LAKE ASSESSMENT PROJECT REPORT

LAKE BYRON

BEADLE COUNTY, SOUTH DAKOTA

SOUTH DAKOTA LAKE ASSESSMENT PROGRAM

DIVISION OF WATER RESOURCES MANAGEMENT

SOUTH DAKOTA

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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A lakeshore inspection was conducted around the periphery of Lake Byron in 1991 by BCCD to verify the conclusions made by an earlier shoreline erosion survey conducted by SCS, and to note any recent changes in the intensity and pattern of lakeshore erosion. Probable sources of additional lake sediments as well as the high nutrient levels found in Lake Byron were investigated by means of a watershed land-use survey conducted by BCCD in 1991 that located livestock operations, eroding croplands, and other potential sources of nutrients, sediments, and bacteria. The 1985 WQSA study indicated that failing septic tank systems of some lakeshore residences may be significant contributors of nutrients and bacteria to the lake.

Results of the water quality (WQ) monitoring portion of this assessment indicated that the high levels of phosphorus and nitrogen recorded a decade ago remain in Lake Byron and its tributaries at the present time. Limited data from previous WQ studies suggest that incoming suspended solids (TSS) levels from the tributaries may have decreased slightly over the past decade. However, average lake water clarity (secchi disk visibility) appears also to have declined in Lake Byron from approximately 5 feet (1.6 m)in 1979 (Koth, 1981) to 2 feet (0.61 m) recorded during this study.

Low dissolved oxygen levels measured in both tributaries during the present assessment strongly suggested that organic loading to the lake is an ongoing problem. Moreover, calculated nitrogen and phosphorus loads to Lake Byron during 1991 were clearly excessive, and high fecal coliform bacteria numbers continue to be a contamination problem in the tributaries. This study concluded that major sources of nutrients, organic loading, and bacteria to the lake are likely to be watershed livestock operations, possible dumping of animal waste material into tributary drainage channels, and secondarily, overfertilization of crop lands and eroding soil in the watershed croplands and land adjacent to tributary water courses.

The study recommendations for lake restoration include 1.) establishing 4 animal waste management system (AWMS) and 10 livestock feeding areas in the watershed 2.) implementing Best Management Practices (BMPs) on crop lands and pasture land 3.) stabilizing stretches of eroding stream and lake banks 4.) planting grass cover, trees, and grass filterstrips 5.) establishing grazing management systems 6.) constructing sediment basins and 7.) other applicable implementation measures such as selective lake dredging.

EXECUTIVE SUMMARY

Lake Byron is a comparatively large prairie pothole lake located in northeast Beadle County, east central South Dakota. Lake Byron is a meandered lake whose water levels fluctuate widely with the amount of annual rainfall. A year of average rainfall in the watershed is not sufficient to maintain lake water level. As with a number of other natural lakes in eastern South Dakota, normal lake level or acreage for Lake Byron is indefinable (State Lakes Preservation Committee Report, 1977). The maintenance of reasonably stable lake water levels to support recreational uses in the lake has been a continuing problem for lakeside residents. In past years, the lake acreage has commonly varied from 1250 acres at low water mark to slightly more than 1900 acres at full capacity. In the mid 1930's the lake was completely dry for several years. The recent establishment of a pipeline from the James River has helped stabilize lake levels to some extent and served to reduce the magnitude of the fluctuations.

A recent USGS survey established that, at a water surface elevation of 1247.5 feet MSL (May 1992), Lake Byron had a capacity of 10,645 acre-feet and a surface area of 1907 acres. At that time average lake depth was determined to be 5.6 feet with a maximum measured depth of 7.0 feet. Due to the present shallow dishpan shape of the lake basin, small changes in lake level result in relatively large changes in lake surface area.

The contributing watershed of Lake Byron encompasses approximately 116,140 acres located in Beadle, Spink, and Clark Counties. Approximately 80% of the watershed consists of the Foster Creek drainage diverted to the lake in the late 1930's. Approximately 63% of the land in the Lake Byron watershed is presently used as crop land with most of the remainder left to grass land and pasture. The watershed to lake surface area ratio is moderately large - approximately 65:1.

Past studies conducted by the South Dakota Department of Environment and Natural Resources (DENR) from 1979 to 1982 determined Lake Byron was nutrient enriched. Data collected from the three lake tributaries indicated high concentrations of phosphorus and nitrogen were entering Lake Byron throughout that period (Lake Byron WQSA Report, 1985). Sampling often detected excessive fecal coliform levels in Foster Creek and the two minor tributaries. During the last decade a number of swimming beach closures were made necessary due to high in-lake coliform bacteria counts.

In November 1990, DENR began a Lake Assessment Project under a Contract/Letter of Agreement with the Beadle County Conservation District (BCCD). Detailed results of that project are presented in this report.

The lake assessment project consisted of water quality monitoring of Lake Byron, Foster Creek, and one of the lake's two minor tributaries. In addition, a sediment depth survey was conducted by USGS in cooperation with DENR and the BCCD. The results of that investigation showed that 72.6 million cubic yards of sediment had accumulated in the lake basin to an average depth of approximately 25 feet (7.6m) over the life span of the lake. That volume of sediment represents the loss of roughly 3/4 of its water capacity since the lake basin was formed approximately 9,000 years ago.

INTRODUCTION

The purpose of this report is to provide information gathered from a Lake Assessment Project of Lake Byron and its watershed. The study was conducted from April of 1991 to late summer in 1992. The parties responsible for the completion of the study were the South Dakota Department of Environment and Natural Resources and the Beadle County Soil Conservation District. The study was initiated at local request to assess the current status of the lake and the watershed, to collect water and sediment samples and analyze the water quality of Lake Byron and of two tributary streams, to identify pollution sources to the lake and the watershed and develop specific restoration alternatives.

STUDY SITE DESCRIPTION

Lake Byron

Lake Byron is a large prairie pothole lake with a planimetered area of 1749 acres (1970) located in northeast Beadle County, central eastern South Dakota (Figure 1). Specifically Lake Byron is located; Township 133N, Range 61W, Sections 22, 23, 25, 26, 27, 34, 35, Longitude 44 deg. 33 min. 54 sec. N, Longitude 98 deg. 08 min. 24 sec. W (Stewart, 1992).

In 1992 Lake Byron had a maximum depth of 7 feet, an average depth of 5.6 feet and a water volume of 10,645 acre-feet, (USGS, 1992). The shoreline is approximately 12.4 miles in length. The basic shape of Lake Byron's basin is spherical with a large bay and marshy area protruding eastwardly from the lake.

Watershed

Lake Byron has a large watershed in excess of 116,000 acres located within three different counties (Figure 2). The counties are Beadle, Spink, and Clark. The physiographic location of the watershed lies in the James River Basin lowland between the Lakota Plain and the Coteau des Prairie in the Central Lowlands Province (USGS, 1990). The major tributary into Lake Byron is Foster Creek which has a 89,260 acre drainage. The other 26,090 acre basin drains directly into Lake Byron. The receiving water of Lake Byron's unnamed outlet is the James River about 2 miles downstream. Lake Byron's watershed to lake ratio is approximately 65:1 (Stewart, 1992).

