMETER 30.	MEAN	24.923	MAX	496.0000	MIN	1.0000	VARIANCE	5244.267	SAMPLE SIZE	52.
PARAMETER 31.	MEAN	132.972	MAX	208.0000	MIN	82.0000	VARIANCE	872.942	SAMPLE SIZE	36.
PARAMETER 18.	MEAN	7.981	MAX	9.6000	MIN	7.2000	VARIANCE	.215	SAMPLE SIZE	53.
PARAMETER 37.	MEAN	251.232	MAX	367.9120	MIN	67.0000	VARIANCE	3367.005	SAMPLE SIZE	49.
PARAMETER 36.	MEAN	260.380	MAX	391.0000	MIN	2.0000	VARIANCE	5251.342	SAMPLE SIZE	50.
PARAMETER 38.	MEAN	61.400	MAX	92.0000	MIN	25.0000	VARIANCE	226.571	SAMPLE SIZE	50.
PARAMETER 39.	MEAN	24.000	MAX	40.0000	MIN	11.0000	VARIANCE	27.265	SAMPLE SIZE	50.
PARAMETER 41.	MEAN	7.688	MAX	19.1000	MIN	.9000	VARIANCE	14.744	SAMPLE SIZE	51.

Table 29. Site 125 SUMMER

SITES 140

YEAR 70 TO 73
MONTH 8 9 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.328	LIMITS	.081	LOW	.247	HIGH	.409		
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000		
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.353	LIMITS	.100	LOW	.253	HIGH	.452		
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.497	LIMITS	.220	LOW	1.277	HIGH	1.717		
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.141	LIMITS	.098	LOW	.043	HIGH	.239		
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000		
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000		
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000		
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	371.357	LIMITS	33.047	LOW	338.290	HIGH	404.424		
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	28.571	LIMITS	33.761	LOW	-5.189	HIGH	62.332		
X31	TOTAL VOLATIRLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	172.143	LIMITS	18.909	LOW	153.234	HIGH	191.052		
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000		
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	318.980	LIMITS	23.491	LOW	295.488	HIGH	342.471		
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000		
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	72.000	LIMITS	5.081	LOW	66.919	HIGH	77.081		
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	32.500	LIMITS	2.628	LOW	29.872	HIGH	35.128		
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.457	LIMITS	.477	LOW	3.980	HIGH	4.934		
X99	RIVER MILEAGE											
X100	TIME											

PARAMETER 19.	MEAN	.328	MAX	.6760	MIN	.1650	VARIANCE	.020	SAMPLE SIZE 14.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.353	MAX	.6300	MIN	.0480	VARIANCE	.030	SAMPLE SIZE 14.
PARAMETER 23.	MEAN	1.497	MAX	2.4400	MIN	1.0600	VARIANCE	.133	SAMPLE SIZE 13.
PARAMETER 24.	MEAN	.141	MAX	.5100	MIN	.0450	VARIANCE	.026	SAMPLE SIZE 13.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 29.	MEAN	371.357	MAX	479.0000	MIN	296.0000	VARIANCE	3281.016	SAMPLE SIZE 14.
PARAMETER 30.	MEAN	28.571	MAX	230.0000	MIN	3.0000	VARIANCE	3420.110	SAMPLE SIZE 14.
PARAMETER 31.	MEAN	172.143	MAX	231.0000	MIN	123.0000	VARIANCE	1072.901	SAMPLE SIZE 14.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 37.	MEAN	318.980	MAX	371.8910	MIN	260.0740	VARIANCE	1222.855	SAMPLE SIZE 11.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 38.	MEAN	72.000	MAX	83.0000	MIN	58.0000	VARIANCE	57.200	SAMPLE SIZE 11.
PARAMETER 39.	MEAN	32.500	MAX	40.0000	MIN	27.0000	VARIANCE	20.731	SAMPLE SIZE 14.
PARAMETER 41.	MEAN	4.457	MAX	6.2000	MIN	3.5000	VARIANCE	.683	SAMPLE SIZE 14.

Table 30. Site 140 FALL

SITES 145

YEAR 70 TO 73
MONTH 4 5 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.214	LIMITS	.069	LOW	.144	HIGH	.285
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.337	LIMITS	.079	LOW	.258	HIGH	.417
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.952	LIMITS	.499	LOW	1.457	HIGH	2.450
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.216	LIMITS	.114	LOW	.102	HIGH	.330
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.410	LIMITS	.000	LOW	.410	HIGH	.410
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.575	LIMITS	1.594	LOW	3.981	HIGH	7.169
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	9.467	LIMITS	5.334	LOW	4.133	HIGH	14.800
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	281.833	LIMITS	18.644	LOW	263.190	HIGH	300.477
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	25.556	LIMITS	19.167	LOW	6.388	HIGH	44.723
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	124.500	LIMITS	10.221	LOW	114.279	HIGH	134.721
X18	PH LAB	PARAMETER 18.	MEAN	7.829	LIMITS	.153	LOW	7.676	HIGH	7.982
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	219.897	LIMITS	8.982	LOW	210.915	HIGH	228.879
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	236.412	LIMITS	9.273	LOW	227.139	HIGH	245.685
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	48.812	LIMITS	2.478	LOW	46.335	HIGH	51.290
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	23.765	LIMITS	.919	LOW	22.846	HIGH	24.683
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	6.035	LIMITS	1.780	LOW	4.256	HIGH	7.815
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.216	MAX	.5200	MIN	.0340	VARIANCE	.019	SAMPLE SIZE	18.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.337	MAX	.6600	MIN	.1260	VARIANCE	.025	SAMPLE SIZE	18.
PARAMETER 23.	MEAN	1.952	MAX	4.2800	MIN	.9000	VARIANCE	1.005	SAMPLE SIZE	18.
PARAMETER 24.	MEAN	.216	MAX	.6000	MIN	.0350	VARIANCE	.042	SAMPLE SIZE	15.
PARAMETER 25.	MEAN	.410	MAX	.4100	MIN	.4100	VARIANCE	.000	SAMPLE SIZE	1.
PARAMETER 2.	MEAN	5.575	MAX	9.0000	MIN	2.4000	VARIANCE	6.291	SAMPLE SIZE	12.
PARAMETER 3.	MEAN	9.467	MAX	32.5000	MIN	.3000	VARIANCE	115.016	SAMPLE SIZE	18.
PARAMETER 29.	MEAN	281.833	MAX	389.0000	MIN	231.0000	VARIANCE	1405.323	SAMPLE SIZE	18.
PARAMETER 30.	MEAN	25.556	MAX	165.0000	MIN	2.0000	VARIANCE	1485.320	SAMPLE SIZE	18.
PARAMETER 31.	MEAN	124.500	MAX	145.0000	MIN	85.0000	VARIANCE	313.500	SAMPLE SIZE	14.
PARAMETER 18.	MEAN	7.829	MAX	8.3000	MIN	7.2000	VARIANCE	.088	SAMPLE SIZE	17.
PARAMETER 37.	MEAN	219.897	MAX	258.4550	MIN	181.3220	VARIANCE	284.237	SAMPLE SIZE	16.
PARAMETER 36.	MEAN	236.412	MAX	269.0000	MIN	208.0000	VARIANCE	325.257	SAMPLE SIZE	17.
PARAMETER 38.	MEAN	48.812	MAX	59.0000	MIN	38.0000	VARIANCE	21.629	SAMPLE SIZE	16.
PARAMETER 39.	MEAN	23.765	MAX	27.0000	MIN	21.0000	VARIANCE	3.191	SAMPLE SIZE	17.
PARAMETER 41.	MEAN	6.035	MAX	11.9000	MIN	1.6000	VARIANCE	11.980	SAMPLE SIZE	17.

Table 31. Site 145 SUMMER

SITES 155

YEAR 70 70 72
MONTH 4 5 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.207L	MITS	.062	LOW	.145	HIGH	.268
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.345L	MITS	.049	LOW	.296	HIGH	.394
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.604L	MITS	.935	LOW	1.669	HIGH	3.539
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.304L	MITS	.155	LOW	.142	HIGH	.461
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000L	MITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.962L	MITS	1.701	LOW	4.260	HIGH	7.663
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	10.306L	MITS	4.594	LOW	5.712	HIGH	14.899
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	318.500L	MITS	23.833	LOW	294.667	HIGH	342.333
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	17.500L	MITS	15.674	LOW	1.826	HIGH	33.174
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	160.200L	MITS	16.214	LOW	143.986	HIGH	176.414
X18	PH LAB	PARAMETER 18.	MEAN	7.906L	MITS	.178	LOW	7.727	HIGH	8.084
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	230.209L	MITS	29.069	LOW	201.140	HIGH	259.278
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	256.471L	MITS	21.316	LOW	235.155	HIGH	277.766
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	54.187L	MITS	5.162	LOW	49.025	HIGH	59.350
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.625L	MITS	1.728	LOW	22.897	HIGH	26.353
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	9.553L	MITS	2.618	LOW	6.935	HIGH	12.171
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.207	MAX	.4900	MIN	.0440	VARIANCE	.015	SAMPLE SIZE	18.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.345	MAX	.5300	MIN	.1440	VARIANCE	.010	SAMPLE SIZE	18.
PARAMETER 23.	MEAN	2.604	MAX	10.0000	MIN	1.0200	VARIANCE	3.535	SAMPLE SIZE	18.
PARAMETER 24.	MEAN	.304	MAX	1.0900	MIN	.0550	VARIANCE	.091	SAMPLE SIZE	17.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	5.962	MAX	11.5000	MIN	3.5000	VARIANCE	7.933	SAMPLE SIZE	13.
PARAMETER 3.	MEAN	10.306	MAX	31.0000	MIN	1.5000	VARIANCE	85.312	SAMPLE SIZE	18.
PARAMETER 29.	MEAN	318.500	MAX	390.0000	MIN	245.0000	VARIANCE	2296.500	SAMPLE SIZE	18.
PARAMETER 30.	MEAN	17.500	MAX	143.0000	MIN	4.0000	VARIANCE	993.324	SAMPLE SIZE	18.
PARAMETER 31.	MEAN	160.200	MAX	208.0000	MIN	121.0000	VARIANCE	857.029	SAMPLE SIZE	15.
PARAMETER 18.	MEAN	7.906	MAX	8.0000	MIN	7.3000	VARIANCE	.129	SAMPLE SIZE	18.
PARAMETER 37.	MEAN	230.209	MAX	277.4160	MIN	64.0000	VARIANCE	2754.794	SAMPLE SIZE	15.
PARAMETER 36.	MEAN	256.471	MAX	337.0000	MIN	165.0000	VARIANCE	1718.640	SAMPLE SIZE	17.
PARAMETER 38.	MEAN	54.187	MAX	64.0000	MIN	26.0000	VARIANCE	93.896	SAMPLE SIZE	16.
PARAMETER 39.	MEAN	24.625	MAX	31.0000	MIN	19.0000	VARIANCE	10.517	SAMPLE SIZE	16.
PARAMETER 41.	MEAN	9.553	MAX	16.7000	MIN	1.6000	VARIANCE	25.931	SAMPLE SIZE	17.

Table 32. Site 155 SUMMER

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SITES                160

YEAR                  70 TO  73
MONTH                  3      4       5       6       7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT
```

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.195	LIMITS	.089	LOW	.106	HIGH .284
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH .000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.248	LIMITS	.096	LOW	.151	HIGH .344
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.149	LIMITS	.140	LOW	1.009	HIGH 1.288
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.428	LIMITS	.117	LOW	.311	HIGH .544
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.094	LIMITS	.020	LOW	.074	HIGH .114
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	4.762	LIMITS	.968	LOW	3.794	HIGH 5.730
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	16.039	LIMITS	4.713	LOW	11.326	HIGH 20.752
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	328.132	LIMITS	14.508	LOW	313.624	HIGH 342.639
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	14.079	LIMITS	3.735	LOW	10.344	HIGH 17.813
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	136.652	LIMITS	10.485	LOW	126.167	HIGH 147.138
X18	PH LAB	PARAMETER 18.	MEAN	7.471	LIMITS	.129	LOW	7.342	HIGH 7.601
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	253.486	LIMITS	11.055	LOW	242.431	HIGH 264.542
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	274.226	LIMITS	9.266	LOW	264.960	HIGH 283.492
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	65.429	LIMITS	3.664	LOW	61.764	HIGH 69.093
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	21.897	LIMITS	.834	LOW	21.062	HIGH 22.731
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.486	LIMITS	.651	LOW	2.835	HIGH 4.137
X99	RIVER MILEAGE								
X100	TIME								

PARAMETER 19.	MEAN .195	MAX 1.4000	MIN .0050	VARIANCE .082	SAMPLE SIZE 42.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .248	MAX 1.6500	MIN .0330	VARIANCE .093	SAMPLE SIZE 41.
PARAMETER 23.	MEAN 1.149	MAX 3.2000	MIN .4000	VARIANCE .182	SAMPLE SIZE 38.
PARAMETER 24.	MEAN .428	MAX 1.9700	MIN .0400	VARIANCE .130	SAMPLE SIZE 39.
PARAMETER 25.	MEAN .094	MAX .1600	MIN .0600	VARIANCE .001	SAMPLE SIZE 10.
PARAMETER 2.	MEAN 4.762	MAX 11.2000	MIN .9000	VARIANCE 6.477	SAMPLE SIZE 29.
PARAMETER 3.	MEAN 16.039	MAX 39.0000	MIN .5000	VARIANCE 166.169	SAMPLE SIZE 31.
PARAMETER 29.	MEAN 328.132	MAX 499.0000	MIN 259.0000	VARIANCE 1962.982	SAMPLE SIZE 34.
PARAMETER 30.	MEAN 14.079	MAX 55.0000	MIN 2.0000	VARIANCE 130.075	SAMPLE SIZE 38.
PARAMETER 31.	MEAN 136.652	MAX 169.0000	MIN 75.0000	VARIANCE 587.873	SAMPLE SIZE 23.
PARAMETER 18.	MEAN 7.471	MAX 8.7000	MIN 7.0000	VARIANCE .141	SAMPLE SIZE 35.
PARAMETER 37.	MEAN 253.486	MAX 315.1450	MIN 193.9440	VARIANCE 812.747	SAMPLE SIZE 28.
PARAMETER 36.	MEAN 274.226	MAX 311.0000	MIN 199.0000	VARIANCE 642.247	SAMPLE SIZE 31.
PARAMETER 38.	MEAN 65.429	MAX 85.0000	MIN 47.0000	VARIANCE 89.291	SAMPLE SIZE 28.
PARAMETER 39.	MEAN 21.897	MAX 26.0000	MIN 18.0000	VARIANCE 4.810	SAMPLE SIZE 29.
PARAMETER 41.	MEAN 3.486	MAX 9.0000	MIN .1000	VARIANCE 2.928	SAMPLE SIZE 29.

Table 33. Site 160 SUMMER

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SITES                160

YEAR                  70 TO  73
MONTH                  8      8        10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT
```

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.118	LIMITS	.078	LOW	.040	HIGH	.196
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.320	LIMITS	.081	LOW	.238	HIGH	.401
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.541	LIMITS	.201	LOW	1.340	HIGH	1.743
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.335	LIMITS	.196	LOW	.139	HIGH	.531
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.110	LIMITS	.381	LOW	-.271	HIGH	.491
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	3.107	LIMITS	.786	LOW	2.321	HIGH	3.893
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	16.360	LIMITS	11.571	LOW	4.789	HIGH	27.931
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	331.214	LIMITS	22.939	LOW	308.275	HIGH	354.153
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	16.857	LIMITS	6.221	LOW	10.636	HIGH	23.078
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	157.750	LIMITS	15.004	LOW	142.746	HIGH	172.754
X18	PH LAB	PARAMETER 18.	MEAN	7.356	LIMITS	.189	LOW	7.167	HIGH	7.544
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	274.518	LIMITS	22.851	LOW	251.666	HIGH	297.369
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	303.400	LIMITS	63.081	LOW	240.319	HIGH	366.481
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	67.462	LIMITS	6.119	LOW	61.343	HIGH	73.580
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	25.706	LIMITS	1.989	LOW	23.716	HIGH	27.695
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.153	LIMITS	.461	LOW	3.692	HIGH	4.614
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.118	MAX	.6190	MIN	.0040	VARIANCE	.023	SAMPLE SIZE	17.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.320	MAX	.6350	MIN	.0340	VARIANCE	.023	SAMPLE SIZE	16.
PARAMETER 23.	MEAN	1.541	MAX	2.7800	MIN	1.0800	VARIANCE	.143	SAMPLE SIZE	16.
PARAMETER 24.	MEAN	.335	MAX	1.4300	MIN	.0500	VARIANCE	.135	SAMPLE SIZE	16.
PARAMETER 25.	MEAN	.110	MAX	.1400	MIN	.0800	VARIANCE	.002	SAMPLE SIZE	2.
PARAMETER 2.	MEAN	3.107	MAX	6.7000	MIN	1.4000	VARIANCE	2.014	SAMPLE SIZE	15.
PARAMETER 3.	MEAN	16.360	MAX	50.0000	MIN	.3000	VARIANCE	261.656	SAMPLE SIZE	10.
PARAMETER 29.	MEAN	331.214	MAX	386.0000	MIN	255.0000	VARIANCE	1578.950	SAMPLE SIZE	14.
PARAMETER 30.	MEAN	16.857	MAX	52.0000	MIN	10.0000	VARIANCE	116.132	SAMPLE SIZE	14.
PARAMETER 31.	MEAN	157.750	MAX	196.0000	MIN	127.0000	VARIANCE	557.659	SAMPLE SIZE	12.
PARAMETER 18.	MEAN	7.356	MAX	7.6000	MIN	7.0000	VARIANCE	.060	SAMPLE SIZE	9.
PARAMETER 37.	MEAN	274.518	MAX	351.4480	MIN	216.2800	VARIANCE	1431.038	SAMPLE SIZE	13.
PARAMETER 36.	MEAN	303.400	MAX	382.0000	MIN	241.0000	VARIANCE	2581.800	SAMPLE SIZE	5.
PARAMETER 38.	MEAN	67.462	MAX	88.0000	MIN	51.0000	VARIANCE	102.603	SAMPLE SIZE	13.
PARAMETER 39.	MEAN	25.706	MAX	32.0000	MIN	20.0000	VARIANCE	14.971	SAMPLE SIZE	17.
PARAMETER 41.	MEAN	4.153	MAX	4.9000	MIN	2.3000	VARIANCE	.803	SAMPLE SIZE	17.