The climate of the Lake Byron watershed varies greatly. The watershed receives total annual precipitation of 19 inches, 14 inches of the total fall between the months of April and September. The area receives an average of 40.2 inches of snow a year. The average mid-afternoon humidity is about 60 percent. The average humidity at dawn is approximately 80 percent. The daily maximum temperature is highest in July and averages 87°F, the yearly daily maximum average is 56.6°F. The yearly daily minimum is lowest in January at 1°F, and the yearly minimum average is 32.7°F. The average temperature throughout the year is 44.7°F (SCS, 1979). The annual lake evaporation is approximately 40 inches.

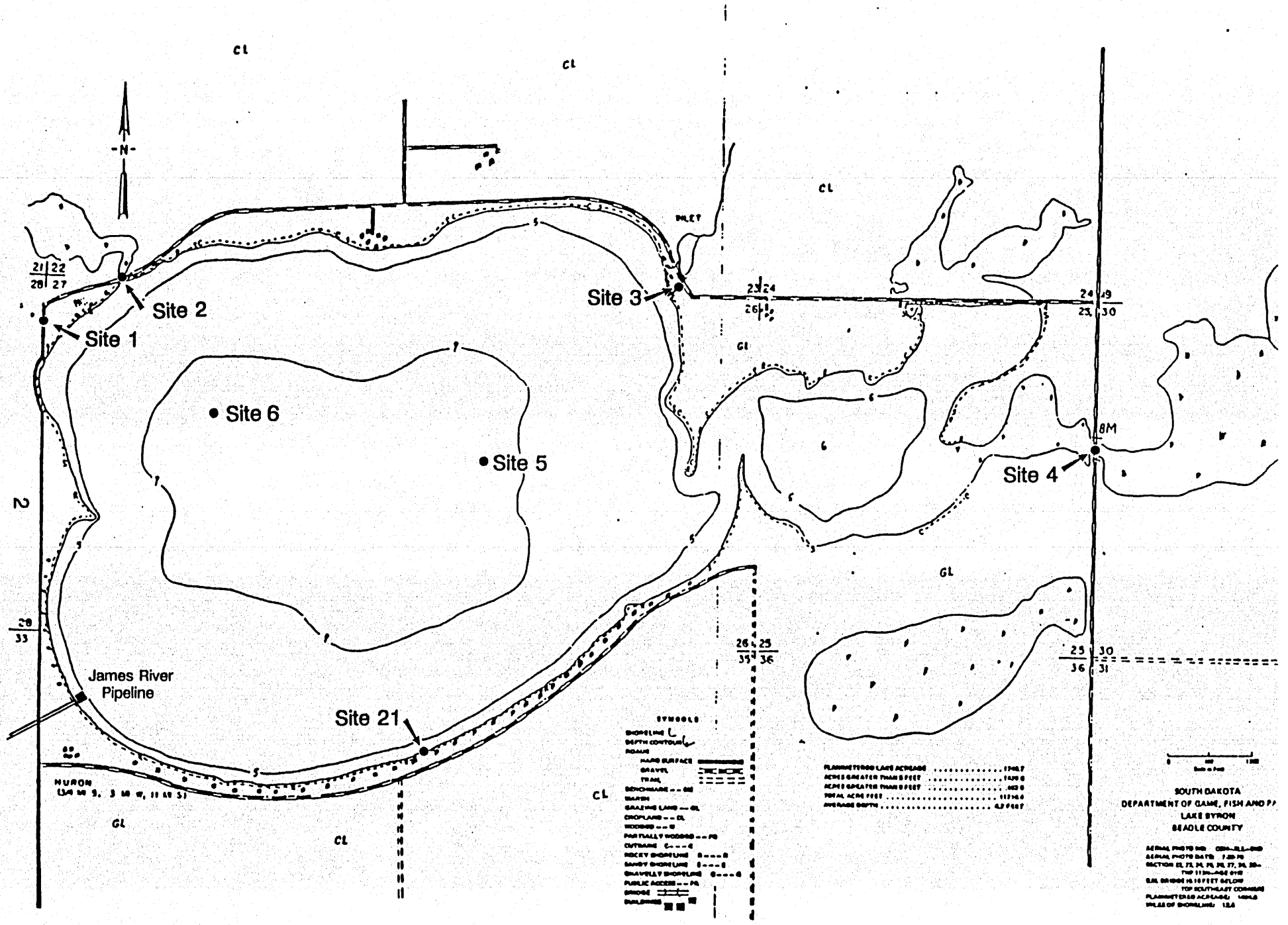
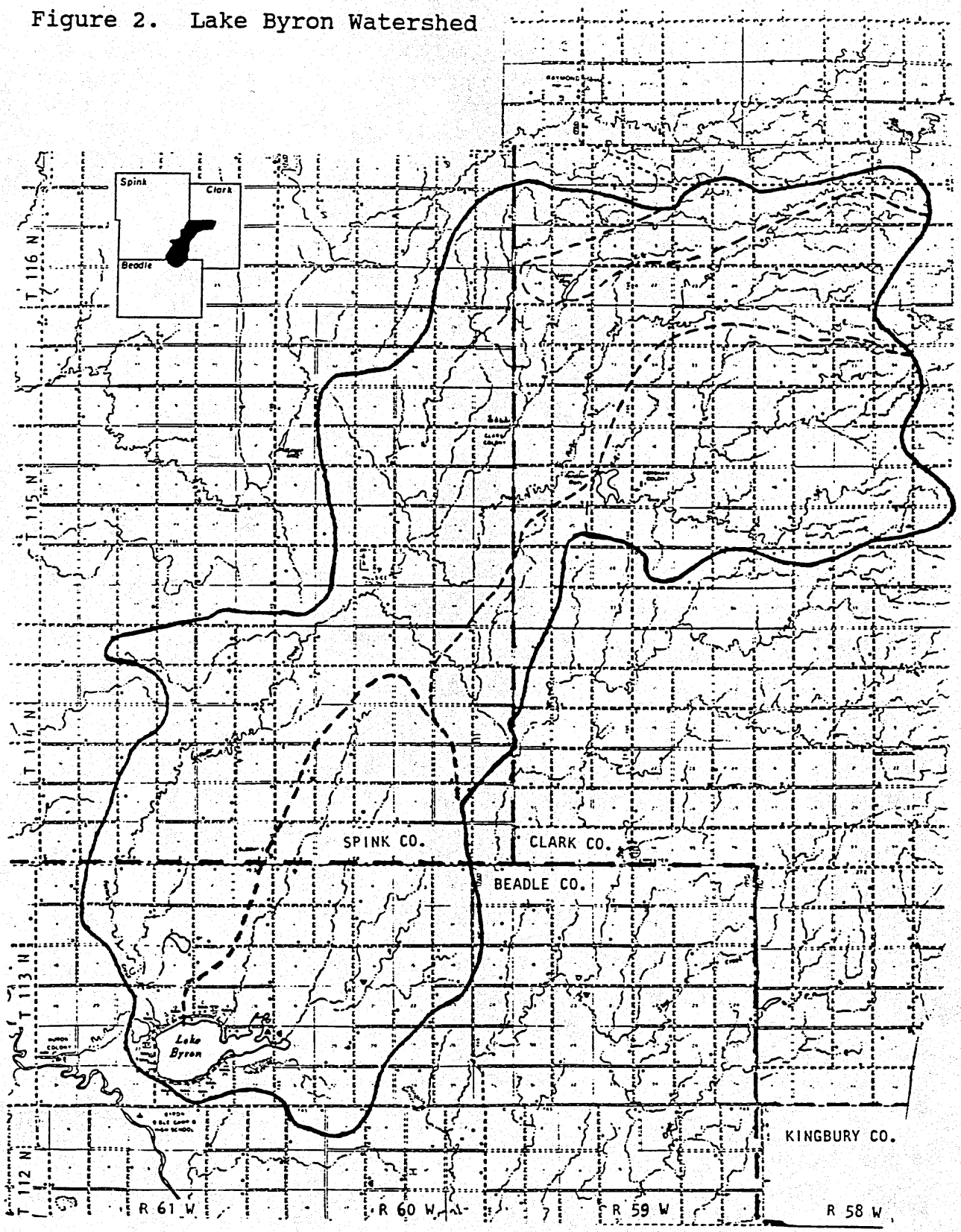


Figure 1. Lake Byron Assessment Sampling Sites

Figure 2. Lake Byron Watershed



WATERSHED (GEOLOGY AND HYDROLOGY SUMMARY)

The contributing watershed of Lake Byron consists primarily of the Foster Creek drainage that was diverted to the lake in the late 1930's to provide supplemental water and stabilize lake water levels. The present watershed encompasses approximately 116,140 acres in northeastern South Dakota. It extends north-by-northeast from the northeast corner of Beadle County, across the southeast corner of Spink, and into the southeast edge of Clark County (Figure 2). Approximately three-fourths of the watershed (in Beadle and Spink Counties.) lies in the James River Basin, a gently undulating plain at elevations of 1240 to 1500 feet. Most of the Foster Creek drainage occupies the lower watershed elevations from 1247 to 1310 feet. The area is drained to the south by the James River. Drainage is generally poorly developed in the basin. Much of the precipitation falling on this area collects in glacier-formed depressions until it evaporates or sinks into the ground. Nearly all streams in this region are ephemeral.

The northern quarter of the watershed in Clark County extends to or slightly past the western boundary of the Prairie Coteau physical division, a steeper region of plateau-like highlands irregularly covered by glacial drift at elevations from 1,600 to 2000 feet above sea level. Along the border of the Prairie Coteau and the James Basin stream gradients may range from 20 feet per mile to as much as 100 feet/mile. Most of the streams tend to be short in length and ephemeral. Estimates of local stream discharges range from 0.3 to 3.0 cfs depending on the size of individual drainage areas.

Two surficial glacial aquifers, Tulare and Altamont, and two bedrock aquifers, Niobrara Marl and Dakota, are found in the Lake Byron watershed. Depth of local groundwater formations ranges from 20 to 400 feet for glacial aquifers and about 80 to 950 feet for bedrock aquifers. Due to this greater than normal depth, interchange between the aquifers and surface waters appears negligible, as evidenced by the ephemeral nature of watershed streams.

The lakes and streams within the James River Basin are typically hard, mineralized waters of high alkalinity ($\geq$200 mg/l) and dissolved solids content. Sulfate, magnesium, sodium, and chloride represent the most abundant dissolved minerals in local waterbodies. Conductivity may sometimes exceed 3000 umhos in a few waters of this region.

Perhaps characteristic of surface waters in this area is high sulfate content which may approach 2000 mg/l in a few instances and elevated chloride levels (max: 500 mg/l). High chloride concentrations (>100 mg/l) in lakes and streams sometimes constitutes evidence of contamination from human and/or animal wastes as this element is excreted by man and animals in unaltered form (Appendix A).

Lake Byron has a history of high in-lake phosphorus and nitrogen concentrations dating back at least 30 years. Much of this nutrient enrichment was probably derived from the lake watershed which is largely overlain with erodible glacial loams with high organic and nutrient content; and the effects of various agricultural activities on these soils. The predominant soil in the Foster Creek drainage is Great Bend Silt Loam. Currently (c. 1991), 63% of watershed acreage is used for crop production with only 28% left to

grassland. These conditions reemphasize the importance of preventing soil erosion in this drainage to reduce the large nutrient loads presently impacting Lake Byron.

Soils

The general soils map for the Lake Byron drainage basin is not complete. As soon as it is completed the information will be gathered and added to the next Lake Assessment which will be updated yearly.

LAND USES IN THE WATERSHED

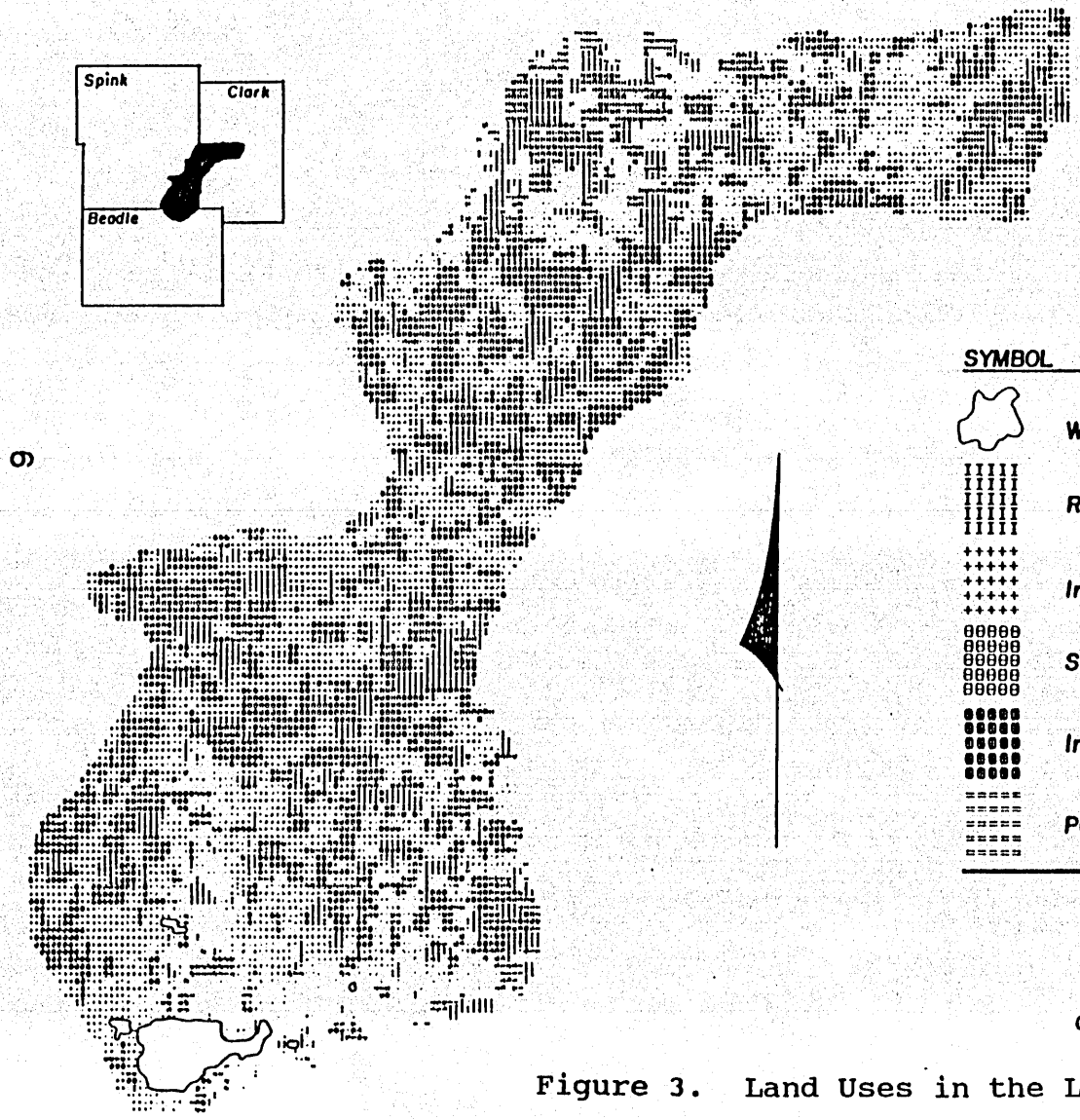
A land use survey of the watershed conducted in 1980 using remote sensing technology was published in 1981. The study used a Landsat satellite to classify the land use in the watershed. A percentage of the acreages was then field checked to test the accuracy of the system. The confidence level of the satellite modeling was 81.8 %. The satellite had the lowest confidence level determining the difference between non-irrigated small grains and pasture/range. The confidence level of the small grain was 68.5 %.