Table 34. Site 160 FALL

SITES 200

YEAR 70 TO 73
MONTH 1 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.0501	LIMITS	.019	LOW	.081	HIGH	.081
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.0001	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.1711	LIMITS	.042	LOW	.129	HIGH	.213
X23	KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.0041	LIMITS	.000	LOW	.005	HIGH	.009
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.1301	LIMITS	.041	LOW	.069	HIGH	.211
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.0001	LIMITS	.000	LOW	.000	HIGH	.000
X27	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	6.2621	LIMITS	1.634	LOW	4.825	HIGH	7.700
X28	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	14.1851	LIMITS	3.707	LOW	12.477	HIGH	18.402
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	353.2461	LIMITS	18.862	LOW	334.464	HIGH	372.128
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	9.0201	LIMITS	3.645	LOW	5.446	HIGH	13.473
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	142.7141	LIMITS	17.027	LOW	124.688	HIGH	160.741
X18	PH LAB	PARAMETER 14.	MEAN	7.9021	LIMITS	.097	LOW	7.805	HIGH	8.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	280.8671	LIMITS	15.159	LOW	265.708	HIGH	296.027
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	305.7401	LIMITS	14.331	LOW	291.409	HIGH	320.161
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	64.4001	LIMITS	3.893	LOW	60.507	HIGH	68.293
X39	MAGNESIUM MG/L	PERAMETER 39.	MEAN	28.6361	LIMITS	2.254	LOW	24.383	HIGH	30.889
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	5.1461	LIMITS	.479	LOW	4.667	HIGH	5.625
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.050	MAX	.1020	MIN	.0140	VARIANCE	.001	SAMPLE SIZE	14.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.171	MAX	.3000	MIN	.0500	VARIANCE	.005	SAMPLE SIZE	14.
PARAMETER 23.	MEAN	.466	MAX	1.1200	MIN	.6000	VARIANCE	.025	SAMPLE SIZE	14.
PARAMETER 24.	MEAN	.130	MAX	.5100	MIN	.0450	VARIANCE	.020	SAMPLE SIZE	14.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	6.262	MAX	8.3000	MIN	3.5000	VARIANCE	2.957	SAMPLE SIZE	8.
PARAMETER 3.	MEAN	14.185	MAX	24.0000	MIN	7.0000	VARIANCE	37.668	SAMPLE SIZE	13.
PARAMETER 29.	MEAN	353.286	MAX	388.0000	MIN	286.0000	VARIANCE	1065.297	SAMPLE SIZE	14.
PARAMETER 30.	MEAN	9.020	MAX	24.0000	MIN	2.0000	VARIANCE	35.610	SAMPLE SIZE	14.
PARAMETER 31.	MEAN	142.714	MAX	206.0000	MIN	90.0000	VARIANCE	969.912	SAMPLE SIZE	14.
PARAMETER 14.	MEAN	7.992	MAX	8.2000	MIN	7.8000	VARIANCE	.026	SAMPLE SIZE	13.
PARAMETER 37.	MEAN	280.867	MAX	301.5980	MIN	238.7530	VARIANCE	388.946	SAMPLE SIZE	9.
PARAMETER 36.	MEAN	305.740	MAX	337.0000	MIN	244.0000	VARIANCE	562.859	SAMPLE SIZE	13.
PARAMETER 38.	MEAN	64.400	MAX	72.0000	MIN	52.0000	VARIANCE	28.267	SAMPLE SIZE	10.
PARAMETER 39.	MEAN	28.636	MAX	32.0000	MIN	21.0000	VARIANCE	11.255	SAMPLE SIZE	11.
PARAMETER 41.	MEAN	5.146	MAX	6.4000	MIN	4.2000	VARIANCE	.629	SAMPLE SIZE	13.

Table 35. Site 200 SUMMER

SITES 210

YEAR 70 TO 73

MONTH 3 4 5 6 7

DAY NO RESTRAINT

HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT

SUBBASIN NO RESTRAINT

LOCATION NO RESTRAINT

COUNTY NO RESTRAINT

TOWNSHIP NO RESTRAINT

LONGITUDE NO RESTRAINT

LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

619	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.028	LIMITS	.014	LOW	.014	HIGH	.042
620	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
622	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.210	LIMITS	.168	LOW	.041	HIGH	.378
623	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.122	LIMITS	.304	LOW	.818	HIGH	1.426
624	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.164	LIMITS	.089	LOW	.074	HIGH	.253
625	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
662	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.650	LIMITS	1.448	LOW	6.202	HIGH	9.098
663	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	23.709	LIMITS	11.307	LOW	12.402	HIGH	35.014
629	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	379.364	LIMITS	68.699	LOW	310.664	HIGH	448.063
630	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	28.436	LIMITS	37.231	LOW	-8.795	HIGH	65.667
631	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	140.000	LIMITS	25.243	LOW	114.757	HIGH	165.243
618	PH LAB	PARAMETER 18.	MEAN	8.091	LIMITS	.082	LOW	8.009	HIGH	8.173
637	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	315.411	LIMITS	200.142	LOW	115.269	HIGH	515.552
636	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	301.000	LIMITS	86.096	LOW	214.904	HIGH	387.096
638	CALCIUM MG/L	PARAMETER 38.	MEAN	74.667	LIMITS	52.486	LOW	22.181	HIGH	127.152
639	MAGNESIUM MG/L	PARAMETER 39.	MEAN	31.333	LIMITS	16.911	LOW	14.423	HIGH	48.244
641	POTASSIUM MG/L	PARAMETER 41.	MEAN	5.633	LIMITS	3.373	LOW	2.260	HIGH	9.006
643	RIVER MILEAGE									
4100	TIME									

PARAMETER 19.	MEAN .028	MAX .0810	MIN .0070	VARIANCE .000	SAMPLE SIZE 11.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 6.
PARAMETER 22.	MEAN .210	MAX .9500	MIN .0840	VARIANCE .063	SAMPLE SIZE 11.
PARAMETER 23.	MEAN 1.122	MAX 2.0800	MIN .5800	VARIANCE .205	SAMPLE SIZE 11.
PARAMETER 24.	MEAN .164	MAX .4500	MIN .0300	VARIANCE .018	SAMPLE SIZE 11.
PARAMETER 25.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN 7.650	MAX 9.1000	MIN 5.0000	VARIANCE 1.903	SAMPLE SIZE 6.
PARAMETER 3.	MEAN 23.709	MAX 59.6000	MIN 6.0000	VARIANCE 283.307	SAMPLE SIZE 11.
PARAMETER 29.	MEAN 379.364	MAX 609.0000	MIN 300.0000	VARIANCE********	SAMPLE SIZE 11.
PARAMETER 30.	MEAN 28.436	MAX 184.0000	MIN 3.0000	VARIANCE3071.655	SAMPLE SIZE 11.
PARAMETER 31.	MEAN 140.000	MAX 215.0000	MIN 102.0000	VARIANCE1412.000	SAMPLE SIZE 11.
PARAMETER 18.	MEAN 8.091	MAX 8.2000	MIN 7.9000	VARIANCE .015	SAMPLE SIZE 11.
PARAMETER 37.	MEAN 315.411	MAX 407.7270	MIN 259.3330	VARIANCE4490.126	SAMPLE SIZE 3.
PARAMETER 36.	MEAN 301.000	MAX 341.0000	MIN 280.0000	VARIANCE1201.000	SAMPLE SIZE 3.
PARAMETER 38.	MEAN 74.667	MAX 99.0000	MIN 61.0000	VARIANCE 446.333	SAMPLE SIZE 3.
PARAMETER 39.	MEAN 31.333	MAX 39.0000	MIN 26.0000	VARIANCE 46.333	SAMPLE SIZE 3.
PARAMETER 41.	MEAN 5.633	MAX 7.2000	MIN 4.8000	VARIANCE 1.843	SAMPLE SIZE 3.

Table 36. Site 210 SUMMER

SITES 210

YEAR 70 TO 73
MONTH 2 6 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
RIGHASIP NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

#19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.534	LIMITS	.201	LOW	.333	HIGH	.735
#20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000
#22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.635	LIMITS	.121	LOW	.514	HIGH	.756
#23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	3.371	LIMITS	.537	LOW	2.834	HIGH	3.908
#24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.444	LIMITS	.119	LOW	.326	HIGH	.563
#25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.0000	LIMITS	.000	LOW	.000	HIGH	.000
#02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.400	LIMITS	7.624	LOW	-.224	HIGH	15.024
#03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	25.567	LIMITS	14.968	LOW	10.599	HIGH	40.535
#29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	487.062	LIMITS	53.405	LOW	433.657	HIGH	540.468
#30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	48.062	LIMITS	12.650	LOW	35.413	HIGH	60.712
#31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	227.437	LIMITS	31.856	LOW	195.580	HIGH	259.295
#18	PH LAB	PARAMETER 18.	MEAN	7.800	LIMITS	.266	LOW	7.534	HIGH	8.066
#37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
#36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
#33	CALCIUM MG/L	PARAMETER 33.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
#35	MAGNESIUM MG/L	PARAMETER 35.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
#41	POTASSIUM MG/L	PARAMETER 41.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
#03	RIVER MILEAGE									
#100	TIME									

PARAMETER 19.	MEAN	.534	MAX	1.5200	MIN	.0180	VARIANCE	.142	SAMPLE SIZE 16.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.635	MAX	.9650	MIN	.1140	VARIANCE	.052	SAMPLE SIZE 16.
PARAMETER 23.	MEAN	3.371	MAX	4.7400	MIN	1.0800	VARIANCE	1.015	SAMPLE SIZE 16.
PARAMETER 24.	MEAN	.444	MAX	.9000	MIN	.0800	VARIANCE	.050	SAMPLE SIZE 16.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	7.400	MAX	8.0000	MIN	6.8000	VARIANCE	.720	SAMPLE SIZE 2.
PARAMETER 3.	MEAN	25.567	MAX	45.5000	MIN	7.4000	VARIANCE	203.367	SAMPLE SIZE 6.
PARAMETER 29.	MEAN	487.062	MAX	694.0000	MIN	323.0000	VARIANCE	*******	SAMPLE SIZE 16.
PARAMETER 30.	MEAN	48.062	MAX	105.0000	MIN	10.0000	VARIANCE	563.796	SAMPLE SIZE 16.
PARAMETER 31.	MEAN	227.437	MAX	399.0000	MIN	127.0000	VARIANCE	3575.862	SAMPLE SIZE 16.
PARAMETER 18.	MEAN	7.800	MAX	8.1000	MIN	7.5000	VARIANCE	.064	SAMPLE SIZE 6.
PARAMETER 37.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 33.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 35.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 41.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.

Table 37. Site 210 FALL

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SITES                215

YEAR                  73 TO  73
MONTH                  3      4      5      6      7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

.PARAMETER VALUE   NO RESTRAINT                    T TEST  (.05)

DEPTH              NO RESTRAINT

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)      PARAMETER 19.  MEAN     .718 LIMITS     .409  LOW     .309  HIGH   1.127
X20   TOTAL SOLUBLE PHOSPHORUS             PARAMETER 20.  MEAN     .000 LIMITS     .000  LOW     .000  HIGH    .000
X22   TOTAL PHOSPHORUS                     PARAMETER 22.  MEAN     .931 LIMITS     .481  LOW     .451  HIGH   1.412
X23   KJELDAHL NITROGEN (MG/L)             PARAMETER 23.  MEAN    4.427 LIMITS    1.031  LOW    3.396  HIGH   5.458
X24   AMMONIA NITROGEN (MG/L)              PARAMETER 24.  MEAN     .402 LIMITS     .222  LOW     .181  HIGH    .624
X25   NITRATE - NITROGEN (MG/L)            PARAMETER 25.  MEAN     .000 LIMITS     .000  LOW     .000  HIGH    .000
X02   DISSOLVED OXYGEN                     PARAMETER  2.  MEAN    6.600 LIMITS    4.052  LOW    2.548  HIGH  10.652
X03   TURBIDITY IN JACKSON UNITS           PARAMETER  3.  MEAN   11.767 LIMITS    5.761  LOW    6.006  HIGH  17.527
X29   TOTAL DISSOLVED SOLIDS (MG/L)        PARAMETER 29.  MEAN 496.000 LIMITS   55.797  LOW  440.203  HIGH 551.797
X30   TOTAL FILTERABLE SOLIDS (MG/L)       PARAMETER 30.  MEAN  19.444 LIMITS   13.534  LOW    5.910  HIGH  32.979
X31   TOTAL VOLATILE SOLIDS (MG/L)         PARAMETER 31.  MEAN 237.778 LIMITS   43.071  LOW  194.707  HIGH 280.848
X18   OIL LAB                              PARAMETER 18.  MEAN   8.089 LIMITS     .182  LOW    7.907  HIGH   8.271
X37   HARDNESS FROM CA AND MG              PARAMETER 37.  MEAN 312.987 LIMITS   44.318  LOW  268.669  HIGH 357.305
X36   ALKALINITY AS CACO3                  PARAMETER 36.  MEAN 320.909 LIMITS   27.111  LOW  293.799  HIGH 348.020
X38   CALCIUM          MG/L                PARAMETER 38.  MEAN  61.333 LIMITS    9.094  LOW   52.239  HIGH  70.427
X39   MAGNESIUM        MG/L                PARAMETER 39.  MEAN  37.625 LIMITS    4.095  LOW   33.530  HIGH  41.720
X41   POTASSIUM        MG/L                PARAMETER 41.  MEAN  11.650 LIMITS    2.188  LOW    9.462  HIGH  13.838
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.  MEAN      .718  MAX    1.5600  MIN     .3350  VARIANCE     .239  SAMPLE SIZE   8.
PARAMETER 20.  MEAN      .000  MAX     .0000  MIN     .0000  VARIANCE     .000  SAMPLE SIZE   8.
PARAMETER 22.  MEAN      .931  MAX    2.2000  MIN     .3100  VARIANCE     .391  SAMPLE SIZE   9.
PARAMETER 23.  MEAN     4.427  MAX    6.4800  MIN    2.7000  VARIANCE    1.799  SAMPLE SIZE   9.
PARAMETER 24.  MEAN      .402  MAX     .9700  MIN     .1000  VARIANCE     .083  SAMPLE SIZE   9.
PARAMETER 25.  MEAN      .000  MAX     .0000  MIN     .0000  VARIANCE     .000  SAMPLE SIZE   0.
PARAMETER  2.  MEAN     6.600  MAX    9.8000  MIN    4.5000  VARIANCE    6.487  SAMPLE SIZE   4.
PARAMETER  3.  MEAN    11.767  MAX   21.0000  MIN    2.5000  VARIANCE   55.775  SAMPLE SIZE   9.
PARAMETER 29.  MEAN   496.000  MAX  617.0000  MIN  394.0000  VARIANCE 5269.250  SAMPLE SIZE   9.
PARAMETER 30.  MEAN    19.444  MAX   52.0000  MIN    5.0000  VARIANCE  310.028  SAMPLE SIZE   9.
PARAMETER 31.  MEAN   237.778  MAX  331.0000  MIN  152.0000  VARIANCE 3139.694  SAMPLE SIZE   9.
PARAMETER 18.  MEAN     8.089  MAX    8.4000  MIN    7.7000  VARIANCE     .056  SAMPLE SIZE   9.
PARAMETER 37.  MEAN   312.987  MAX  355.8940  MIN  248.3300  VARIANCE 1782.812  SAMPLE SIZE   6.
PARAMETER 36.  MEAN   320.909  MAX  391.0000  MIN  271.0000  VARIANCE 1428.691  SAMPLE SIZE  11.
PARAMETER 38.  MEAN    61.333  MAX   71.0000  MIN   50.0000  VARIANCE   75.067  SAMPLE SIZE   6.
PARAMETER 39.  MEAN    37.625  MAX   44.0000  MIN   30.0000  VARIANCE   23.982  SAMPLE SIZE   8.
PARAMETER 41.  MEAN    11.650  MAX   13.6000  MIN    6.8000  VARIANCE    6.846  SAMPLE SIZE   8.
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Table 38. Site 215 SUMMER

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SITES                220

YEAR                  70 TO  73
MONTH                  9      9      10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT
```

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.975	LIMITS	.440	LOW	.536	HIGH	1.415
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.987	LIMITS	.322	LOW	.664	HIGH	1.309
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	4.102	LIMITS	.522	LOW	3.580	HIGH	4.624
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.598	LIMITS	.475	LOW	-.077	HIGH	1.274
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	473.600	LIMITS	85.540	LOW	388.060	HIGH	559.140
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	86.667	LIMITS	42.505	LOW	44.162	HIGH	129.172
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	215.700	LIMITS	35.153	LOW	180.547	HIGH	250.853
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	316.906	LIMITS	49.992	LOW	266.914	HIGH	366.898
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	73.286	LIMITS	6.082	LOW	67.204	HIGH	79.367
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	30.667	LIMITS	4.892	LOW	25.775	HIGH	35.558
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	5.310	LIMITS	.878	LOW	4.432	HIGH	6.188
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.975	MAX	1.5640	MIN	.4480	VARIANCE	.226	SAMPLE SIZE	7.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.987	MAX	1.4000	MIN	.2040	VARIANCE	.149	SAMPLE SIZE	8.
PARAMETER 23.	MEAN	4.102	MAX	4.9800	MIN	3.1000	VARIANCE	.532	SAMPLE SIZE	10.
PARAMETER 24.	MEAN	.598	MAX	2.9000	MIN	.0650	VARIANCE	.891	SAMPLE SIZE	10.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	473.600	MAX	719.0000	MIN	388.0000	VARIANCE	********	SAMPLE SIZE	10.
PARAMETER 30.	MEAN	86.667	MAX	195.0000	MIN	30.0000	VARIANCE	3057.750	SAMPLE SIZE	9.
PARAMETER 31.	MEAN	215.700	MAX	333.0000	MIN	172.0000	VARIANCE	2415.122	SAMPLE SIZE	10.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	316.906	MAX	386.7360	MIN	267.7020	VARIANCE	2268.565	SAMPLE SIZE	6.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 38.	MEAN	73.286	MAX	84.0000	MIN	66.0000	VARIANCE	43.238	SAMPLE SIZE	7.
PARAMETER 39.	MEAN	30.667	MAX	43.0000	MIN	24.0000	VARIANCE	40.500	SAMPLE SIZE	9.
PARAMETER 41.	MEAN	5.310	MAX	7.6000	MIN	3.8000	VARIANCE	1.508	SAMPLE SIZE	10.

Table 39. Site 220 FALL

SITES 300

YEAR 70 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.031	LIMITS	.009	LOW	.022	HIGH	.039
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.094	LIMITS	.008	LOW	.094	HIGH	.094
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.094	LIMITS	.016	LOW	.082	HIGH	.114
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.774	LIMITS	.125	LOW	.648	HIGH	.899
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.264	LIMITS	.082	LOW	.182	HIGH	.345
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	9.216	LIMITS	1.143	LOW	8.073	HIGH	10.359
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	6.168	LIMITS	1.871	LOW	4.297	HIGH	8.039
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	259.636	LIMITS	9.539	LOW	250.097	HIGH	269.176
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	13.606	LIMITS	3.817	LOW	9.789	HIGH	17.423
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	111.474	LIMITS	13.313	LOW	98.161	HIGH	124.786
X18	PH LAB	PARAMETER 18.	MEAN	8.004	LIMITS	.094	LOW	7.910	HIGH	8.099
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	210.617	LIMITS	8.108	LOW	202.509	HIGH	218.725
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	214.824	LIMITS	10.290	LOW	204.534	HIGH	225.113
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	49.779	LIMITS	2.423	LOW	47.356	HIGH	52.201
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	21.103	LIMITS	1.024	LOW	20.078	HIGH	22.127
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.303	LIMITS	.442	LOW	2.860	HIGH	3.745
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.031	MAX	.1360	MIN	.0050	VARIANCE	.001	SAMPLE SIZE	30.
PARAMETER 20.	MEAN	.099	MAX	.0980	MIN	.0980	VARIANCE	.000	SAMPLE SIZE	1.
PARAMETER 22.	MEAN	.098	MAX	.2750	MIN	.0300	VARIANCE	.002	SAMPLE SIZE	40.
PARAMETER 23.	MEAN	.774	MAX	2.5600	MIN	.3400	VARIANCE	.153	SAMPLE SIZE	40.
PARAMETER 24.	MEAN	.264	MAX	.8400	MIN	.0100	VARIANCE	.056	SAMPLE SIZE	35.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	9.216	MAX	17.2000	MIN	4.6000	VARIANCE	7.661	SAMPLE SIZE	25.
PARAMETER 3.	MEAN	6.168	MAX	19.0000	MIN	.7000	VARIANCE	20.549	SAMPLE SIZE	25.
PARAMETER 29.	MEAN	259.636	MAX	304.0000	MIN	182.0000	VARIANCE	724.614	SAMPLE SIZE	33.
PARAMETER 30.	MEAN	13.606	MAX	51.0000	MIN	4.0000	VARIANCE	115.996	SAMPLE SIZE	33.
PARAMETER 31.	MEAN	111.474	MAX	195.0000	MIN	84.0000	VARIANCE	762.819	SAMPLE SIZE	19.
PARAMETER 18.	MEAN	8.004	MAX	8.5000	MIN	7.5000	VARIANCE	.048	SAMPLE SIZE	23.
PARAMETER 37.	MEAN	210.617	MAX	256.6990	MIN	153.1140	VARIANCE	580.887	SAMPLE SIZE	36.
PARAMETER 36.	MEAN	214.824	MAX	250.0000	MIN	134.0000	VARIANCE	868.695	SAMPLE SIZE	34.
PARAMETER 38.	MEAN	49.779	MAX	63.0000	MIN	38.0000	VARIANCE	51.892	SAMPLE SIZE	36.
PARAMETER 39.	MEAN	21.103	MAX	29.0000	MIN	13.0000	VARIANCE	10.042	SAMPLE SIZE	39.
PARAMETER 41.	MEAN	3.303	MAX	8.7000	MIN	2.0000	VARIANCE	1.826	SAMPLE SIZE	38.

Table 40. Site 300 SUMMER

SITES 300

YEAR 70 TO 73
MONTH 8 9 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.170	LIMITS	.055	LOW	.114	HIGH	.225
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.339	LIMITS	.095	LOW	.244	HIGH	.434
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.341	LIMITS	.245	LOW	1.096	HIGH	1.586
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.269	LIMITS	.089	LOW	.180	HIGH	.358
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.900	LIMITS	2.291	LOW	5.609	HIGH	10.191
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	13.700	LIMITS	13.816	LOW	-.116	HIGH	27.516
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	297.640	LIMITS	19.365	LOW	278.275	HIGH	317.005
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	35.520	LIMITS	13.279	LOW	22.241	HIGH	48.799
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	134.773	LIMITS	12.139	LOW	122.634	HIGH	146.912
X18	PH LAB	PARAMETER 18.	MEAN	8.043	LIMITS	.206	LOW	7.837	HIGH	8.249
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	232.059	LIMITS	10.822	LOW	221.237	HIGH	242.881
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	215.333	LIMITS	27.117	LOW	188.216	HIGH	242.450
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	52.619	LIMITS	2.859	LOW	49.760	HIGH	55.478
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.792	LIMITS	1.155	LOW	23.637	HIGH	25.946
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.876	LIMITS	.511	LOW	3.365	HIGH	4.387
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN .170	MAX .4800	MIN .0100	VARIANCE .014	SAMPLE SIZE 21.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .339	MAX .6350	MIN .0200	VARIANCE .043	SAMPLE SIZE 21.
PARAMETER 23.	MEAN 1.341	MAX 2.4200	MIN .3500	VARIANCE .336	SAMPLE SIZE 24.
PARAMETER 24.	MEAN .269	MAX .6800	MIN .0350	VARIANCE .045	SAMPLE SIZE 24.
PARAMETER 25.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN 7.900	MAX 10.9000	MIN 6.0000	VARIANCE 3.405	SAMPLE SIZE 5.
PARAMETER 3.	MEAN 13.700	MAX 35.5000	MIN 3.3000	VARIANCE 173.268	SAMPLE SIZE 6.
PARAMETER 29.	MEAN 297.640	MAX 368.0000	MIN 213.0000	VARIANCE 2200.573	SAMPLE SIZE 25.
PARAMETER 30.	MEAN 35.520	MAX 140.0000	MIN 8.0000	VARIANCE 1034.843	SAMPLE SIZE 25.
PARAMETER 31.	MEAN 134.773	MAX 178.0000	MIN 91.0000	VARIANCE 749.327	SAMPLE SIZE 22.
PARAMETER 18.	MEAN 8.043	MAX 8.3000	MIN 7.7000	VARIANCE .050	SAMPLE SIZE 7.
PARAMETER 37.	MEAN 232.059	MAX 269.1840	MIN 185.4380	VARIANCE 534.709	SAMPLE SIZE 20.
PARAMETER 36.	MEAN 215.333	MAX 249.0000	MIN 170.0000	VARIANCE 667.467	SAMPLE SIZE 6.
PARAMETER 38.	MEAN 52.619	MAX 65.0000	MIN 38.0000	VARIANCE 39.448	SAMPLE SIZE 21.
PARAMETER 39.	MEAN 24.792	MAX 29.0000	MIN 21.0000	VARIANCE 7.476	SAMPLE SIZE 24.
PARAMETER 41.	MEAN 3.876	MAX 6.0000	MIN 1.8000	VARIANCE 1.530	SAMPLE SIZE 25.

Table 41. Site 300 FALL

SITES 400

YEAR 70 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.028	LIMITS	.008	LOW	.021	HIGH .036
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH .000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.081	LIMITS	.013	LOW	.068	HIGH .095
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.088	LIMITS	.056	LOW	1.032	HIGH 1.143
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.371	LIMITS	.078	LOW	.293	HIGH .449
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.089	LIMITS	.040	LOW	.050	HIGH .129
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	6.609	LIMITS	.957	LOW	5.652	HIGH 7.566
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	4.331	LIMITS	2.274	LOW	2.056	HIGH 6.605
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	198.372	LIMITS	13.110	LOW	185.262	HIGH 211.482
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	10.930	LIMITS	3.744	LOW	7.186	HIGH 14.674
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	84.781	LIMITS	7.696	LOW	77.085	HIGH 92.478
X18	PH LAB	PARAMETER 18.	MEAN	7.780	LIMITS	.105	LOW	7.675	HIGH 7.885
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	157.260	LIMITS	8.867	LOW	148.393	HIGH 166.127
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	161.622	LIMITS	11.457	LOW	150.166	HIGH 173.079
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	39.061	LIMITS	2.009	LOW	37.052	HIGH 41.071
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	14.577	LIMITS	1.078	LOW	13.499	HIGH 15.655
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	2.680	LIMITS	.246	LOW	2.435	HIGH 2.926
X99	RIVER MILEAGE								
X100	TIME								

PARAMETER 19.	MEAN .028	MAX .1750	MIN .0010	VARIANCE .001	SAMPLE SIZE 51.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .081	MAX .2650	MIN .0220	VARIANCE .002	SAMPLE SIZE 51.
PARAMETER 23.	MEAN 1.088	MAX 1.4600	MIN .7200	VARIANCE .038	SAMPLE SIZE 49.
PARAMETER 24.	MEAN .371	MAX 1.0000	MIN .0300	VARIANCE .067	SAMPLE SIZE 45.
PARAMETER 25.	MEAN .089	MAX .5800	MIN .0100	VARIANCE .011	SAMPLE SIZE 28.
PARAMETER 2.	MEAN 6.609	MAX 10.5000	MIN 3.0000	VARIANCE 4.654	SAMPLE SIZE 22.
PARAMETER 3.	MEAN 4.331	MAX 27.5000	MIN .1000	VARIANCE 45.703	SAMPLE SIZE 36.
PARAMETER 29.	MEAN 198.372	MAX 296.0000	MIN 122.0000	VARIANCE 1814.001	SAMPLE SIZE 43.
PARAMETER 30.	MEAN 10.930	MAX 69.0000	MIN 1.0000	VARIANCE 147.924	SAMPLE SIZE 43.
PARAMETER 31.	MEAN 84.781	MAX 130.0000	MIN 30.0000	VARIANCE 457.402	SAMPLE SIZE 32.
PARAMETER 18.	MEAN 7.780	MAX 8.4000	MIN 7.1000	VARIANCE .121	SAMPLE SIZE 45.
PARAMETER 37.	MEAN 157.260	MAX 242.7320	MIN 69.7790	VARIANCE 945.545	SAMPLE SIZE 49.
PARAMETER 36.	MEAN 161.622	MAX 244.0000	MIN 94.0000	VARIANCE 1449.649	SAMPLE SIZE 45.
PARAMETER 38.	MEAN 39.061	MAX 56.0000	MIN 23.0000	VARIANCE 48.559	SAMPLE SIZE 49.
PARAMETER 39.	MEAN 14.577	MAX 25.0000	MIN 3.0000	VARIANCE 15.112	SAMPLE SIZE 52.
PARAMETER 41.	MEAN 2.680	MAX 4.7000	MIN 1.6000	VARIANCE .681	SAMPLE SIZE 46.

Table 42. Site 400 SUMMER

SITES 400

YEAR 70 TO 73
MONTH 8 8 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT
DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.025	LIMITS	.012	LOW	.012	HIGH	.037
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.020	LIMITS	.000	LOW	.020	HIGH	.020
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.081	LIMITS	.048	LOW	.033	HIGH	.130
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.368	LIMITS	.226	LOW	1.142	HIGH	1.594
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.530	LIMITS	.100	LOW	.430	HIGH	.630
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.105	LIMITS	.073	LOW	.033	HIGH	.178
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.800	LIMITS	35.577	LOW	-29.777	HIGH	41.377
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	1.360	LIMITS	1.674	LOW	-.314	HIGH	3.034
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	205.727	LIMITS	11.365	LOW	194.362	HIGH	217.092
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	9.455	LIMITS	7.585	LOW	1.870	HIGH	17.039
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	96.500	LIMITS	8.371	LOW	88.129	HIGH	104.871
X18	PH (LAB)	PARAMETER 18.	MEAN	7.690	LIMITS	.262	LOW	7.428	HIGH	7.952
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	168.933	LIMITS	8.698	LOW	159.637	HIGH	177.032
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	158.000	LIMITS	16.434	LOW	141.566	HIGH	174.434
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	41.700	LIMITS	2.998	LOW	38.702	HIGH	44.698
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	15.536	LIMITS	.339	LOW	15.297	HIGH	15.975
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	2.536	LIMITS	.346	LOW	2.191	HIGH	2.882
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN .025	MAX .0460	MIN .0100	VARIANCE .000	SAMPLE SIZE 8.
PARAMETER 20.	MEAN .020	MAX .0200	MIN .0200	VARIANCE .000	SAMPLE SIZE 1.
PARAMETER 22.	MEAN .081	MAX .1750	MIN .0290	VARIANCE .003	SAMPLE SIZE 7.
PARAMETER 23.	MEAN 1.368	MAX 2.1000	MIN .9000	VARIANCE .100	SAMPLE SIZE 10.
PARAMETER 24.	MEAN .530	MAX .7700	MIN .2400	VARIANCE .022	SAMPLE SIZE 11.
PARAMETER 25.	MEAN .105	MAX .1600	MIN .0520	VARIANCE .002	SAMPLE SIZE 4.
PARAMETER 2.	MEAN 5.800	MAX 8.6005	MIN 3.0000	VARIANCE 15.680	SAMPLE SIZE 2.
PARAMETER 3.	MEAN 1.360	MAX 3.5000	MIN .4000	VARIANCE 1.810	SAMPLE SIZE 5.
PARAMETER 29.	MEAN 205.727	MAX 229.0000	MIN 174.0000	VARIANCE 286.218	SAMPLE SIZE 11.
PARAMETER 30.	MEAN 9.455	MAX 42.0000	MIN 1.0000	VARIANCE 127.473	SAMPLE SIZE 11.
PARAMETER 31.	MEAN 96.500	MAX 118.0000	MIN 82.0000	VARIANCE 136.944	SAMPLE SIZE 10.
PARAMETER 18.	MEAN 7.690	MAX 8.4000	MIN 7.1000	VARIANCE .134	SAMPLE SIZE 10.
PARAMETER 37.	MEAN 168.334	MAX 180.2000	MIN 142.1300	VARIANCE 147.840	SAMPLE SIZE 10.
PARAMETER 36.	MEAN 158.000	MAX 177.0000	MIN 123.0000	VARIANCE 386.256	SAMPLE SIZE 8.
PARAMETER 38.	MEAN 41.700	MAX 49.0000	MIN 35.0000	VARIANCE 17.567	SAMPLE SIZE 10.
PARAMETER 39.	MEAN 15.536	MAX 16.0000	MIN 15.0000	VARIANCE .255	SAMPLE SIZE 11.
PARAMETER 41.	MEAN 2.536	MAX 3.0000	MIN 1.0000	VARIANCE .255	SAMPLE SIZE 11.

Table 43. Site 400 FALL

SITES 405

YEAR 70 TO 73
MONTH 4 5 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.024	LIMITS	.010	LOW	.014	HIGH	.034
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.076	LIMITS	.012	LOW	.064	HIGH	.088
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.667	LIMITS	.165	LOW	1.502	HIGH	1.833
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.521	LIMITS	.138	LOW	.383	HIGH	.657
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.132	LIMITS	.062	LOW	.070	HIGH	.193
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.650	LIMITS	.906	LOW	4.744	HIGH	6.556
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	1.674	LIMITS	.702	LOW	.972	HIGH	2.376
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	243.406	LIMITS	27.144	LOW	216.262	HIGH	270.550
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	10.600	LIMITS	4.237	LOW	6.363	HIGH	14.837
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	138.261	LIMITS	22.921	LOW	115.340	HIGH	161.182
X18	PH LAB	PARAMETER 18.	MEAN	7.740	LIMITS	.081	LOW	7.659	HIGH	7.821
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	199.391	LIMITS	21.338	LOW	178.054	HIGH	220.729
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	181.972	LIMITS	14.780	LOW	165.192	HIGH	198.752
X38	CALCIUM MG/L	PARAMETER 39.	MEAN	49.588	LIMITS	5.347	LOW	44.241	HIGH	54.935