The acreages and percent confidence levels for the different land uses are shown in Table 1. Figure 3 depicts the locations of these land uses in the watershed.

Table 1 - Lake Byron Land Uses in June of 1980.

CATEGORY	PERCENT	ACRES	% ACCURACY
Watershed	1.7	1,940	100.0
Row Crops	12.0	14,644	70.6
Irrigated Row Crops	0.5	612	100.0
Small Grains	33.5	38,861	68.5
Irrigated Small Grains	0.6	743	100.0
Pasture/ Rangeland	51.7	59,340	94.5
TOTALS	**100.0**	**116,140**	**81.8**

Lake Byron Watershed



June 1980 Land Cover

SYMBOL	CATEGORY	PERCENT	ACRES	% ACCURACY
	Water / Wetland	1.7	1,940	100.0
IIIII	Row Crops	12.0	14,644	70.6
+++++	Irrigated Row Crops	.5	612	100.0
00000	Small Grains	33.5	38,861	68.5
●●●●●	Irrigated Small Grains	.6	743	100.0
=====	Pasture / Rangeland	51.7	59,340	94.5
	TOTALS	100.0%	116,140	81.8

Scale

0 1 2 3 4 5 6 7 8 9 10 11 12

Miles

Figure 3. Land Uses in the Lake Byron Watershed

A more recent general survey was completed in 1991 by the Beadle County Conservation District (BCCD) that utilized on-the-ground inspection of the watershed acreages and interviews with local land operators. A summary of this latest inventory is presented below:

Table 2: Land Use And Ownership In The Lake Byron Watershed

INDIVIDUAL COUNTY LAND STATISTICS	BEADLE COUNTY	CLARK COUNTY	SPINK COUNTY	TOTALS
Acres of Grasslands	9,900	9,320	16,100	35,320
Acres of Cropland	17,020	20,160	41,800	78,980
Acres of Farmstead and Misc.	300	600	9,400	10,300
TOTAL ACRES (of these Total Acres)	27,220	30,080	67,300	124,600
Acres of Wetlands	2,439	4,996	2,500	9,935
Acres of CRP	1,437	3,005	3,160	7,602
Acres of GPCP	0	0	2,160	2,160
Acres of Highly Erodible Soils	1,688	1,121	290	3,099
Acres of State Owned Land	1,160	640	0	1,800
Acres of Federal Owned land	160	0	0	160
Number of Operators	45	75	100	220
Number of Limited Resource Farmers	12	20	2	34

DESCRIPTION OF PUBLIC ACCESS

Lake Byron has two public access areas and approximately 100 acres of lakeshore land owned and managed by the South Dakota Department of Game, Fish and Parks. Game, Fish and Parks manages two day use areas located on the west and north sides of the lake. Public lakeshore facilities include convenient access to shore fishing, two boat ramps, public toilets, picnic grounds, picnic tables, and primitive camping grounds.

POTENTIAL USER POPULATION

The estimated population within a 65 mile radius of Lake Byron is 79,074 and approximately 31,000 people reside within a 30 mile radius of the project area. The lake has a permanent population of 25 residents. There are also approximately 200 other property owners who spend some time during the year at the lake. The closest municipality is Huron, the ninth largest city in South Dakota, about 13 miles southwest of Lake Byron. Huron has a population of 12,448.

HISTORICAL AND BACKGROUND INFORMATION

Lake Byron was originally called "Big Toad Lake" because of the appearance of the trees around the lake from a distance. It was renamed "Byron" by local residents who found the name of an Indian trader, Byron Paye who camped there in 1866, carved in a tree. The lake has had extreme fluctuations in the water level. The lake was dry and farmed from 1933 to 1935. Annual fluctuations can be expected range from plus one to minus three feet.

In 1926, a study by Over and Churchill concluded that diverting water into Lake Byron from the James River could help stabilize lake water levels (Churchill, 1926). In June of 1984 the Lake Byron Watershed District received a water right (Attachment A) to pump no more than 3,400 acre-feet a year into Lake Byron and only if the James River was flowing at 20 cfs (April 1 to June 30 flow must be over 60 cfs) over the Third Street Dam located in Huron.

Wildlife

An extensive wetland forms the east end of Lake Byron. The wetland serves as a home to a variety of species of resident wildlife in the area. The South Dakota Department of Game, Fish and Parks also owns land located on the south end of the lake which is habitat to upland species indigenous to the area.

The lake itself serves as a staging area for a variety of migratory species. Snow geese (*Chen hyperborea*) are probably the most prevalent species in Lake Byron proper, while puddle ducks stage more closely to the marshy wetlands east of the lake.

Fish

Water flowing out of the lake reaches the James River approximately 2 miles downstream. Due to this close connection, any fish possible in the James River may be present in Lake Byron (Table 3). In the 1991 SD GF&P Fisheries Management Plan, it was stated that Lake Byron has the potential to support large quantities of catchable game fish. However, the poor water quality and large rough fish populations are having a detrimental effect on the game fish population. According to the management plan, walleye, northern pike, and yellow perch are managed as primary species; black crappie, largemouth buffalo, white sucker, and freshwater drum are managed as secondary species.