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	19.289	LIMITS	2.020	LOW	17.270	HIGH	21.309
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.062	LIMITS	.479	LOW	2.583	HIGH	3.541
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.024	MAX	.1760	MIN	.0040	VARIANCE	.001	SAMPLE SIZE	39.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.076	MAX	.1340	MIN	.0200	VARIANCE	.001	SAMPLE SIZE	33.
PARAMETER 23.	MEAN	1.667	MAX	3.1500	MIN	.9200	VARIANCE	.261	SAMPLE SIZE	39.
PARAMETER 24.	MEAN	.521	MAX	1.7100	MIN	.0400	VARIANCE	.163	SAMPLE SIZE	36.
PARAMETER 25.	MEAN	.132	MAX	.2300	MIN	.0700	VARIANCE	.003	SAMPLE SIZE	6.
PARAMETER 2.	MEAN	5.650	MAX	9.3000	MIN	1.5000	VARIANCE	4.175	SAMPLE SIZE	22.
PARAMETER 3.	MEAN	1.674	MAX	5.8000	MIN	.4000	VARIANCE	3.144	SAMPLE SIZE	27.
PARAMETER 29.	MEAN	243.406	MAX	496.0000	MIN	148.0000	VARIANCE	5691.216	SAMPLE SIZE	32.
PARAMETER 30.	MEAN	10.600	MAX	47.0000	MIN	1.0000	VARIANCE	128.800	SAMPLE SIZE	30.
PARAMETER 31.	MEAN	138.261	MAX	335.0000	MIN	84.0000	VARIANCE	2409.111	SAMPLE SIZE	33.
PARAMETER 18.	MEAN	7.740	MAX	8.2000	MIN	7.3000	VARIANCE	.055	SAMPLE SIZE	35.
PARAMETER 37.	MEAN	199.391	MAX	373.6670	MIN	85.0000	VARIANCE	3735.525	SAMPLE SIZE	34.
PARAMETER 36.	MEAN	181.972	MAX	288.0000	MIN	18.0000	VARIANCE	2487.856	SAMPLE SIZE	36.
PARAMETER 38.	MEAN	49.588	MAX	87.0000	MIN	19.0000	VARIANCE	234.553	SAMPLE SIZE	34.
PARAMETER 39.	MEAN	19.289	MAX	40.0000	MIN	13.0000	VARIANCE	38.049	SAMPLE SIZE	38.
PARAMETER 41.	MEAN	3.062	MAX	6.3000	MIN	.8000	VARIANCE	1.882	SAMPLE SIZE	34.

Table 44. Site 405 SUMMER

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SITES                410

YEAR                  70 TO  73
MONTH                  3      4        5       6       7
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)   PARAMETER 19.  MEAN     .095LIMITS     .041  LOW     .054  HIGH     .136
X20   TOTAL SOLUBLE PHOSPHORUS          PARAMETER 20.  MEAN     .040LIMITS     .000  LOW     .040  HIGH     .080
X22   TOTAL PHOSPHORUS                  PARAMETER 22.  MEAN     .122LIMITS     .021  LOW     .101  HIGH     .144
X23   KJEDAHL NITROGEN (MG/L)           PARAMETER 23.  MEAN    1.647LIMITS     .143  LOW    1.504  HIGH    1.789
X24   AMMONIA NITROGEN (MG/L)           PARAMETER 24.  MEAN     .578LIMITS     .108  LOW     .470  HIGH     .686
X25   NITRATE - NITROGEN (MG/L)         PARAMETER 25.  MEAN     .137LIMITS     .043  LOW     .094  HIGH     .181
X02   DISSOLVED OXYGEN                  PARAMETER  2.  MEAN    5.656LIMITS     .902  LOW    4.754  HIGH    6.557
X03   TURBIDITY IN JACKSON UNITS        PARAMETER  3.  MEAN   12.355LIMITS    7.366  LOW    4.989  HIGH   19.720
X29   TOTAL DISSOLVED SOLIDS (MG/L)     PARAMETER 29.  MEAN  428.872LIMITS   41.491  LOW  387.381  HIGH  470.362
X30   TOTAL FILTERABLE SOLIDS (MG/L)    PARAMETER 30.  MEAN   17.895LIMITS    6.672  LOW   11.223  HIGH   24.567
X31   TOTAL VOLATILE SOLIDS (MG/L)      PARAMETER 31.  MEAN  159.897LIMITS   15.307  LOW  144.590  HIGH  175.203
X18   PH LAB                            PARAMETER 18.  MEAN    7.436LIMITS     .120  LOW    7.316  HIGH    7.756
X37   HARDNESS FROM CA AND MG           PARAMETER 37.  MEAN  299.026LIMITS   32.663  LOW  266.363  HIGH  331.690
X36   ALKALINITY AS CACO3               PARAMETER 36.  MEAN  276.195LIMITS   23.739  LOW  252.456  HIGH  299.934
X38   CALCIUM            MG/L           PARAMETER 38.  MEAN   73.070LIMITS    8.104  LOW   64.966  HIGH   81.174
X39   MAGNESIUM          MG/L           PARAMETER 39.  MEAN   28.205LIMITS    3.139  LOW   25.066  HIGH   31.343
X41   POTASSIUM          MG/L           PARAMETER 41.  MEAN    4.160LIMITS     .408  LOW    3.752  HIGH    4.568
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .095   MAX      .7600   MIN      .0100   VARIANCE     .019   SAMPLE SIZE   47.
PARAMETER 20.   MEAN      .040   MAX      .0400   MIN      .0400   VARIANCE     .000   SAMPLE SIZE    1.
PARAMETER 22.   MEAN      .122   MAX      .3500   MIN      .0250   VARIANCE     .005   SAMPLE SIZE   47.
PARAMETER 23.   MEAN     1.647   MAX    2.4800   MIN      .6600   VARIANCE     .231   SAMPLE SIZE   46.
PARAMETER 24.   MEAN      .578   MAX    1.5000   MIN      .0400   VARIANCE     .123   SAMPLE SIZE   43.
PARAMETER 25.   MEAN      .137   MAX      .3500   MIN      .0500   VARIANCE     .006   SAMPLE SIZE   15.
PARAMETER  2.   MEAN     5.656   MAX    9.4000   MIN    3.2000   VARIANCE    3.288   SAMPLE SIZE   18.
PARAMETER  3.   MEAN    12.355   MAX   55.0000   MIN    1.1000   VARIANCE  275.881   SAMPLE SIZE   22.
PARAMETER 29.   MEAN   428.872   MAX  658.0000   MIN  230.0000   VARIANCE********   SAMPLE SIZE   39.
PARAMETER 30.   MEAN    17.895   MAX   91.0000   MIN    3.0000   VARIANCE  415.178   SAMPLE SIZE   38.
PARAMETER 31.   MEAN   159.897   MAX  217.0000   MIN   88.0000   VARIANCE 1619.953   SAMPLE SIZE   29.
PARAMETER 18.   MEAN     7.636   MAX    8.4000   MIN    7.0000   VARIANCE     .155   SAMPLE SIZE   44.
PARAMETER 37.   MEAN   299.026   MAX  514.6870   MIN  134.5640   VARIANCE********   SAMPLE SIZE   42.
PARAMETER 36.   MEAN   276.195   MAX  408.0000   MIN  147.0000   VARIANCE 5670.760   SAMPLE SIZE   41.
PARAMETER 38.   MEAN    73.070   MAX  127.0000   MIN   43.0000   VARIANCE  693.114   SAMPLE SIZE   43.
PARAMETER 39.   MEAN    28.205   MAX   48.0000   MIN    6.0000   VARIANCE  106.399   SAMPLE SIZE   44.
PARAMETER 41.   MEAN     4.160   MAX    7.5000   MIN    2.2000   VARIANCE    1.843   SAMPLE SIZE   45.
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Table 45. Site 410 SUMMER

SITES A10

YEAR 70 TO 73
MONTH 8 9 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.105	LIMITS	.136	LOW	-.026	HIGH	.240
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.104	LIMITS	.045	LOW	.060	HIGH	.149
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.639	LIMITS	.282	LOW	1.358	HIGH	1.921
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.455	LIMITS	.152	LOW	.303	HIGH	.606
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.125	LIMITS	.106	LOW	.019	HIGH	.231
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.771	LIMITS	1.485	LOW	4.285	HIGH	7.258
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	2.380	LIMITS	1.719	LOW	.661	HIGH	4.099
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	339.118	LIMITS	43.994	LOW	295.124	HIGH	383.111
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	9.176	LIMITS	3.531	LOW	5.646	HIGH	12.707
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	141.000	LIMITS	15.435	LOW	125.565	HIGH	156.435
X18	PH LAB	PARAMETER 18.	MEAN	7.773	LIMITS	.233	LOW	7.541	HIGH	8.006
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	257.233	LIMITS	44.897	LOW	212.336	HIGH	302.130
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	249.500	LIMITS	43.541	LOW	205.959	HIGH	293.041
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	62.467	LIMITS	12.437	LOW	50.030	HIGH	74.904
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	24.000	LIMITS	2.720	LOW	21.280	HIGH	26.720
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.994	LIMITS	.752	LOW	3.243	HIGH	4.746
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN .105	MAX 1.2500	MIN .0050	VARIANCE .078	SAMPLE SIZE 19.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .104	MAX .4150	MIN .0150	VARIANCE .009	SAMPLE SIZE 19.
PARAMETER 23.	MEAN 1.639	MAX 3.0000	MIN .6700	VARIANCE .382	SAMPLE SIZE 21.
PARAMETER 24.	MEAN .455	MAX 1.2300	MIN .1000	VARIANCE .111	SAMPLE SIZE 21.
PARAMETER 25.	MEAN .125	MAX .2200	MIN .0700	VARIANCE .004	SAMPLE SIZE 4.
PARAMETER 2.	MEAN 5.771	MAX 8.0000	MIN 4.1000	VARIANCE 2.582	SAMPLE SIZE 7.
PARAMETER 3.	MEAN 2.380	MAX 4.0000	MIN .7000	VARIANCE 1.917	SAMPLE SIZE 5.
PARAMETER 29.	MEAN 339.118	MAX 558.0000	MIN 219.0000	VARIANCE 7320.735	SAMPLE SIZE 17.
PARAMETER 30.	MEAN 9.176	MAX 30.0000	MIN 1.0000	VARIANCE 47.154	SAMPLE SIZE 17.
PARAMETER 31.	MEAN 141.000	MAX 184.0000	MIN 92.0000	VARIANCE 776.714	SAMPLE SIZE 15.
PARAMETER 18.	MEAN 7.773	MAX 8.4000	MIN 7.2000	VARIANCE .176	SAMPLE SIZE 15.
PARAMETER 37.	MEAN 257.233	MAX 458.4080	MIN 180.5810	VARIANCE 5571.590	SAMPLE SIZE 15.
PARAMETER 36.	MEAN 249.500	MAX 384.0000	MIN 175.0000	VARIANCE 4696.091	SAMPLE SIZE 12.
PARAMETER 38.	MEAN 62.467	MAX 115.0000	MIN 41.0000	VARIANCE 504.267	SAMPLE SIZE 15.
PARAMETER 39.	MEAN 24.000	MAX 41.0000	MIN 19.0000	VARIANCE 33.789	SAMPLE SIZE 20.
PARAMETER 41.	MEAN 3.994	MAX 7.3000	MIN 1.8000	VARIANCE 2.285	SAMPLE SIZE 18.

Table 46. Site 410 FALL

SITES 500

YEAR 70 TO 74
MONTH 1 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

x19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.015	LIMITS	.010	LOW	.006	HIGH .025
x20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.0001	LIMITS	.000	LOW	.000	HIGH .000
x22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.1221	LIMITS	.064	LOW	.054	HIGH .181
x23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.6051	LIMITS	.133	LOW	.472	HIGH .738
x24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.0901	LIMITS	.130	LOW	-.040	HIGH .220
x25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.0001	LIMITS	.000	LOW	.000	HIGH .000
x02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.750	LIMITS	2.593	LOW	6.157	HIGH 11.343
x03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	10.567	LIMITS	7.176	LOW	3.390	HIGH 17.743
x29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	274.833	LIMITS	16.454	LOW	258.179	HIGH 291.488
x30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	12.200	LIMITS	8.484	LOW	3.716	HIGH 20.684
x31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	105.500	LIMITS	16.352	LOW	89.148	HIGH 121.852
x18	PH LAB	PARAMETER 18.	MEAN	8.200	LIMITS	.094	LOW	8.106	HIGH 8.294
x37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	218.344	LIMITS	17.184	LOW	201.160	HIGH 235.527
x36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	230.167	LIMITS	20.838	LOW	209.329	HIGH 251.005
x38	CALCIUM MG/L	PARAMETER 38.	MEAN	48.000	LIMITS	5.900	LOW	42.100	HIGH 53.900
x39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	23.200	LIMITS	.555	LOW	22.645	HIGH 23.755
x41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.183	LIMITS	.335	LOW	3.849	HIGH 4.518
x99	RIVER MILEAGE								
x100	TIME								

PARAMETER 19.	MEAN .015	MAX .0300	MIN .0050	VARIANCE .000	SAMPLE SIZE 6.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .122	MAX .2250	MIN .0640	VARIANCE .003	SAMPLE SIZE 6.
PARAMETER 23.	MEAN .605	MAX .7600	MIN .4200	VARIANCE .016	SAMPLE SIZE 6.
PARAMETER 24.	MEAN .090	MAX .3400	MIN .0200	VARIANCE .015	SAMPLE SIZE 6.
PARAMETER 25.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN 8.750	MAX 10.0000	MIN 6.5000	VARIANCE 2.657	SAMPLE SIZE 4.
PARAMETER 3.	MEAN 10.567	MAX 19.5000	MIN 2.5000	VARIANCE 46.747	SAMPLE SIZE 6.
PARAMETER 29.	MEAN 274.833	MAX 296.0000	MIN 250.0000	VARIANCE 251.767	SAMPLE SIZE 6.
PARAMETER 30.	MEAN 12.200	MAX 23.0000	MIN 5.0000	VARIANCE 46.700	SAMPLE SIZE 5.
PARAMETER 31.	MEAN 105.500	MAX 133.0000	MIN 91.0000	VARIANCE 242.700	SAMPLE SIZE 6.
PARAMETER 18.	MEAN 8.200	MAX 8.3000	MIN 8.1000	VARIANCE .008	SAMPLE SIZE 6.
PARAMETER 37.	MEAN 218.344	MAX 234.5000	MIN 199.5420	VARIANCE 191.583	SAMPLE SIZE 5.
PARAMETER 36.	MEAN 230.167	MAX 250.0000	MIN 196.0000	VARIANCE 394.167	SAMPLE SIZE 6.
PARAMETER 38.	MEAN 48.000	MAX 56.0000	MIN 42.0000	VARIANCE 31.600	SAMPLE SIZE 6.
PARAMETER 39.	MEAN 23.200	MAX 24.0000	MIN 23.0000	VARIANCE .200	SAMPLE SIZE 5.
PARAMETER 41.	MEAN 4.183	MAX 4.8000	MIN 3.9000	VARIANCE .102	SAMPLE SIZE 6.

Table 47. Site 500 SUMMER

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SITES                500

YEAR                  70 TO  73
MONTH                  4      8        10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)     PARAMETER 19.  MEAN     .1390 LIMITS     .343  LOW    -.204  HIGH     .482
X20   TOTAL SOLUBLE PHOSPHORUS            PARAMETER 20.  MEAN     .0000 LIMITS     .000  LOW     .000  HIGH     .000
X22   TOTAL PHOSPHORUS                    PARAMETER 22.  MEAN     .2530 LIMITS     .419  LOW    -.165  HIGH     .672
X23   KJEDAHL NITROGEN (MG/L)             PARAMETER 23.  MEAN    1.6470 LIMITS    1.311  LOW    -.336  HIGH    2.958
X24   AMMONIA NITROGEN (MG/L)             PARAMETER 24.  MEAN     .2830 LIMITS     .404  LOW    -.121  HIGH     .687
X25   NITRATE - NITROGEN (MG/L)           PARAMETER 25.  MEAN     .0000 LIMITS     .000  LOW     .000  HIGH     .000
X02   DISSOLVED OXYGEN                    PARAMETER  2.  MEAN   11.5000 LIMITS     .000  LOW   11.500  HIGH   11.500
X03   TURBIDITY IN JACKSON UNITS          PARAMETER  3.  MEAN    7.8500 LIMITS   20.965  LOW  -13.115  HIGH   28.815
X29   TOTAL DISSOLVED SOLIDS (MG/L)       PARAMETER 29.  MEAN  302.3331 LIMITS  104.352  LOW  197.981  HIGH  406.685
X30   TOTAL FILTERABLE SOLIDS (MG/L)      PARAMETER 30.  MEAN   25.3331 LIMITS   29.794  LOW   -3.461  HIGH   54.127
X31   TOTAL VOLATILE SOLIDS (MG/L)        PARAMETER 31.  MEAN  124.0001 LIMITS   44.163  LOW   79.837  HIGH  168.163
X18   PH LAB                              PARAMETER 18.  MEAN    8.1501 LIMITS    3.176  LOW    4.974  HIGH   11.326
X37   HARDNESS FROM CA AND MG             PARAMETER 37.  MEAN  234.9481 LIMITS   97.356  LOW  137.592  HIGH  332.305
X36   ALKALINITY AS CACO3                 PARAMETER 36.  MEAN     .0001 LIMITS     .000  LOW     .000  HIGH     .000
X38   CALCIUM          MG/L               PARAMETER 38.  MEAN   52.3331 LIMITS   25.958  LOW   26.476  HIGH   78.191
X39   MAGNESIUM        MG/L               PARAMETER 39.  MEAN   25.3331 LIMITS    7.984  LOW   17.347  HIGH   33.319
X41   POTASSIUM        MG/L               PARAMETER 41.  MEAN    4.2001 LIMITS     .497  LOW    3.703  HIGH    4.697
X9    RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN      .139   MAX      .2890   MIN      .0170   VARIANCE     .019   SAMPLE SIZE    3.
PARAMETER 20.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER 22.   MEAN      .253   MAX      .4280   MIN      .0920   VARIANCE     .028   SAMPLE SIZE    3.
PARAMETER 23.   MEAN     1.647   MAX     2.0000   MIN     1.0400   VARIANCE     .279   SAMPLE SIZE    3.
PARAMETER 24.   MEAN      .283   MAX      .4100   MIN      .1000   VARIANCE     .026   SAMPLE SIZE    3.
PARAMETER 25.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER  2.   MEAN    11.500   MAX    11.5000   MIN    11.5000   VARIANCE     .000   SAMPLE SIZE    1.
PARAMETER  3.   MEAN     7.850   MAX     9.5000   MIN     6.2000   VARIANCE    5.445   SAMPLE SIZE    2.
PARAMETER 29.   MEAN   302.333   MAX   344.0000   MIN   260.0000   VARIANCE 1764.333   SAMPLE SIZE    3.
PARAMETER 30.   MEAN    25.333   MAX    33.0000   MIN    12.0000   VARIANCE  134.333   SAMPLE SIZE    3.
PARAMETER 31.   MEAN   124.000   MAX   144.0000   MIN   110.0000   VARIANCE  316.000   SAMPLE SIZE    3.
PARAMETER 18.   MEAN     8.150   MAX     8.4000   MIN     7.9000   VARIANCE     .125   SAMPLE SIZE    2.
PARAMETER 37.   MEAN   234.948   MAX   279.1720   MIN   204.5360   VARIANCE 1535.698   SAMPLE SIZE    3.
PARAMETER 36.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE     .000   SAMPLE SIZE    0.
PARAMETER 38.   MEAN    52.333   MAX    64.0000   MIN    44.0000   VARIANCE  108.333   SAMPLE SIZE    3.
PARAMETER 39.   MEAN    25.333   MAX    29.0000   MIN    23.0000   VARIANCE   10.333   SAMPLE SIZE    3.
PARAMETER 41.   MEAN     4.200   MAX     4.4000   MIN     4.0000   VARIANCE     .040   SAMPLE SIZE    3.
```

Table 48. Site 500 FALL

ES 600

9 70 TO 73

TH 3 4 5 6 7

R NO RESTRAINT
R NO RESTRAINT

E NO RESTRAINT

IN NO RESTRAINT
BASIN NO RESTRAINT
ATION NO RESTRAINT

ITY NO RESTRAINT
SHIP NO RESTRAINT
ITUDE NO RESTRAINT
TUDE NO RESTRAINT

AMETER VALUE NO RESTRAINT

TH NO RESTRAINT

T TEST (.05)

SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.064	LIMITS	.049	LOW	.015	HIGH	.112
TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.066	LIMITS	.000	LOW	.044	HIGH	.066
TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.140	LIMITS	.093	LOW	.047	HIGH	.233
KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.080	LIMITS	.216	LOW	.864	HIGH	1.296
AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.274	LIMITS	.354	LOW	-.081	HIGH	.628
NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.500	LIMITS	.000	LOW	8.500	HIGH	8.500
TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	10.775	LIMITS	6.943	LOW	3.832	HIGH	17.718
TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	351.000	LIMITS	72.328	LOW	278.672	HIGH	423.328
TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	8.750	LIMITS	10.583	LOW	-1.833	HIGH	19.333
TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	128.500	LIMITS	33.132	LOW	95.368	HIGH	161.632
PH LAB	PARAMETER 18.	MEAN	8.150	LIMITS	.092	LOW	8.058	HIGH	8.242
HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	243.843	LIMITS	68.161	LOW	175.682	HIGH	312.005
ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
CALCIUM MG/L	PARAMETER 38.	MEAN	51.500	LIMITS	6.353	LOW	45.147	HIGH	57.853
MAGNESIUM MG/L	PARAMETER 39.	MEAN	27.000	LIMITS	2.250	LOW	24.750	HIGH	29.250
POTASSIUM MG/L	PARAMETER 41.	MEAN	5.400	LIMITS	.468	LOW	4.932	HIGH	5.868
RIVER MILEAGE									
TIME									

TER 19.	MEAN	.064	MAX	.0860	MIN	.0510	VARIANCE	.000	SAMPLE SIZE	3.
TER 20.	MEAN	.066	MAX	.0660	MIN	.0660	VARIANCE	.000	SAMPLE SIZE	1.
TER 22.	MEAN	.140	MAX	.2250	MIN	.0900	VARIANCE	.003	SAMPLE SIZE	4.
TER 23.	MEAN	1.000	MAX	1.2800	MIN	.9800	VARIANCE	.018	SAMPLE SIZE	4.
TER 24.	MEAN	.274	MAX	.5000	MIN	.0900	VARIANCE	.050	SAMPLE SIZE	4.
TER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
TER 2.	MEAN	8.500	MAX	8.5000	MIN	8.5000	VARIANCE	.000	SAMPLE SIZE	1.
TER 3.	MEAN	10.775	MAX	17.0000	MIN	6.8000	VARIANCE	19.042	SAMPLE SIZE	4.
TER 29.	MEAN	351.000	MAX	411.0000	MIN	301.0000	VARIANCE	2066.667	SAMPLE SIZE	4.
TER 30.	MEAN	8.750	MAX	17.0000	MIN	1.0000	VARIANCE	44.250	SAMPLE SIZE	4.
TER 31.	MEAN	128.500	MAX	151.0000	MIN	102.0000	VARIANCE	433.667	SAMPLE SIZE	4.
TER 18.	MEAN	8.150	MAX	8.2000	MIN	8.1000	VARIANCE	.003	SAMPLE SIZE	4.
TER 37.	MEAN	243.843	MAX	249.2680	MIN	236.4790	VARIANCE	57.556	SAMPLE SIZE	2.
TER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
TER 38.	MEAN	51.500	MAX	52.0000	MIN	51.0000	VARIANCE	.500	SAMPLE SIZE	2.
TER 39.	MEAN	27.000	MAX	29.0000	MIN	26.0000	VARIANCE	2.000	SAMPLE SIZE	4.
TER 41.	MEAN	5.400	MAX	5.7000	MIN	5.1000	VARIANCE	.087	SAMPLE SIZE	4.

Table 49. Site 600 SUMMAR

SITES 600

YEAR 70 TO 73
MONTH 8 9 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.337	LIMITS	.064	LOW	.273	HIGH	.401
20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.442	LIMITS	.111	LOW	.331	HIGH	.553
23	KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.296	LIMITS	.315	LOW	1.981	HIGH	2.612
24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.321	LIMITS	.093	LOW	.228	HIGH	.414
25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
2	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	7.014	LIMITS	1.361	LOW	5.653	HIGH	8.375
3	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	8.883	LIMITS	6.715	LOW	2.168	HIGH	15.599
29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	402.556	LIMITS	38.984	LOW	363.571	HIGH	441.540
30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	22.278	LIMITS	3.195	LOW	19.083	HIGH	25.473
31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	193.357	LIMITS	19.262	LOW	174.095	HIGH	212.619
18	PH LAB	PARAMETER 18.	MEAN	7.917	LIMITS	.154	LOW	7.762	HIGH	8.071
37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	267.252	LIMITS	17.873	LOW	249.379	HIGH	285.125
34	ALKALINITY AS CACO3	PARAMETER 34.	MEAN	216.333	LIMITS	16.164	LOW	200.169	HIGH	232.497
38	CALCIUM MG/L	PARAMETER 38.	MEAN	55.600	LIMITS	3.125	LOW	52.475	HIGH	58.725
39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	31.056	LIMITS	2.475	LOW	28.581	HIGH	33.530
41	POTASSIUM MG/L	PARAMETER 41.	MEAN	5.061	LIMITS	.811	LOW	4.250	HIGH	5.872
99	RIVER MILEAGE									
100	TIME									

PARAMETER 19.	MEAN	.337	MAX	.5900	MIN	.1020	VARIANCE	.016	SAMPLE SIZE 17.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.442	MAX	.7600	MIN	.0820	VARIANCE	.046	SAMPLE SIZE 17.
PARAMETER 23.	MEAN	2.296	MAX	2.9800	MIN	.9200	VARIANCE	.376	SAMPLE SIZE 17.
PARAMETER 24.	MEAN	.321	MAX	.6900	MIN	.0400	VARIANCE	.033	SAMPLE SIZE 17.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	7.014	MAX	9.7000	MIN	5.0000	VARIANCE	2.165	SAMPLE SIZE 7.
PARAMETER 3.	MEAN	8.883	MAX	18.0000	MIN	3.5000	VARIANCE	40.934	SAMPLE SIZE 6.
PARAMETER 29.	MEAN	402.556	MAX	530.0000	MIN	225.0000	VARIANCE	6144.496	SAMPLE SIZE 18.
PARAMETER 30.	MEAN	22.278	MAX	36.0000	MIN	11.0000	VARIANCE	41.271	SAMPLE SIZE 18.
PARAMETER 31.	MEAN	193.357	MAX	236.0000	MIN	138.0000	VARIANCE	1113.324	SAMPLE SIZE 14.
PARAMETER 18.	MEAN	7.917	MAX	8.1000	MIN	7.7000	VARIANCE	.022	SAMPLE SIZE 6.
PARAMETER 37.	MEAN	267.252	MAX	338.2780	MIN	220.2590	VARIANCE	1041.440	SAMPLE SIZE 15.
PARAMETER 36.	MEAN	216.333	MAX	223.0000	MIN	210.0000	VARIANCE	42.333	SAMPLE SIZE 3.
PARAMETER 38.	MEAN	55.600	MAX	65.0000	MIN	47.0000	VARIANCE	31.829	SAMPLE SIZE 15.
PARAMETER 39.	MEAN	31.056	MAX	47.0000	MIN	25.0000	VARIANCE	24.761	SAMPLE SIZE 18.
PARAMETER 41.	MEAN	5.051	MAX	6.9000	MIN	2.2000	VARIANCE	2.659	SAMPLE SIZE 18.

Table 50. Site 600 FALL

SITES 700

YEAR 70 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT
DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.034	LIMITS	.008	LOW	.026	HIGH	.042
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.126	LIMITS	.034	LOW	.092	HIGH	.160
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	.644	LIMITS	.157	LOW	.487	HIGH	.800
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.124	LIMITS	.094	LOW	.030	HIGH	.218
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.167	LIMITS	.468	LOW	7.699	HIGH	8.634
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	12.483	LIMITS	3.414	LOW	9.070	HIGH	15.897
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	307.182	LIMITS	32.716	LOW	274.466	HIGH	339.897
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	5.636	LIMITS	1.953	LOW	3.683	HIGH	7.590
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	111.545	LIMITS	14.443	LOW	97.102	HIGH	125.989
X18	PH LAB	PARAMETER 18.	MEAN	8.190	LIMITS	.119	LOW	8.071	HIGH	8.309
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	216.640	LIMITS	39.780	LOW	176.860	HIGH	256.419
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	249.833	LIMITS	34.160	LOW	215.673	HIGH	283.993
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	51.778	LIMITS	9.452	LOW	42.326	HIGH	61.229
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	22.273	LIMITS	3.479	LOW	18.794	HIGH	25.752
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	4.309	LIMITS	.592	LOW	3.717	HIGH	4.901
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.034	MAX	.0520	MIN	.0190	VARIANCE	.000	SAMPLE SIZE 11.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.126	MAX	.2500	MIN	.0750	VARIANCE	.003	SAMPLE SIZE 11.
PARAMETER 23.	MEAN	.644	MAX	.9800	MIN	.2400	VARIANCE	.054	SAMPLE SIZE 11.
PARAMETER 24.	MEAN	.124	MAX	.4100	MIN	.0400	VARIANCE	.020	SAMPLE SIZE 11.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	8.167	MAX	8.6000	MIN	7.3000	VARIANCE	.199	SAMPLE SIZE 6.
PARAMETER 3.	MEAN	12.483	MAX	20.1000	MIN	6.5000	VARIANCE	28.867	SAMPLE SIZE 12.
PARAMETER 29.	MEAN	307.182	MAX	367.0000	MIN	214.0000	VARIANCE	2371.764	SAMPLE SIZE 11.
PARAMETER 30.	MEAN	5.636	MAX	11.0000	MIN	2.0000	VARIANCE	8.455	SAMPLE SIZE 11.
PARAMETER 31.	MEAN	111.545	MAX	138.0000	MIN	70.0000	VARIANCE	462.273	SAMPLE SIZE 11.
PARAMETER 18.	MEAN	8.190	MAX	8.5000	MIN	8.0000	VARIANCE	.028	SAMPLE SIZE 10.
PARAMETER 37.	MEAN	216.640	MAX	271.8180	MIN	149.1350	VARIANCE	2678.220	SAMPLE SIZE 9.
PARAMETER 36.	MEAN	249.833	MAX	296.0000	MIN	162.0000	VARIANCE	2890.515	SAMPLE SIZE 12.
PARAMETER 38.	MEAN	51.778	MAX	66.0000	MIN	35.0000	VARIANCE	151.194	SAMPLE SIZE 9.
PARAMETER 39.	MEAN	22.273	MAX	27.0000	MIN	14.0000	VARIANCE	26.818	SAMPLE SIZE 11.
PARAMETER 41.	MEAN	4.309	MAX	6.0000	MIN	3.4000	VARIANCE	.777	SAMPLE SIZE 11.

Table 51. Site 700 SUMMER

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SITES                 700A

YEAR                  70 TO  73
MONTH                  8      9      10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT

DEPTH              NO RESTRAINT                                    T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)   PARAMETER 19.  MEAN    .129LIMITS    .127  LOW    .002  HIGH    .257
X20   TOTAL SOLUBLE PHOSPHORUS          PARAMETER 20.  MEAN    .032LIMITS    .000  LOW    .032  HIGH    .032
X22   TOTAL PHOSPHORUS                  PARAMETER 22.  MEAN    .168LIMITS    .054  LOW    .114  HIGH    .222
X23   KJEDAHL NITROGEN (MG/L)           PARAMETER 23.  MEAN   1.544LIMITS    .233  LOW   1.311  HIGH   1.777
X24   AMMONIA NITROGEN (MG/L)           PARAMETER 24.  MEAN    .138LIMITS    .078  LOW    .059  HIGH    .216
X25   NITRATE - NITROGEN (MG/L)         PARAMETER 25.  MEAN    .000LIMITS    .000  LOW    .000  HIGH    .000
X02   DISSOLVED OXYGEN                  PARAMETER  2.  MEAN  10.100LIMITS    .000  LOW  10.100  HIGH  10.100
X03   TURBIDITY IN JACKSON UNITS        PARAMETER  3.  MEAN  20.100LIMITS 189.319  LOW-169.219  HIGH 209.419
X29   TOTAL DISSOLVED SOLIDS (MG/L)     PARAMETER 29.  MEAN 213.357LIMITS  17.455  LOW 195.902  HIGH 230.812
X30   TOTAL FILTERABLE SOLIDS (MG/L)    PARAMETER 30.  MEAN  34.214LIMITS  21.614  LOW  12.600  HIGH  55.829
X31   TOTAL VOLATILE SOLIDS (MG/L)      PARAMETER 31.  MEAN 100.714LIMITS   7.852  LOW  92.863  HIGH 108.565
X18   PH LAB                            PARAMETER 18.  MEAN   8.000LIMITS   2.541  LOW   5.459  HIGH  10.541
X37   HARDNESS FROM CA AND MG           PARAMETER 37.  MEAN 158.903LIMITS  40.132  LOW 118.772  HIGH 199.035
X36   ALKALINITY AS CACO3               PARAMETER 36.  MEAN    .000LIMITS    .000  LOW    .000  HIGH    .000
X38   CALCIUM          MG/L             PARAMETER 38.  MEAN  38.500LIMITS  10.752  LOW  27.748  HIGH  49.252
X39   MAGNESIUM        MG/L             PARAMETER 39.  MEAN  13.714LIMITS   2.371  LOW  11.343  HIGH  16.085
X41   POTASSIUM        MG/L             PARAMETER 41.  MEAN   3.367LIMITS   1.161  LOW   2.206  HIGH   4.527
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN     .129   MAX     .8900   MIN     .0380   VARIANCE     .048   SAMPLE SIZE  14.
PARAMETER 20.   MEAN     .032   MAX     .0320   MIN     .0320   VARIANCE     .000   SAMPLE SIZE   1.
PARAMETER 22.   MEAN     .168   MAX     .3550   MIN     .0140   VARIANCE     .010   SAMPLE SIZE  15.
PARAMETER 23.   MEAN    1.544   MAX    2.3000   MIN    1.0500   VARIANCE     .148   SAMPLE SIZE  13.
PARAMETER 24.   MEAN     .138   MAX     .5100   MIN     .0600   VARIANCE     .018   SAMPLE SIZE  14.
PARAMETER 25.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE   0.
PARAMETER  2.   MEAN   10.100   MAX   10.1000   MIN   10.1000   VARIANCE     .000   SAMPLE SIZE   1.
PARAMETER  3.   MEAN   20.100   MAX   35.0000   MIN    5.2000   VARIANCE  444.020   SAMPLE SIZE   2.
PARAMETER 29.   MEAN  213.357   MAX  265.0000   MIN  162.0000   VARIANCE  914.247   SAMPLE SIZE  14.
PARAMETER 30.   MEAN   34.214   MAX  146.0000   MIN    9.0000   VARIANCE 1401.874   SAMPLE SIZE  14.
PARAMETER 31.   MEAN  100.714   MAX  121.0000   MIN   73.0000   VARIANCE  184.989   SAMPLE SIZE  14.
PARAMETER 18.   MEAN    8.000   MAX    8.2000   MIN    7.8000   VARIANCE     .080   SAMPLE SIZE   2.
PARAMETER 37.   MEAN  158.903   MAX  184.8340   MIN  124.3020   VARIANCE  636.263   SAMPLE SIZE   4.
PARAMETER 36.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE   0.
PARAMETER 38.   MEAN   38.500   MAX   46.0000   MIN   30.0000   VARIANCE   45.667   SAMPLE SIZE   4.
PARAMETER 39.   MEAN   13.714   MAX   17.0000   MIN   11.0000   VARIANCE    6.571   SAMPLE SIZE   7.
PARAMETER 41.   MEAN    3.367   MAX    5.3000   MIN    2.1000   VARIANCE    1.223   SAMPLE SIZE   6.
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Table 52. Site 700A FALL