Table 3 - Fish Species Possible in Lake Byron and the Watershed

COMMON NAME	SCIENTIFIC NAME
Short Nose Gar	*Lepisosteus platostomus*
Gizzard Shad	*Dorosoma cepedianum*
Goldeye	*Hiodon alosoides*
Northern Pike	*Esox luscius*
Muskellunge	*Esox masquinongy*
Carp	*Cyprinus carpio*
Silvery Minnow	*Hybognathus nuchalis*
Emerald Shiner	*Notropis atherinoides*
Common Shiner	*Notropis cornutus*
Red Shiner	*Notropis lutrensis*
Sand Shiner	*Notropis stramineus*
Fathead Minnow	*Pimephales promelas*
Creek Chub	*Semotilus atromaculatus*
River Carpsucker	*Carpiodes carpio*
White Sucker	*Catostomus commersoni*
Smallmouth Buffalo	*Ictiobus bubalus*
Bigmouth Buffalo	*Ictiobus cyprinellus*
Black Bullhead	*Ictalurus melas*
Yellow Bullhead	*Ictalurus natalis*
Channel Catfish	*Ictalurus punctatus*
Tadpole Madtom	*Noturus gyrinus*
Brook Stickleback	*Culaea inconstans*
White Bass	*Morone chrysops*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
Iowa Darter	*Etheostoma exile*
Johnny Darter	*Etheostoma nigrum*
Yellow Perch	*Perca flavescens*
Walleye	*Stizostedion vitreum vitreum*
Freshwater Drum	*Aplodinotus grunniens*

Sources: Elsen 1977; Fredrickson/Houtcooper, 1986; Murphey, 1987; Tol, 1976.

Lake Byron has an annual contract for rough fish removal. Removal of rough fish is contingent on size of the population and also the size of the fish. The contractor usually drops tests nets down to see if rough fish removal would be economically feasible. Table 4 shows the poundage of rough fish removed from Lake Byron in past years. Lake Byron is stocked with game fish almost annually. The predominant species stocked are walleye, northern pike, and yellow perch. Stocking records are listed in Table 5.

Table 4. Commercial Rough Fish Removal

Year	Species	Pounds
1974	Carp & Buffalofish	63,000
1975	Carp & Buffalofish	111,000
1976	Carp	260,000
	Buffalofish	30,000
	Sheephead	800

Aquatic Plants

Survey

On July 23, 1991, an aquatic plant survey was completed on Lake Byron by Kay Joy - Beadle County District Conservationist, and Connie Vicuna - Biologist for the Soil Conservation Service. The survey showed aquatic plants present mainly along the shoreline (Figure 4). There were scattered patches of emergent macrophytes around the main lake, but not further than 50 and 100 feet from the shoreline. The primary vegetation observed along the shoreline was prairie cord grass and common reeds (phragmites). Secondary coverage consisted of areas of bulrush, cattails, and willows. The smaller eastern bay was almost exclusively covered by cattails.

Seasonal variation in biomass and dominance depend on many biological factors. Macrophytes can be an important source of nutrient uptake. However, they may also release large amounts of organic matter and inorganic nutrients when conditions are no longer conducive to growth. Evaporation of water is also increased by the presence of emergent macrophytes. An area with macrophytes will experience more water loss by evaporation than the same area of water without macrophytes due to the additional water loss incurred by plant transpiration (Wetzel, 1983).

The estimated shoreline macrophyte coverage in the main lake at the time of the study was 20 to 30 percent. When the bay to the east was included macrophyte coverage was closer to 50 percent coverage. It was also observed that there were extensive areas of rocky shoreline and beach front where human activities have disturbed and removed plant communities.

Table 5 - Lake Byron Stocking Record From 1974 to 1992

YEAR	NUMBER	SIZE	SPECIES
1974	615,000	Fry	Walleye
1975	400,000	Fry	Northern Pike
1977	750,000	Fry	Northern Pike
	8,000	Fingerling	Yellow Perch
1978	825,000	Fry	Northern Pike
	450,000	Fry	Walleye
	485	Adult	Yellow Perch
	100	Adult	Northern Pike
1979	750,000	Fry	Walleye
1980	900,000	Fry	Northern Pike
	850,000	Fry	Walleye
1981	650,000	Fry	Northern Pike
	65,000	Fingerling	Walleye
1982	700,000	Fry	Northern Pike
1983	650,000	Fry	Northern Pike
1984	1,300,000	Fry	Northern Pike
	74,100	Fingerling	Yellow Perch
	510	Adult	Black Crappie
1986	1,300,000	Fry	Walleye
	650,000	Fry	Northern Pike
1987	600,000	Fry	Walleye
1989	650,000	Fry	Walleye
1990	50,400	Large Fingerling	Yellow Perch
1991	650,000	Fry	Northern Pike
1992	1,300,000	Fry	Walleye
	8,886	Fingerling	Yellow Perch