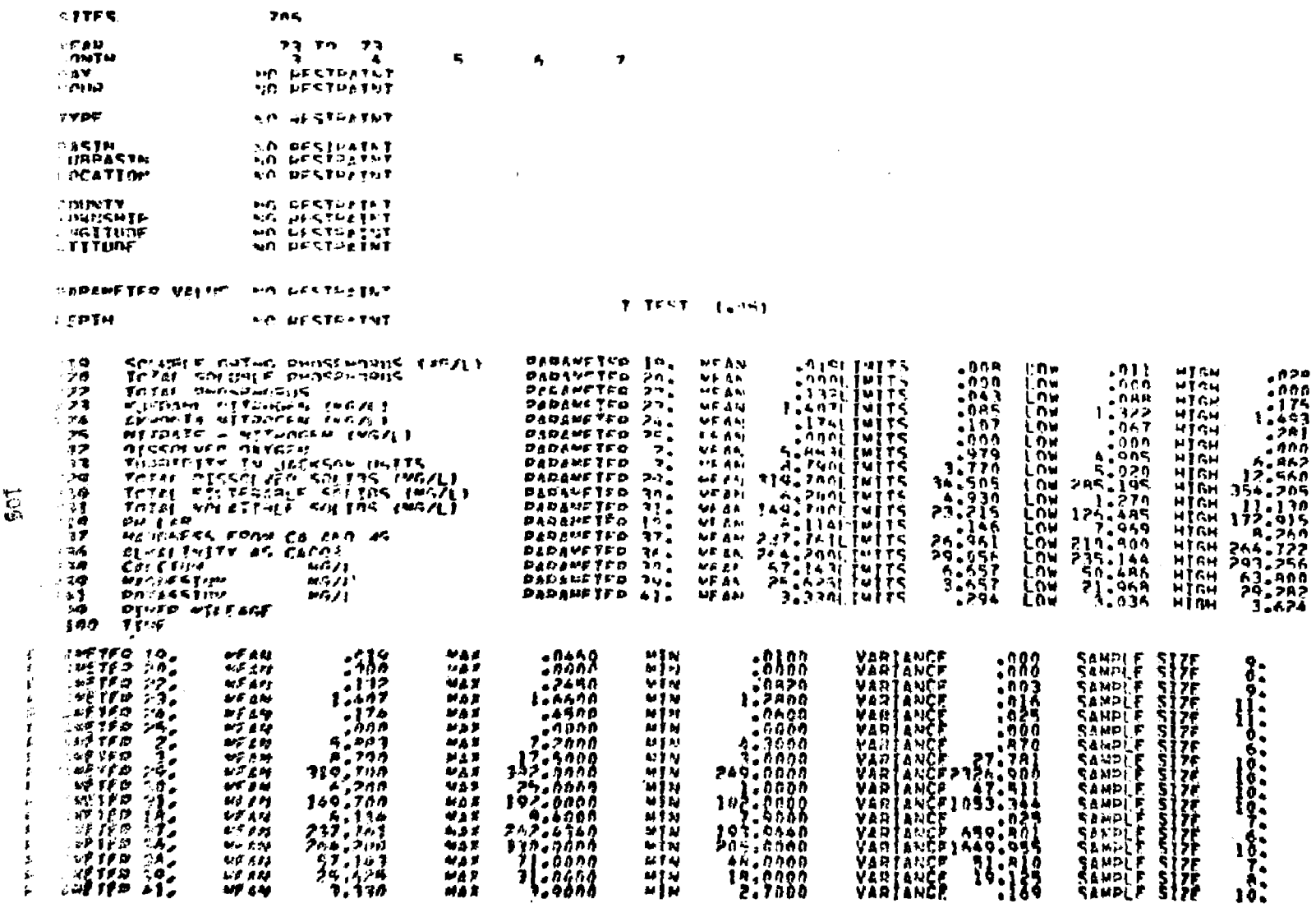

Table 53. Site 705 SUMMER

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SITES                710

YEAR                  70 TO  73
MONTH                  8      9      10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT
DEPTH              NO RESTRAINT
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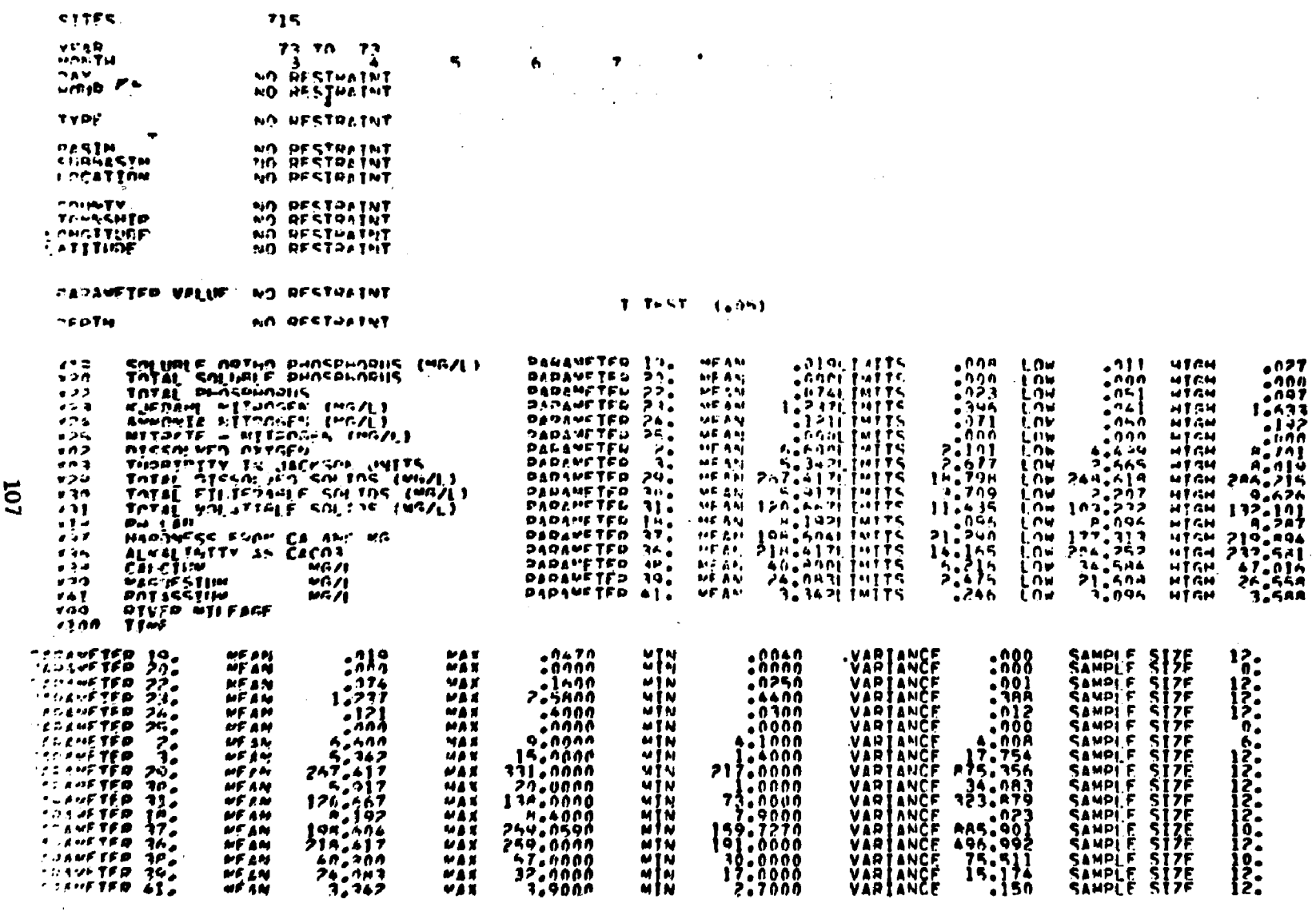
T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.015	LIMITS	.008	LOW	.007	HIGH	.023
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.116	LIMITS	.032	LOW	.084	HIGH	.147
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.311	LIMITS	.184	LOW	1.127	HIGH	1.495
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.240	LIMITS	.167	LOW	.073	HIGH	.408
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	278.846	LIMITS	24.294	LOW	254.552	HIGH	303.140
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	7.692	LIMITS	2.880	LOW	4.812	HIGH	10.572
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	130.538	LIMITS	13.229	LOW	117.309	HIGH	143.767
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	228.832	LIMITS	25.711	LOW	203.120	HIGH	254.543
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	55.143	LIMITS	6.991	LOW	48.151	HIGH	62.134
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	21.615	LIMITS	1.246	LOW	20.369	HIGH	22.862
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	3.369	LIMITS	.233	LOW	3.136	HIGH	3.602
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.015	MAX	.0460	MIN	.0020	VARIANCE	.000	SAMPLE SIZE	14.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.116	MAX	.1950	MIN	.0130	VARIANCE	.003	SAMPLE SIZE	13.
PARAMETER 23.	MEAN	1.311	MAX	1.9200	MIN	.9200	VARIANCE	.093	SAMPLE SIZE	13.
PARAMETER 24.	MEAN	.240	MAX	.9700	MIN	.0400	VARIANCE	.077	SAMPLE SIZE	13.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	278.846	MAX	390.0000	MIN	226.0000	VARIANCE	1617.474	SAMPLE SIZE	13.
PARAMETER 30.	MEAN	7.692	MAX	19.0000	MIN	3.0000	VARIANCE	22.731	SAMPLE SIZE	13.
PARAMETER 31.	MEAN	130.538	MAX	179.0000	MIN	110.0000	VARIANCE	479.603	SAMPLE SIZE	13.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	228.832	MAX	285.9220	MIN	203.7950	VARIANCE	772.826	SAMPLE SIZE	7.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 38.	MEAN	55.143	MAX	70.0000	MIN	47.0000	VARIANCE	57.143	SAMPLE SIZE	7.
PARAMETER 39.	MEAN	21.615	MAX	27.0000	MIN	18.0000	VARIANCE	4.256	SAMPLE SIZE	13.
PARAMETER 41.	MEAN	3.369	MAX	4.4000	MIN	2.9000	VARIANCE	.149	SAMPLE SIZE	13.

Table 54. Site 710 FALL



SITES 715

YEAR 73 TO 73
MONTH 3 4 5 6 7 8
DAY NO RESTRAINT
WMID FR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

610	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 10.	MEAN	.010	UNITS	.008	LOW	.011	HIGH	.027
620	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.0001	UNITS	.000	LOW	.000	HIGH	.000
622	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.0741	UNITS	.023	LOW	.051	HIGH	.097
630	KJELDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.2371	UNITS	.346	LOW	.941	HIGH	1.633
636	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.1211	UNITS	.071	LOW	.040	HIGH	.192
638	NITRATE - NITRITE (MG/L)	PARAMETER 25.	MEAN	.0001	UNITS	.000	LOW	.000	HIGH	.000
900	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	6.6001	UNITS	2.101	LOW	6.436	HIGH	8.761
903	PERCENTILE IN JACKSON UNITS	PARAMETER 3.	MEAN	5.3421	UNITS	2.677	LOW	3.665	HIGH	8.019
920	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 20.	MEAN	247.417	UNITS	14.798	LOW	244.619	HIGH	284.215
930	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	5.917	UNITS	3.709	LOW	2.207	HIGH	9.626
931	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	126.667	UNITS	11.435	LOW	103.232	HIGH	132.101
010	PH (SU)	PARAMETER 1H.	MEAN	8.192	UNITS	.094	LOW	8.096	HIGH	8.287
927	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	104.406	UNITS	21.240	LOW	177.313	HIGH	219.894
934	ALKALINITY AS CACO3	PARAMETER 34.	MEAN	218.417	UNITS	14.165	LOW	204.252	HIGH	232.581
940	CHLORIDE MG/L	PARAMETER 4P.	MEAN	40.000	UNITS	6.215	LOW	34.584	HIGH	47.016
950	SULFATE MG/L	PARAMETER 39.	MEAN	24.083	UNITS	2.675	LOW	21.604	HIGH	26.562
941	FLUORIDE MG/L	PARAMETER 41.	MEAN	3.342	UNITS	.246	LOW	3.096	HIGH	3.588
900	DIVED WITHDRAW									
4100	TIME									

PARAMETER 10.	MEAN	.010	MAX	.0470	MIN	.0040	VARIANCE	.000	SAMPLE SIZE 12.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN	.074	MAX	.1600	MIN	.0250	VARIANCE	.001	SAMPLE SIZE 12.
PARAMETER 23.	MEAN	1.237	MAX	2.5800	MIN	.4400	VARIANCE	.388	SAMPLE SIZE 12.
PARAMETER 24.	MEAN	.121	MAX	.4000	MIN	.0300	VARIANCE	.012	SAMPLE SIZE 12.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE 0.
PARAMETER 2.	MEAN	6.400	MAX	9.0000	MIN	4.1000	VARIANCE	4.008	SAMPLE SIZE 6.
PARAMETER 3.	MEAN	5.342	MAX	15.0000	MIN	1.4000	VARIANCE	17.754	SAMPLE SIZE 12.
PARAMETER 20.	MEAN	247.417	MAX	331.0000	MIN	217.0000	VARIANCE	875.356	SAMPLE SIZE 12.
PARAMETER 30.	MEAN	5.917	MAX	20.0000	MIN	1.0000	VARIANCE	34.083	SAMPLE SIZE 12.
PARAMETER 31.	MEAN	126.667	MAX	134.0000	MIN	73.0000	VARIANCE	323.879	SAMPLE SIZE 12.
PARAMETER 1H.	MEAN	8.192	MAX	8.4000	MIN	7.9000	VARIANCE	.023	SAMPLE SIZE 12.
PARAMETER 37.	MEAN	104.406	MAX	244.0590	MIN	159.7270	VARIANCE	885.901	SAMPLE SIZE 10.
PARAMETER 34.	MEAN	218.417	MAX	259.0000	MIN	191.0000	VARIANCE	496.992	SAMPLE SIZE 12.
PARAMETER 4P.	MEAN	40.000	MAX	57.0000	MIN	30.0000	VARIANCE	75.511	SAMPLE SIZE 10.
PARAMETER 39.	MEAN	24.083	MAX	32.0000	MIN	17.0000	VARIANCE	15.174	SAMPLE SIZE 12.
PARAMETER 41.	MEAN	3.342	MAX	3.9000	MIN	2.7000	VARIANCE	.150	SAMPLE SIZE 12.