Source: SD GF&P

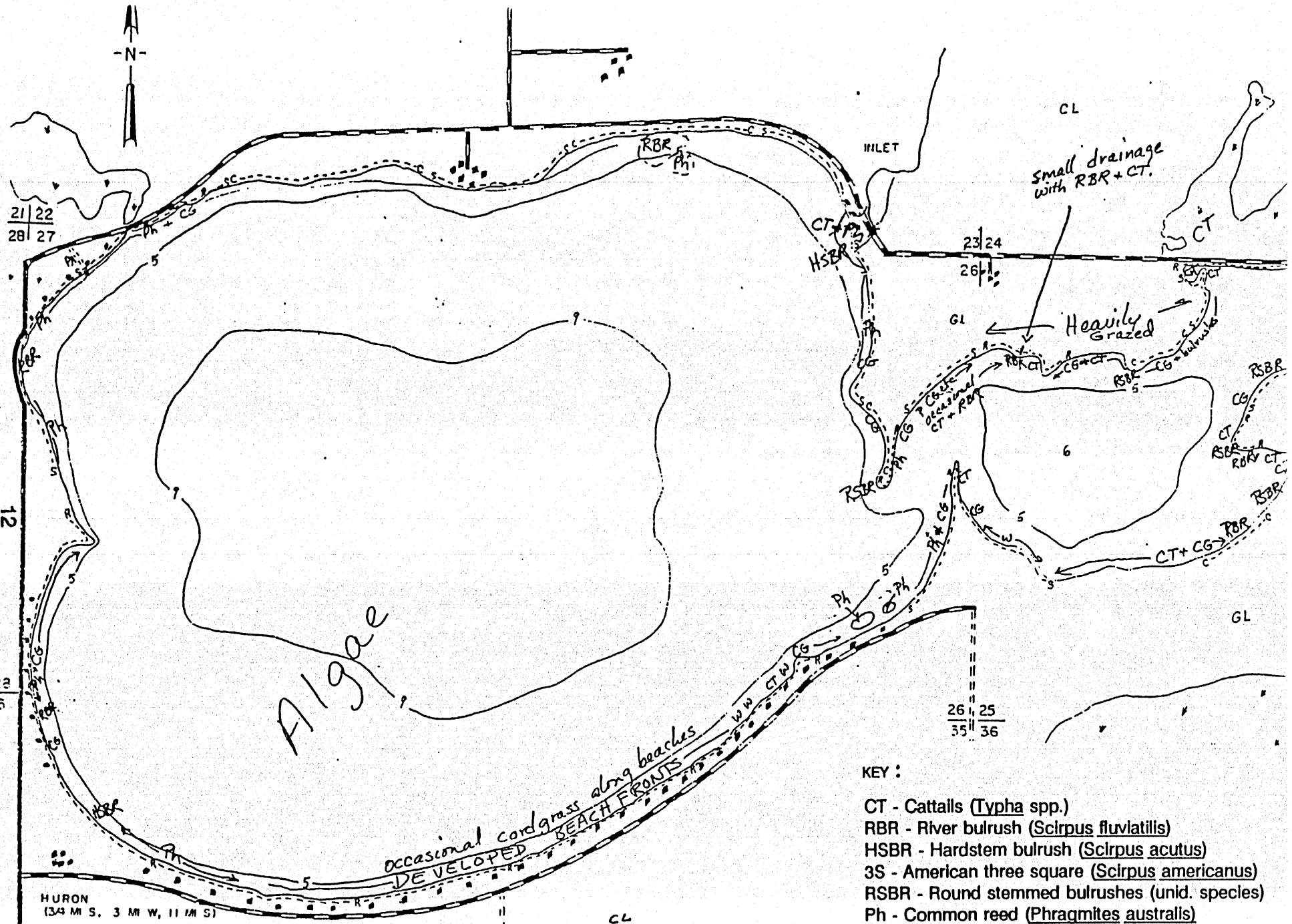


Figure 4. Byron Lake Macrophytes

Algae

In 1989 algal samples were taken for the SD DENR Lakes Assessment. Two samples were taken in the summer of the year, one on June 13 and the other on July 11. These samples were sent to a private contractor for analysis. Table 6 lists the results of the analysis. It appears that a diatom bloom was taking place at the time of the first sample due to the large number of flagellates and diatoms present. During the second sampling the blue-green algae (cyanobacteria) were the dominant form of algae. The most prevalent blue-green alga at that time, *Aphanizomenon flos-aquae*, is found in many South Dakota lakes and is responsible for the floating green mats that sometimes appear on non-windy days. After a large bloom, these same floating mats are usually blown to shore where they can cause odor problems.

WATER QUALITY MONITORING

Water Quality Standards

The surface water quality standards for the State of South Dakota are based on the highest ranking criteria assigned to a body of water. Lake Byron is given the beneficial uses of a warmwater marginal fishery, immersion recreation, limited contact recreation, and wildlife propagation/stock watering. The parameters which have water quality standards are listed in Table 7.

Table 7 - Lake Byron Water Quality Standards

Parameter	Standard
Total Chloride Residual	<0.02 mg/L
Un-ionized Ammonia	<0.05 mg/L
Total Cyanide	<0.02 mg/L
Free Cyanide	<0.005 mg/L
Dissolved Oxygen	<5.0 mg/L
Undissassociated Hydrogen Sulfide	<0.002 mg/L
pH	>6.5 & <8.3 units
Suspended Solids	<150 mg/L
Temperature	<90°F
Polychlorinated Biphenyls	<0.000001 mg/L
Fecal Coliform Organism	<200 colonies/100ml
Total Alkalinity	<750 mg/L
Total Dissolved Solids	<2500 mg/L
Conductivity	<4000 micromhos/cm
Nitrates	<50 mg/L
Sodium, absorption rate	<10:1

SD DENR, Title 74.

Table 6. Lake Byron Algal Species and Densities

	June 13, 1989		July 11, 1989	
Taxa	Number	Units/ml	Number	Units/ml
Chlamydomonas	187	10,067	-	-
Cyclotella meneghiniana	34	1,830	-	-
Algae (other)	31	1,669	3	277
Cryptomonas sp. #1	28	1,507	-	-
Green Algae (other)	6	323	-	-
Marssoniella	3	161	-	-
Characium	3	161	-	-
Blue-green (other)	3	161	1	92
Diatom (centric)	3	161	-	-
Cryptomonas	2	108	-	-
Lyngbya Diguetii	2	108	-	-
Tetrastrum	1	54	-	-
Dactylococcopsis	1	54	-	-
Nephrocytium	1	54	-	-
Cryptomonas ovata	1	54	-	-
Aphanizomenon flos-aquae	-	-	294	27,150
Lyngbya	-	-	6	554
Algae (flagellate)	-	-	1	92
Total	306	16,473	305	28,166

Methods and Materials

Sample Location and Schedule

Water samples were collected at 6 individual sampling sites in Lake Byron and its watershed (Figure 1). Site 1 was the outlet site on the spillway of Lake Byron. Sites 2 and 3 were both inlet sites. Site numbers 4, 5, and 6 were inlake sites. Some special samples were taken during the study: Site 20 was the inlet from the James River; site 21 is the tile field discharge entering the lake on the south side; site 22 is on the south side where the tile mixed with the lake; site 30 was located on Foster Creek on a bridge one mile north of the lake; and site 40 was located on a Highway 28 bridge crossing Foster Creek approximately 4 miles north of Lake Byron. The descriptions of the principal sampling sites are as follows:

Site 1 Latitude 44 Deg., 34 Min., 23 Sec., Longitude 98 Deg., 9 Min., 30 Sec. Outlet, located on the northwest side of Lake Byron the NE 1/4 of the NE1/4 of Section 28, T113N, R61W.

Site 2 Latitude 44 Deg., 34 Min., 31 Sec., Longitude 98 Deg., 9 Min., 19 Sec. Foster Creek, located on the northwest side of the lake on the NW 1/4 of the NE 1/4 of Section 21, T113N, R61W.

Site 3 Latitude 44 Deg., 34 Min., 29 Sec., Longitude 98 Deg., 7 Min., 24 Sec. Unnamed creek which flows into Lake Byron located in the SE 1/4 of the SE 1/4 of Section 23, T113, R61W.

Site 4 Latitude 44 Deg., 34 Min., 5 Sec., Longitude 98 Deg., 5 Min., 55 Sec. Inlake, located on the bridge between Section 25 and 30, T113N, R60W.

Site 5 Latitude 44 Deg., 34 Min., 4 Sec., Longitude 98 Deg., 8 Min., 1 Sec. Inlake, approximately 1/2 mile west of the east bay in Section 26, T113N, W60W.

Site 6 Latitude 44 Deg., 34 Min., 10 Sec., Longitude 98 Deg., 8 Min., 59 Sec. Inlake, approximately 1/4 mile east of the outlet in Section 27, T113N, R61W.

The tributary sites were sampled during runoff events and the lake samples were taken on a monthly basis. The earliest sampling date was November 20, 1990, and the last sample date was August 5, 1992. There were a total of 70 samples taken (Table 8).

Tributary flow stages were measured with a Steven's stage recorder installed at each of the tributary sites. Stage recorders were calibrated for discharge by discrete measurements with a Marsh-McBirney portable flow meter. Daily stream discharges in cubic feet per second (cfs) were obtained by "best-fit" regression lines generated with a computer graphics program that related stage height with stream velocity (ft/sec). Using those generated graphs (Appendix B) the water velocity corresponding to any given stage

height can be found. Daily stream flows were then calculated by multiplying water velocity by a previously determined channel cross-sectional area for each tributary site.

Nutrient and sediment loadings were calculated for each sampling date by multiplying the known nutrient/sediment concentration by the daily water flow (cfs). Daily loads between water quality sampling dates were obtained by averaging nutrient and sediment (TSS) concentrations between consecutive dates. The derived loadings were then summed and divided by the lake area to provide annual nutrient and sediment loads.

Table 8 - Sampling Period and Number of Samples.