Table 55. Site 715 SUMMER

SITES 801

YEAR 70 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.032	LIMITS	.009	LOW	.023	HIGH	.041
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.103	LIMITS	.022	LOW	.081	HIGH	.125
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.662	LIMITS	.226	LOW	1.436	HIGH	1.887
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.554	LIMITS	.181	LOW	.373	HIGH	.736
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.142	LIMITS	.071	LOW	.071	HIGH	.213
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	8.332	LIMITS	1.321	LOW	7.011	HIGH	9.652
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	5.257	LIMITS	2.619	LOW	2.639	HIGH	7.876
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	311.000	LIMITS	27.828	LOW	283.172	HIGH	338.828
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	7.633	LIMITS	4.674	LOW	2.959	HIGH	12.307
X31	TOTAL VOLATILE SOLIDS (MG/L)	PARAMETER 31.	MEAN	139.947	LIMITS	14.059	LOW	125.889	HIGH	154.004
X18	PH LAB	PARAMETER 18.	MEAN	7.690	LIMITS	.079	LOW	7.611	HIGH	7.769
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	211.395	LIMITS	24.894	LOW	186.500	HIGH	236.289
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	193.200	LIMITS	22.311	LOW	170.889	HIGH	215.511
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	52.852	LIMITS	6.266	LOW	46.586	HIGH	59.117
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	19.367	LIMITS	2.366	LOW	17.000	HIGH	21.733
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	1.353	LIMITS	.406	LOW	.947	HIGH	1.760
X98	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.032	MAX	.1140	MIN	.0050	VARIANCE	.001	SAMPLE SIZE	30.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	8.
PARAMETER 22.	MEAN	.103	MAX	.3000	MIN	.0330	VARIANCE	.004	SAMPLE SIZE	30.
PARAMETER 23.	MEAN	1.662	MAX	4.2400	MIN	.5200	VARIANCE	.381	SAMPLE SIZE	31.
PARAMETER 24.	MEAN	.554	MAX	1.7500	MIN	.0500	VARIANCE	.245	SAMPLE SIZE	31.
PARAMETER 25.	MEAN	.142	MAX	.4700	MIN	.0310	VARIANCE	.018	SAMPLE SIZE	16.
PARAMETER 2.	MEAN	8.332	MAX	16.0000	MIN	4.7000	VARIANCE	7.508	SAMPLE SIZE	19.
PARAMETER 3.	MEAN	5.257	MAX	25.0000	MIN	.3000	VARIANCE	45.694	SAMPLE SIZE	20.
PARAMETER 29.	MEAN	311.000	MAX	435.0000	MIN	189.0000	VARIANCE	5555.241	SAMPLE SIZE	30.
PARAMETER 30.	MEAN	7.633	MAX	68.0000	MIN	1.0000	VARIANCE	156.723	SAMPLE SIZE	30.
PARAMETER 31.	MEAN	139.947	MAX	193.0000	MIN	103.0000	VARIANCE	850.719	SAMPLE SIZE	19.
PARAMETER 18.	MEAN	7.690	MAX	8.2000	MIN	7.2000	VARIANCE	.044	SAMPLE SIZE	30.
PARAMETER 37.	MEAN	211.395	MAX	368.9270	MIN	112.6950	VARIANCE	3958.329	SAMPLE SIZE	27.
PARAMETER 36.	MEAN	193.200	MAX	319.0000	MIN	87.0000	VARIANCE	3570.993	SAMPLE SIZE	30.
PARAMETER 38.	MEAN	52.852	MAX	95.0000	MIN	27.0000	VARIANCE	250.746	SAMPLE SIZE	27.
PARAMETER 39.	MEAN	19.367	MAX	37.0000	MIN	11.0000	VARIANCE	40.171	SAMPLE SIZE	30.
PARAMETER 41.	MEAN	1.353	MAX	3.8000	MIN	.2000	VARIANCE	1.184	SAMPLE SIZE	30.

Table 56. Site 801 SUMMER

SITES 801

YEAR 70 TO 73
MONTH 8 4 10
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.059	LIMITS	.064	LOW	-.005	HIGH	.123
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.110	LIMITS	.103	LOW	.007	HIGH	.213
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.072	LIMITS	.455	LOW	1.617	HIGH	2.527
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.741	LIMITS	.400	LOW	.341	HIGH	1.141
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.125	LIMITS	.040	LOW	.085	HIGH	.165
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	5.067	LIMITS	3.569	LOW	1.498	HIGH	8.635
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	1.814	LIMITS	1.101	LOW	.713	HIGH	2.916
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	346.000	LIMITS	43.322	LOW	302.678	HIGH	389.322
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	17.000	LIMITS	17.291	LOW	-.291	HIGH	34.291
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	169.286	LIMITS	24.585	LOW	144.701	HIGH	193.870
X18	PH LAB	PARAMETER 18.	MEAN	7.650	LIMITS	.245	LOW	7.405	HIGH	7.895
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	216.449	LIMITS	39.761	LOW	176.688	HIGH	256.211
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	214.400	LIMITS	49.795	LOW	164.605	HIGH	264.195
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	53.167	LIMITS	9.256	LOW	43.911	HIGH	62.423
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	20.625	LIMITS	3.489	LOW	17.136	HIGH	24.114
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	1.762	LIMITS	1.258	LOW	.505	HIGH	3.020
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN .059	MAX .3000	MIN .0020	VARIANCE .008	SAMPLE SIZE 10.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .110	MAX .4500	MIN .0100	VARIANCE .018	SAMPLE SIZE 9.
PARAMETER 23.	MEAN 2.072	MAX 3.2600	MIN 1.1600	VARIANCE .350	SAMPLE SIZE 9.
PARAMETER 24.	MEAN .741	MAX 1.5400	MIN .0700	VARIANCE .312	SAMPLE SIZE 10.
PARAMETER 25.	MEAN .125	MAX .1600	MIN .0900	VARIANCE .001	SAMPLE SIZE 5.
PARAMETER 2.	MEAN 5.067	MAX 6.7000	MIN 4.0000	VARIANCE 2.063	SAMPLE SIZE 3.
PARAMETER 3.	MEAN 1.814	MAX 3.4000	MIN .6000	VARIANCE 1.418	SAMPLE SIZE 7.
PARAMETER 29.	MEAN 346.000	MAX 412.0000	MIN 266.0000	VARIANCE 3176.500	SAMPLE SIZE 9.
PARAMETER 30.	MEAN 17.000	MAX 70.0000	MIN 1.0000	VARIANCE 506.000	SAMPLE SIZE 9.
PARAMETER 31.	MEAN 169.286	MAX 204.0000	MIN 138.0000	VARIANCE 706.571	SAMPLE SIZE 7.
PARAMETER 18.	MEAN 7.650	MAX 8.0000	MIN 7.0000	VARIANCE .086	SAMPLE SIZE 8.
PARAMETER 37.	MEAN 216.449	MAX 257.8510	MIN 164.1170	VARIANCE 1435.064	SAMPLE SIZE 6.
PARAMETER 36.	MEAN 214.400	MAX 259.0000	MIN 159.0000	VARIANCE 1608.800	SAMPLE SIZE 5.
PARAMETER 38.	MEAN 53.167	MAX 67.0000	MIN 41.0000	VARIANCE 77.767	SAMPLE SIZE 6.
PARAMETER 39.	MEAN 20.625	MAX 25.0000	MIN 14.0000	VARIANCE 17.411	SAMPLE SIZE 8.
PARAMETER 41.	MEAN 1.762	MAX 4.7000	MIN .1000	VARIANCE 2.263	SAMPLE SIZE 8.

Table 57. Site 801 FALL

SITES 805

YEAR 70 TO 73
MONTH 4 5 6 7 8
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT

DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.134	LIMITS	.124	LOW	.014	HIGH .243
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH .000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.153	LIMITS	.057	LOW	.094	HIGH .211
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	2.188	LIMITS	.177	LOW	2.011	HIGH 2.365
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.595	LIMITS	.167	LOW	.428	HIGH .762
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.110	LIMITS	.019	LOW	.091	HIGH .129
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	6.933	LIMITS	1.196	LOW	5.737	HIGH 8.129
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	3.321	LIMITS	1.143	LOW	2.178	HIGH 4.466
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	293.062	LIMITS	18.236	LOW	274.826	HIGH 311.297
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	9.929	LIMITS	3.285	LOW	6.643	HIGH 13.214
X31	TOTAL VOLATIPLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	145.476	LIMITS	12.638	LOW	132.838	HIGH 158.114
X18	PH LAB	PARAMETER 18.	MEAN	7.800	LIMITS	.155	LOW	7.645	HIGH 7.955
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	205.243	LIMITS	21.274	LOW	183.970	HIGH 226.517
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	185.897	LIMITS	17.786	LOW	168.111	HIGH 203.683
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	49.429	LIMITS	5.636	LOW	43.793	HIGH 55.064
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	19.867	LIMITS	1.770	LOW	18.097	HIGH 21.636
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	2.252	LIMITS	.549	LOW	1.703	HIGH 2.801
X99	RIVER MILEAGE								
X100	TIME								

PARAMETER 19.	MEAN .134	MAX 1.9560	MIN .0090	VARIANCE .119	SAMPLE SIZE 32.
PARAMETER 20.	MEAN .000	MAX .0000	MIN .0000	VARIANCE .000	SAMPLE SIZE 0.
PARAMETER 22.	MEAN .153	MAX .4970	MIN .0250	VARIANCE .024	SAMPLE SIZE 30.
PARAMETER 23.	MEAN 2.188	MAX 3.3600	MIN 1.3800	VARIANCE .242	SAMPLE SIZE 32.
PARAMETER 24.	MEAN .595	MAX 1.5000	MIN .0700	VARIANCE .178	SAMPLE SIZE 27.
PARAMETER 25.	MEAN .110	MAX .2100	MIN .0400	VARIANCE .001	SAMPLE SIZE 18.
PARAMETER 2.	MEAN 6.933	MAX 13.7000	MIN 3.4000	VARIANCE 8.020	SAMPLE SIZE 24.
PARAMETER 3.	MEAN 3.321	MAX 15.0000	MIN .3000	VARIANCE 9.033	SAMPLE SIZE 29.
PARAMETER 29.	MEAN 293.062	MAX 373.0000	MIN 181.0000	VARIANCE 2567.415	SAMPLE SIZE 32.
PARAMETER 30.	MEAN 9.929	MAX 40.0000	MIN 2.0000	VARIANCE 71.772	SAMPLE SIZE 28.
PARAMETER 31.	MEAN 145.476	MAX 184.0000	MIN 99.0000	VARIANCE 770.862	SAMPLE SIZE 21.
PARAMETER 18.	MEAN 7.800	MAX 8.7000	MIN 6.6000	VARIANCE .172	SAMPLE SIZE 30.
PARAMETER 37.	MEAN 205.243	MAX 315.1450	MIN 106.9600	VARIANCE 2890.673	SAMPLE SIZE 27.
PARAMETER 36.	MEAN 185.897	MAX 281.0000	MIN 107.0000	VARIANCE 2187.239	SAMPLE SIZE 29.
PARAMETER 38.	MEAN 49.429	MAX 85.0000	MIN 28.0000	VARIANCE 211.217	SAMPLE SIZE 28.
PARAMETER 39.	MEAN 19.867	MAX 27.0000	MIN 9.0000	VARIANCE 22.464	SAMPLE SIZE 30.
PARAMETER 41.	MEAN 2.252	MAX 6.5000	MIN .5000	VARIANCE 2.400	SAMPLE SIZE 29.

Table 58. Site 805 SUMMER

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SITES              810

YEAR               70 TO  73
MONTH               3      4        5       6       7
DAY              NO RESTRAINT
HOUR             NO RESTRAINT

TYPE             NO RESTRAINT

BASIN            NO RESTRAINT
SUBBASIN         NO RESTRAINT
LOCATION         NO RESTRAINT

COUNTY           NO RESTRAINT
TOWNSHIP         NO RESTRAINT
LONGITUDE        NO RESTRAINT
LATITUDE         NO RESTRAINT

PARAMETER VALUE  NO RESTRAINT
DEPTH            NO RESTRAINT                                  T TEST  (.05)

X19   SOLUBLE ORTHO PHOSPHORUS (MG/L)   PARAMETER 19.  MEAN     .128LIMITS     .046  LOW     .081  HIGH     .174
X20   TOTAL SOLUBLE PHOSPHORUS          PARAMETER 20.  MEAN     .000LIMITS     .000  LOW     .000  HIGH     .000
X22   TOTAL PHOSPHORUS                  PARAMETER 22.  MEAN     .184LIMITS     .039  LOW     .145  HIGH     .223
X23   KJEDAHL NITROGEN (MG/L)           PARAMETER 23.  MEAN    1.940LIMITS     .294  LOW    1.646  HIGH    2.235
X24   AMMONIA NITROGEN (MG/L)           PARAMETER 24.  MEAN     .552LIMITS     .166  LOW     .386  HIGH     .718
X25   NITRATE - NITROGEN (MG/L)         PARAMETER 25.  MEAN     .098LIMITS     .026  LOW     .073  HIGH     .124
X02   DISSOLVED OXYGEN                  PARAMETER  2.  MEAN    9.110LIMITS    1.651  LOW    7.459  HIGH   10.761
X03   TURBIDITY IN JACKSON UNITS        PARAMETER  3.  MEAN   10.300LIMITS    4.014  LOW    6.286  HIGH   14.314
X29   TOTAL DISSOLVED SOLIDS (MG/L)     PARAMETER 29.  MEAN  325.118LIMITS   15.205  LOW  309.913  HIGH  340.323
X30   TOTAL FILTERABLE SOLIDS (MG/L)    PARAMETER 30.  MEAN   13.091LIMITS    4.987  LOW    8.104  HIGH   18.078
X31   TOTAL VOLATIBLE SOLIDS (MG/L)     PARAMETER 31.  MEAN  145.000LIMITS   11.736  LOW  133.264  HIGH  156.736
X18   PH LAB                            PARAMETER 18.  MEAN    7.552LIMITS     .070  LOW    7.482  HIGH    7.621
X37   HARDNESS FROM CA AND MG           PARAMETER 37.  MEAN  216.473LIMITS   12.430  LOW  204.042  HIGH  228.903
X36   ALKALINITY AS CACO3               PARAMETER 36.  MEAN  216.030LIMITS   12.839  LOW  203.192  HIGH  228.869
X38   CALCIUM          MG/L             PARAMETER 38.  MEAN   54.344LIMITS    3.772  LOW   50.572  HIGH   58.115
X39   MAGNESIUM        MG/L             PARAMETER 39.  MEAN   19.706LIMITS    1.082  LOW   18.624  HIGH   20.788
X41   POTASSIUM        MG/L             PARAMETER 41.  MEAN    2.038LIMITS     .429  LOW    1.610  HIGH    2.467
X99   RIVER MILEAGE
X100  TIME

PARAMETER 19.   MEAN     .128   MAX     .8200   MIN     .0240   VARIANCE     .018   SAMPLE SIZE  35.
PARAMETER 20.   MEAN     .000   MAX     .0000   MIN     .0000   VARIANCE     .000   SAMPLE SIZE   0.
PARAMETER 22.   MEAN     .184   MAX     .6400   MIN     .0750   VARIANCE     .013   SAMPLE SIZE  35.
PARAMETER 23.   MEAN    1.940   MAX    4.8300   MIN     .6400   VARIANCE     .690   SAMPLE SIZE  33.
PARAMETER 24.   MEAN     .552   MAX    1.6800   MIN     .0650   VARIANCE     .207   SAMPLE SIZE  31.
PARAMETER 25.   MEAN     .098   MAX     .1630   MIN     .0120   VARIANCE     .002   SAMPLE SIZE  14.
PARAMETER  2.   MEAN    9.110   MAX   16.6000   MIN    3.8000   VARIANCE   12.442   SAMPLE SIZE  20.
PARAMETER  3.   MEAN   10.300   MAX   35.0000   MIN     .5000   VARIANCE  120.529   SAMPLE SIZE  31.
PARAMETER 29.   MEAN  325.118   MAX  399.0000   MIN  211.0000   VARIANCE 1896.834   SAMPLE SIZE  34.
PARAMETER 30.   MEAN   13.091   MAX   58.0000   MIN    2.0000   VARIANCE  198.023   SAMPLE SIZE  33.
PARAMETER 31.   MEAN  145.000   MAX  215.0000   MIN  101.0000   VARIANCE  664.700   SAMPLE SIZE  21.
PARAMETER 18.   MEAN    7.552   MAX    7.9000   MIN    7.2000   VARIANCE     .039   SAMPLE SIZE  33.
PARAMETER 37.   MEAN  216.473   MAX  275.3300   MIN  123.2870   VARIANCE 1193.141   SAMPLE SIZE  32.
PARAMETER 36.   MEAN  216.030   MAX  259.0000   MIN  104.0000   VARIANCE 1312.593   SAMPLE SIZE  33.
PARAMETER 38.   MEAN   54.344   MAX   74.0000   MIN   23.0000   VARIANCE  109.846   SAMPLE SIZE  32.
PARAMETER 39.   MEAN   19.706   MAX   24.0000   MIN   11.0000   VARIANCE    9.608   SAMPLE SIZE  34.
PARAMETER 41.   MEAN    2.038   MAX    4.4000   MIN    .2000   VARIANCE    1.507   SAMPLE SIZE  34.
```

Table 59. Site 810 SUMMER

```
SITES                 810

YEAR                   70 TO  73
MONTH                   8      9        10
DAY                 NO RESTRAINT
HOUR                NO RESTRAINT

TYPE                NO RESTRAINT

BASIN               NO RESTRAINT
SUBBASIN            NO RESTRAINT
LOCATION            NO RESTRAINT

COUNTY              NO RESTRAINT
TOWNSHIP            NO RESTRAINT
LONGITUDE           NO RESTRAINT
LATITUDE            NO RESTRAINT

PARAMETER VALUE     NO RESTRAINT                    T TEST  (.05)