Site #	Sample Period	# of Samples
1	06/12/91 to 07/23/91	3
2	04/16/91 to 08/05/92	14
3	04/16/91 to 08/05/92	14
4	11/19/90 to 08/05/92	15
5	01/15/91 to 06/21/92	7
6	11/20/90 to 06/21/92	8
10	05/06/91	1
12	05/06/91	1
20	05/21/91	1
21	06/17/91 to 07/23/91	3
22	07/01/91	1
30	08/05/92	1
40	08/05/92	1
	TOTAL	**70**

Sample Analysis

The field tests and samples were taken by the staff of the Beadle County SCS. The laboratory analyses were conducted by the South Dakota State Health Laboratory in Pierre, South Dakota. Samples were analyzed for the parameters listed in Table 9. The analytical methods used for sampling are located on Table 10.

Table 9 - Water Quality Parameters

Field Parameters

Water Temperature	Air Temperature	Secchi Disk
Field pH	Dissolved Oxygen	Depth
	Visible Observations	

Laboratory Parameters

Fecal Coliform Bacteria	Laboratory pH
Total Alkalinity	Total Solids
Total Suspended Solids	Nitrates-Nitrites
Volatile Solids	Total Phosphorus
Ammonia	Total Dissolved Phosphorus
Total Kjeldahl Nitrogen	

Concentrations Derived By Calculations

Total Dissolved Solids	Non-Volatile Solids
Un-ionized Ammonia	Organic Nitrogen
Total Nitrogen	Nitrogen to Phosphorus Ratio

Carlson's Trophic Status Index
for Secchi Disk and Phosphorus

Table 10 - Methods for Physical and Chemical Parameters.

Parameter	ANALYTICAL Method	Reference
Temperature	Thermometric	APHA (1985)
Secchi Disk	Shaded Side of Boat	Lind (1985)
pH	pH probe	APHA (1985)
Dissolved Oxygen	DO meter	EPA (1990)
Depth	Tape measure	EPA (1990)
Fecal Coliform	Membraned filter	APHA (1985)
Total Alkalinity	Potentiometric titration to pH of 4.5	APHA (1980) EPA (1983)
Total Solids	Evaporation	APHA (1980) EPA (1983)
Total Suspended Solids	Evaporation @ 180°C	APHA (1980) EPA (1983)
Ammonia	Automated phenolate	APHA (1980) EPA (1983)
Nitrate-Nitrite	Automated Cadmium Reduction	APHA (1980) EPA (1983)
Total Kjeldahl Nitrogen	Semi-Automated Block Block Digester AAII	EPA (1983)
Total Phosphorus	Persulfate digestion	EPA (1983)
Total Dissolved Phosphate	Filtered persulfate digestion	EPA (1983)

CONCENTRATIONS DERIVED BY FORMULA

Parameter — **Formula**

Total Dissolved Solids = Total Solids - Suspended Solids

Non-Volatile Solids = Suspended Solids - Volatile Solids

Un-Ionized Ammonia = % (un-ionized/100) * Ammonia concentration

where: $T = {}^{\circ}C + 273.2$

$pk_a = 0.09018 + 2729.92/T$

% un-ionized = $100/1 + \text{antilog}*(pk_a - pH)$

Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia Nitrogen

Total Nitrogen = Total Kjeldahl Nitrogen + Nitrate-Nitrite

Nitrogen to Phosphorus Ratio = Total Nitrogen - Total Phosphorus

Carlson's TSI Values for Secchi Disk = $10 * (6 - (\ln SD / \ln 2))$

Where: ln = Natural Log

SD = Secchi Depth in meters

Carlson's TSI Values for Total Phosphorus =

$= 10 * (6 - ((\ln 48/TP) / \ln 2))$

Where: ln = Natural Log

TP = Total Phosphorus in parts per billion

Sediment Sampling and Survey

Two sediments samples were taken in Lake Byron on June 27, 1990. The samples were submitted to the U.S. Army Corps of Engineers for analysis of metals, pesticides, other toxins, and various nutrient parameters.

The volume estimation of sediment in Lake Byron was conducted by the United States Geological Survey (USGS) in Huron, South Dakota. The raw data for the estimation was acquired from a boat using marine seismic technology. This technology uses two high energy sonic signals which when reflected give both the depth to the top of the sediment and also the depth to the bottom of the sediment. The information is recorded on a strip chart which can be plotted on a lake map. The orientation of the readings taken from the boat was by moving the boat along a constant speed along a known transect. To satisfy the study objectives, 15 north/south transects were established, spaced approximately every 1000 feet across Lake Byron. Two diagonal transects (#16 and #17) were also established (Figure 5). The preliminary results will be discussed later in the report.

RESULTS AND DISCUSSION

In-lake Water Quality

In-lake water quality data is summarized in Table 11 and the complete data set is located in Appendix A. The mean values for the different in-lake sites have been separated because site 4 is located in a littoral area while sites 5 and 6 are located in Lake Byron proper. Discussion of results has been divided into four components; trophic condition, nutrients, fecal coliform bacteria, and fisheries impacts.

Trophic Condition

During the natural aging process of most lakes, nutrient concentrations increase over time. As nutrients increase, so does productivity and the number of living organisms. As living organisms die, the decomposed bodies break down and release nutrients back into the system. The particulate matter which isn't broken down becomes part of the sediments and over years decreases the depth of the lake. Although the process may take thousands of years, the final destiny of many lakes is to cease being an aquatic ecosystem and become a terrestrial ecosystem. This process, although natural, is often accelerated by human activities which result in increased nutrient and sediment loadings.