DEPTH               NO RESTRAINT

X19    SOLUBLE ORTHO PHOSPHORUS (MG/L)      PARAMETER 19.  MEAN     .069 LIMITS     .029  LOW     .040  HIGH     .098
X20    TOTAL SOLUBLE PHOSPHORUS             PARAMETER 20.  MEAN     .000 LIMITS     .000  LOW     .000  HIGH     .000
X22    TOTAL PHOSPHORUS                     PARAMETER 22.  MEAN     .175 LIMITS     .078  LOW     .097  HIGH     .253
X23    KJEDAHL NITROGEN (MG/L)              PARAMETER 23.  MEAN    2.111 LIMITS     .297  LOW    1.813  HIGH    2.408
X24    AMMONIA NITROGEN (MG/L)              PARAMETER 24.  MEAN     .662 LIMITS     .415  LOW     .247  HIGH    1.077
X25    NITRATE - NITROGEN (MG/L)            PARAMETER 25.  MEAN     .139 LIMITS     .085  LOW     .054  HIGH     .224
X02    DISSOLVED OXYGEN                     PARAMETER  2.  MEAN    6.071 LIMITS    1.560  LOW    4.511  HIGH    7.632
X03    TURBIDITY IN JACKSON UNITS           PARAMETER  3.  MEAN    2.987 LIMITS    2.160  LOW     .828  HIGH    5.147
X29    TOTAL DISSOLVED SOLIDS (MG/L)        PARAMETER 29.  MEAN  286.133 LIMITS   33.425  LOW  252.708  HIGH  319.559
X30    TOTAL FILTERABLE SOLIDS (MG/L)       PARAMETER 30.  MEAN   11.533 LIMITS    5.751  LOW    5.782  HIGH   17.285
X31    TOTAL VOLATILE SOLIDS (MG/L)         PARAMETER 31.  MEAN  149.538 LIMITS   25.011  LOW  124.528  HIGH  174.549
X18    PH LAB                               PARAMETER 18.  MEAN    7.614 LIMITS     .280  LOW    7.335  HIGH    7.894
X37    HARDNESS FROM CA AND MG              PARAMETER 37.  MEAN  198.587 LIMITS   37.439  LOW  161.148  HIGH  236.026
X36    ALKALINITY AS CACO3                  PARAMETER 36.  MEAN  219.000 LIMITS   65.160  LOW  153.840  HIGH  284.160
X38    CALCIUM          MG/L                PARAMETER 38.  MEAN   49.200 LIMITS   10.496  LOW   38.704  HIGH   59.696
X39    MAGNESIUM        MG/L                PARAMETER 39.  MEAN   17.429 LIMITS    2.569  LOW   14.860  HIGH   19.997
X41    POTASSIUM        MG/L                PARAMETER 41.  MEAN    2.236 LIMITS     .687  LOW    1.549  HIGH    2.923
X99    RIVER MILEAGE
X100   TIME

PARAMETER 19.   MEAN      .069   MAX      .2250   MIN      .0100   VARIANCE      .003   SAMPLE SIZE   15.
PARAMETER 20.   MEAN      .000   MAX      .0000   MIN      .0000   VARIANCE      .000   SAMPLE SIZE    0.
PARAMETER 22.   MEAN      .175   MAX      .5100   MIN      .0290   VARIANCE      .020   SAMPLE SIZE   15.
PARAMETER 23.   MEAN     2.111   MAX     3.1000   MIN     1.6500   VARIANCE      .219   SAMPLE SIZE   12.
PARAMETER 24.   MEAN      .662   MAX     1.8600   MIN      .0650   VARIANCE      .472   SAMPLE SIZE   13.
PARAMETER 25.   MEAN      .139   MAX      .2400   MIN      .0810   VARIANCE      .005   SAMPLE SIZE    5.
PARAMETER  2.   MEAN     6.071   MAX     8.1000   MIN     3.7000   VARIANCE     2.846   SAMPLE SIZE    7.
PARAMETER  3.   MEAN     2.987   MAX     7.3000   MIN      .4000   VARIANCE     6.473   SAMPLE SIZE    8.
PARAMETER 29.   MEAN   286.133   MAX   418.0000   MIN   197.0000   VARIANCE  3642.409   SAMPLE SIZE   15.
PARAMETER 30.   MEAN    11.533   MAX    36.0000   MIN     1.0000   VARIANCE   107.838   SAMPLE SIZE   15.
PARAMETER 31.   MEAN   149.538   MAX   237.0000   MIN    92.0000   VARIANCE  1714.269   SAMPLE SIZE   13.
PARAMETER 18.   MEAN     7.614   MAX     8.1000   MIN     7.1000   VARIANCE      .091   SAMPLE SIZE    7.
PARAMETER 37.   MEAN   198.587   MAX   291.0530   MIN   117.6890   VARIANCE  2739.447   SAMPLE SIZE   10.
PARAMETER 36.   MEAN   219.000   MAX   269.0000   MIN   179.0000   VARIANCE  1677.333   SAMPLE SIZE    4.
PARAMETER 38.   MEAN    49.200   MAX    77.0000   MIN    29.0000   VARIANCE   215.289   SAMPLE SIZE   10.
PARAMETER 39.   MEAN    17.429   MAX    24.0000   MIN    11.0000   VARIANCE    19.802   SAMPLE SIZE   14.
PARAMETER 41.   MEAN     2.236   MAX     4.2000   MIN      .5000   VARIANCE     1.416   SAMPLE SIZE   14.
```

Table 60. Site 810 FALL

SITES 900

YEAR 73 TO 73
MONTH 3 4 5 6 7
DAY NO RESTRAINT
HOUR NO RESTRAINT

TYPE NO RESTRAINT

BASIN NO RESTRAINT
SUBBASIN NO RESTRAINT
LOCATION NO RESTRAINT

COUNTY NO RESTRAINT
TOWNSHIP NO RESTRAINT
LONGITUDE NO RESTRAINT
LATITUDE NO RESTRAINT

PARAMETER VALUE NO RESTRAINT
DEPTH NO RESTRAINT

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.046	LIMITS	.025	LOW	.021	HIGH	.071
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.070	LIMITS	.049	LOW	.021	HIGH	.119
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.556	LIMITS	.402	LOW	1.154	HIGH	1.958
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.229	LIMITS	.229	LOW	-.000	HIGH	.458
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	188.400	LIMITS	9.479	LOW	178.921	HIGH	197.879
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	12.800	LIMITS	11.459	LOW	1.341	HIGH	24.259
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	99.600	LIMITS	8.263	LOW	91.337	HIGH	107.863
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	105.204	LIMITS	42.504	LOW	62.700	HIGH	147.708
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	24.000	LIMITS	8.957	LOW	15.043	HIGH	32.957
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	11.200	LIMITS	1.841	LOW	9.359	HIGH	13.041
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	2.560	LIMITS	1.274	LOW	1.286	HIGH	3.834
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.046	MAX	.0720	MIN	.0230	VARIANCE	.000	SAMPLE SIZE	5.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.070	MAX	.1250	MIN	.0340	VARIANCE	.002	SAMPLE SIZE	5.
PARAMETER 23.	MEAN	1.556	MAX	1.9000	MIN	1.1000	VARIANCE	.105	SAMPLE SIZE	5.
PARAMETER 24.	MEAN	.229	MAX	.4600	MIN	.0600	VARIANCE	.034	SAMPLE SIZE	5.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	188.400	MAX	194.0000	MIN	175.0000	VARIANCE	58.300	SAMPLE SIZE	5.
PARAMETER 30.	MEAN	12.800	MAX	28.0000	MIN	4.0000	VARIANCE	85.200	SAMPLE SIZE	5.
PARAMETER 31.	MEAN	99.600	MAX	108.0000	MIN	91.0000	VARIANCE	44.300	SAMPLE SIZE	5.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	105.204	MAX	120.9270	MIN	86.9640	VARIANCE	292.708	SAMPLE SIZE	3.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 38.	MEAN	24.000	MAX	27.0000	MIN	20.0000	VARIANCE	13.000	SAMPLE SIZE	5.
PARAMETER 39.	MEAN	11.200	MAX	13.0000	MIN	9.0000	VARIANCE	2.200	SAMPLE SIZE	5.
PARAMETER 41.	MEAN	2.560	MAX	3.8000	MIN	1.1000	VARIANCE	1.053	SAMPLE SIZE	5.

Table 61. Site 900 SUMMER

```
SITES                 900

YEAR                   70 TO  73
MONTH                   8      9      10
DAY                NO RESTRAINT
HOUR               NO RESTRAINT

TYPE               NO RESTRAINT

BASIN              NO RESTRAINT
SUBBASIN           NO RESTRAINT
LOCATION           NO RESTRAINT

COUNTY             NO RESTRAINT
TOWNSHIP           NO RESTRAINT
LONGITUDE          NO RESTRAINT
LATITUDE           NO RESTRAINT

PARAMETER VALUE    NO RESTRAINT
DEPTH              NO RESTRAINT
```

T TEST (.05)

X19	SOLUBLE ORTHO PHOSPHORUS (MG/L)	PARAMETER 19.	MEAN	.068	LIMITS	.017	LOW	.051	HIGH	.085
X20	TOTAL SOLUBLE PHOSPHORUS	PARAMETER 20.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X22	TOTAL PHOSPHORUS	PARAMETER 22.	MEAN	.097	LIMITS	.039	LOW	.058	HIGH	.136
X23	KJEDAHL NITROGEN (MG/L)	PARAMETER 23.	MEAN	1.627	LIMITS	.169	LOW	1.458	HIGH	1.796
X24	AMMONIA NITROGEN (MG/L)	PARAMETER 24.	MEAN	.148	LIMITS	.069	LOW	.079	HIGH	.217
X25	NITRATE - NITROGEN (MG/L)	PARAMETER 25.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X02	DISSOLVED OXYGEN	PARAMETER 2.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X03	TURBIDITY IN JACKSON UNITS	PARAMETER 3.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X29	TOTAL DISSOLVED SOLIDS (MG/L)	PARAMETER 29.	MEAN	172.947	LIMITS	26.955	LOW	145.992	HIGH	199.902
X30	TOTAL FILTERABLE SOLIDS (MG/L)	PARAMETER 30.	MEAN	6.053	LIMITS	1.249	LOW	4.803	HIGH	7.302
X31	TOTAL VOLATIBLE SOLIDS (MG/L)	PARAMETER 31.	MEAN	101.421	LIMITS	17.183	LOW	84.238	HIGH	118.604
X18	PH LAB	PARAMETER 18.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X37	HARDNESS FROM CA AND MG	PARAMETER 37.	MEAN	98.126	LIMITS	19.745	LOW	78.381	HIGH	117.871
X36	ALKALINITY AS CACO3	PARAMETER 36.	MEAN	.000	LIMITS	.000	LOW	.000	HIGH	.000
X38	CALCIUM MG/L	PARAMETER 38.	MEAN	21.062	LIMITS	4.476	LOW	16.586	HIGH	25.539
X39	MAGNESIUM MG/L	PARAMETER 39.	MEAN	10.476	LIMITS	1.683	LOW	8.794	HIGH	12.159
X41	POTASSIUM MG/L	PARAMETER 41.	MEAN	1.814	LIMITS	.278	LOW	1.537	HIGH	2.092
X99	RIVER MILEAGE									
X100	TIME									

PARAMETER 19.	MEAN	.068	MAX	.1340	MIN	.0080	VARIANCE	.001	SAMPLE SIZE	19.
PARAMETER 20.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 22.	MEAN	.097	MAX	.3000	MIN	.0100	VARIANCE	.007	SAMPLE SIZE	19.
PARAMETER 23.	MEAN	1.627	MAX	2.4400	MIN	1.1600	VARIANCE	.123	SAMPLE SIZE	19.
PARAMETER 24.	MEAN	.148	MAX	.5100	MIN	.0600	VARIANCE	.020	SAMPLE SIZE	19.
PARAMETER 25.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 2.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 3.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 29.	MEAN	172.947	MAX	360.0000	MIN	120.0000	VARIANCE	3127.386	SAMPLE SIZE	19.
PARAMETER 30.	MEAN	6.053	MAX	12.0000	MIN	2.0000	VARIANCE	6.719	SAMPLE SIZE	19.
PARAMETER 31.	MEAN	101.421	MAX	208.0000	MIN	53.0000	VARIANCE	1270.813	SAMPLE SIZE	19.
PARAMETER 18.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 37.	MEAN	98.126	MAX	222.7560	MIN	70.3830	VARIANCE	1373.601	SAMPLE SIZE	16.
PARAMETER 36.	MEAN	.000	MAX	.0000	MIN	.0000	VARIANCE	.000	SAMPLE SIZE	0.
PARAMETER 38.	MEAN	21.062	MAX	48.0000	MIN	15.0000	VARIANCE	70.596	SAMPLE SIZE	16.
PARAMETER 39.	MEAN	10.476	MAX	25.0000	MIN	8.0000	VARIANCE	13.662	SAMPLE SIZE	21.
PARAMETER 41.	MEAN	1.814	MAX	3.0000	MIN	1.0000	VARIANCE	.372	SAMPLE SIZE	21.

Table 62. Site 900 FALL

SECTION VII

APPENDIX B

Table 63. CHANGES IN SOIL PHOSPHORUS FRACTION RESULTING FROM RADICAL SOIL DISTURBANCE[a]. ALL VALUES REPORTED AS ppm/g.

Date[b]	pH	Avail. P	Al-P	Fe-P	Ca-P	Total-P
Site (near 405) - Organic Soil Paddy - First Year Production						
6-22-73	6.2	40	89	7.6	48	1240
7-10-73	6.1	22	109	5.8	70	831
7-11-73	6.2	14	159	2.4	29	643
7-13-73	6.0	27	164	8.2	71	793
7-30-73	6.3	70	200	7.6	58	793
Site 115 - Organic Soil Paddy - Fourth Year of Production						
6-22-73	7.0	54	85	8.1	64	1072
7-10-73	71	71	100	14.	70	1167
7-11-73	6.9	34	158		26	1219
7-13-73	6.6	80	157	8.5	98	1080
7-30-73	6.8	40	157	11.	118	905
Site 125 - Organic Soil Paddy - Fourth Year of Production						
6-22-73	6.8	35	122	11.1	75	1147
7-10-73	6.8	136	137	6.5	175	1181
7-11-73	6.9	16	173	4.9	42	1011
7-13-73	6.5	471	75	.8	67	1144
7-30-73	6.9	88	230	19.1	129	1118
Site 215 - Organic Soil Paddy - First Year of Production						
6-22-73	7.0	33	138	6.9	119	909
7-10-73	6.8	63	103	3.8	83	856
7-11-73	7.0	26	164	3.3	40	806
7-13-73	6.6	34	87	4.7	115	1022
7-30-73	6.9	61	199	30.	87	682

Table 63. (cont.) CHANGES IN SOIL PHOSPHORUS FRACTION RESULTING FROM RADICAL SOIL DISTURBANCE. ALL VALUES REPORTED AS ppm/g.

Date	pH	Avail. P	Al-P	Fe-P	Ca-P	Total-P
Site 705 - Mineral Soil Paddy - First Year Production						
6-22-73	7.2	2.9	13	2.5	22	412
7-10-73	6.9	15.0	44	14.0	80	573
7-11-73	7.1	2.4	48	2.2	13	617
7-13-73	7.0	0.6	85	24.0	98	897
7-30-73	6.9	47.0	249	33.0	100	701
Site 710 - Mineral Soil Paddy - (3-5) Year of Production						
6-22-73	7.1	5.9	4.4	2.4	6.9	374
7-10-73	6.8	60.0	69.0	14.0	85.0	371
7-11-73	6.7	7.6	55.0	7.0	17.0	495
7-13-73	6.9	37.0	65.0	19.0	103.0	487
7-30-73	7.2	.6	34.0	10.0	63.0	503

[a]Soil analyses conducted at field moisture conditions except pH and total soil phosphorus.

[b]At all sites the date 7-10-73 represents 1 minute after, 7-11-73 24 hours after and 7-13-73 72 hours after major soil disturbance.

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

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EPA-660/2-75-026		

4. TITLE AND SUBTITLE
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5. REPORT DATE

6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)
Kenneth R. Lundberg
Patrick T. Trihey

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9. PERFORMING ORGANIZATION NAME AND ADDRESS
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Bemidji State College
Bemidji, Minnesota 56601

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National Environmental Research Center
P. O. Box 1198
Ada, Oklahoma 74820

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16. ABSTRACT

A study was conducted to determine effects on water quality from flooded paddies used for the commercial culture of wild rice, Zizania aquatica. Water samples were taken from flooded impoundments on fertilized peat and mineral soils as well as unfertilized peat soils. Weekly changes in the chemical and physical parameters of water entering, within, and discharged from paddies were measured through the summer. No significant changes were observed in the receiving waters until fall draindown occurred when increases in dissolved solids, total Kjeldahl-nitrogen and total phosphorus occurred in the Clearwater River. Algal assay tests indicated that the increase in nutrients at peak discharge was sufficient to increase algal populations. The quantities of nutrients released from rice paddies were not significantly greater than would be expected in normal runoff in the area and much less than the amounts released from most agricultural endeavors.

Consumptive water use was found to be 20-22 inches per acre (51-56 cm/ha).

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Agricultural wastes Nitrogen Phosphorus Surface waters	Wild rice culture Nutrient control Peat soils	02/04

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