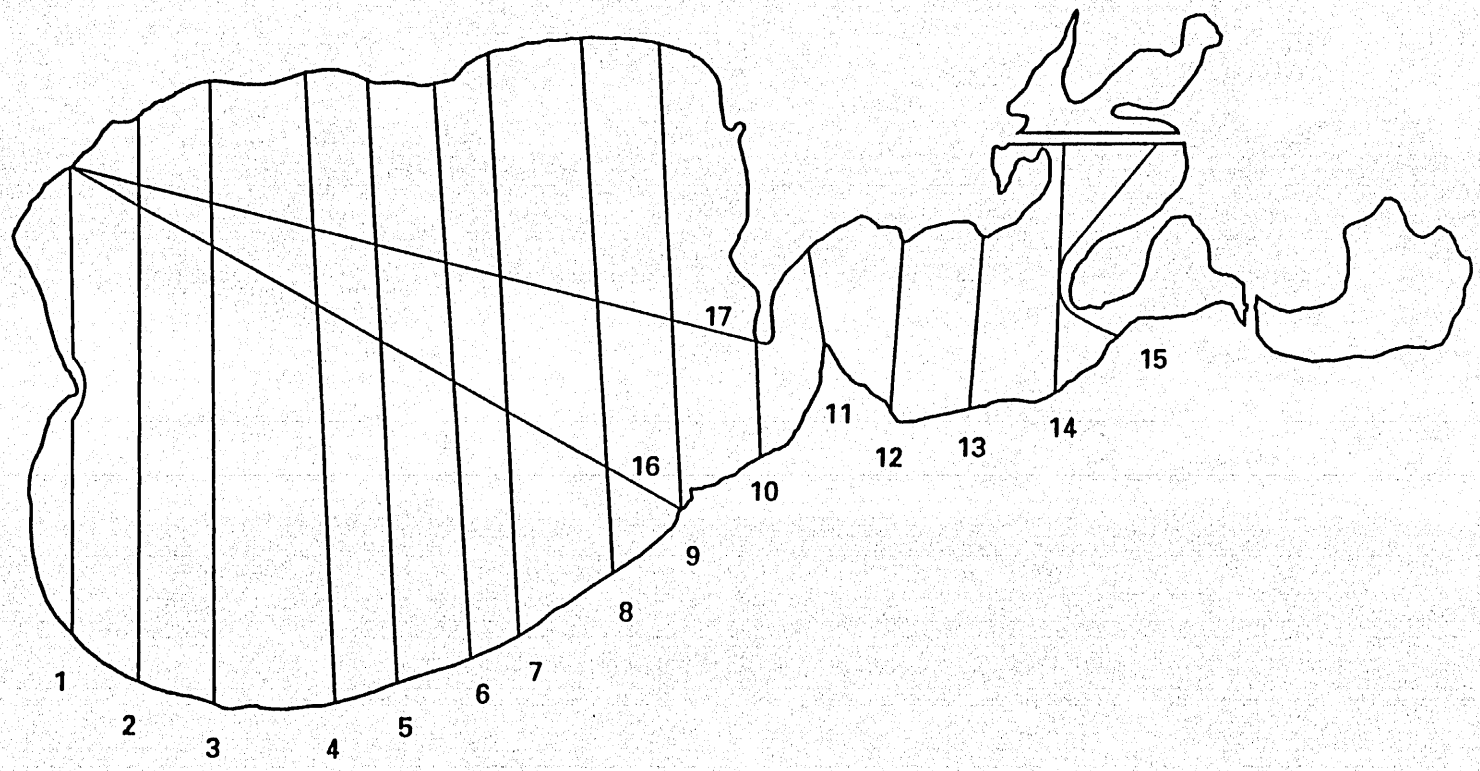


Figure 5.--Lake Byron and approximate distribution of transects for sediment survey.

Table 11 - Mean Values for In-lake Data

Parameter	Mean Value Site 4	Combined Mean 5 & 6
Total Depth	0.8 Meters	1.7 Meters
Water Temperature	16.7°C	12.4°
Secchi Disk	0.3 Meters	0.61 Meters
Dissolved Oxygen	6.0 mg/L	7.55 mg/L
Field pH	7.7 units	8.33 units
Fecal Colonies	232 per/100 ml	12 per/100 ml
Total Alkalinity	238 mg/L	256.5 mg/L
Total Solids	1,898 mg/L	2,018 mg/L
Total Dissolved Solids	1,743 mg/L	1,910 mg/L
Total Suspended Solids	85 mg/L	39.5 mg/L
Volatile Solids	27 mg/L	14.5 mg/L
Non-Volatile Solids	58 mg/L	25 mg/L
Ammonia	0.16 mg/L	1.0 mg/L
Un-ionized Ammonia	0.0040 mg/L	0.0426 mg/L
Nitrate-Nitrite	0.29 mg/L	0.31 mg/L
Organic Nitrogen	2.26 mg/L	2.315 mg/L
Total Nitrogen	2.55 mg/L	3.625 mg/L
Total Phosphorus	1.057 mg/l	0.437 mg/L
Total Dissolved Phosphorus	0.530 mg/L	0.409 mg/L
Nitrogen to Phosphorus Ratio	2.90 to 1	9.52 to 1
TSI for Secchi Disk	79.76	69.26
TSI for Total Phosphorus	102.99	90.12

The trophic condition of a lake or, trophy of a lake, refers to the amount of organic matter or nutrients in a lake's system and the combined effects these nutrients have on a lake at a given time (Wetzel, 1983). Lakes are commonly divided into four trophic categories: 1) oligotrophic lakes are those which are nutrient poor, relatively clear, and support low numbers of many species of animals and plants and usually have high diversity (Cole, 1983), 2) mesotrophic lakes are intermediate in nutrient availability which better supports the plants and animals of the lake system, 3) eutrophic lakes are those with high nutrient loads, large numbers of few species of plants and animals, tend to be more turbid, and have less diversity, 4) hypereutrophic lakes are those which have an overabundance of nutrients, usually very low species diversity, a tendency to be shallow and turbid, and large nutrient loads not only from the drainage basin but also from the lake itself. These lakes, as well as eutrophic lakes, often experience nuisance algal blooms and excessive weed growth.

The Carlson Trophic State Index (TSI) is a method of ranking the trophic condition of a lake based on three different parameters; total phosphorus, Secchi disk visibility, and chlorophyll a measurements. The scale is ranked from 0 - 100, an increase in value of 10 (10 to 20, 20 to 30, etc.) represents a doubling of the algal biomass. A TSI value of 50 is considered eutrophic and a value of 65 is considered hypereutrophic. Although chlorophyll a samples were collected and preserved in storage, analysis of the samples will not be completed till the winter of 1992-93. At the completion of the analysis, the TSI for chlorophyll a will be available upon request.

Trophic state indices for Lake Byron are based on mean total phosphorus and mean Secchi depth for 1991. The mean TSI value using phosphorus for in-lake sites 5 & 6 was 90.12. Index values using phosphorus depend on the assumption that phosphorus is the limiting nutrient (Carlson, 1977). Discounting the times when nitrogen was the limiting factor (N/P ratio < 10) the adjusted mean was 83.52 for site 5 and 83.97 for site 6. Although TSI values for site 4 were calculated, all were discarded because nitrogen not phosphorus was the limiting nutrient. The values near 84.0 for sites 5 and 6 are near the top of Carlson's scale, classifying the lake as highly eutrophic.

Trophic index values were also calculated using Secchi depths. Since Secchi depth is dependent on light, the occurrence of an algal bloom could greatly modify the depth at which the Secchi disk can be seen and thus increase the TSI value. Large seasonal variations were seen in TSI values which could have been the result of crashes or blooms in the algal population. This number, however, usually correlates very closely with the chlorophyll a TSI values (Carlson, 1977). The yearly average for sites 5 and 6 is 69.26 and for site 4, 79.76. These values again are over the hypereutrophic mark according to the Carlson TSI scale.

Nutrients

Phosphorus is essential for all plant growth. Average concentrations of phosphorus in Lake Byron were 1.057 for site 4 and 0.437 for sites 5 and 6. Again, the in-lake sites were separated because site 4 does not represent what is happening in the open water

part of the lake. The optimum growth for most green and blue-green algae is around 0.02 mg/l of phosphorus (Wetzel, 1983). On December 17, 1991, the minimum in-lake phosphorus concentration was recorded (Appendix A). The level of phosphorus at that time was 0.179, almost 9 times the optimum phosphorus needed. That same level is over three times the amount used to classify lakes as eutrophic (Wetzel, 1983). Sources of nitrogen can be from precipitation, geology, groundwater, land runoff, and from plants and algae present in the lake system.

Nitrogen is another nutrient vitally important to the growth of plants. Inorganic nitrogen concentrations (NO_3+NO_2 and NH_4) in excess of 0.3 mg/l are sufficient to stimulate algal growth (Sawyer, 1952).

Inorganic nitrogen concentrations in Lake Byron were in excess of 0.3 mg/L a majority of the time in the open water area of the lake. Of the three inorganic nitrogen forms, ammonia is most readily available for use by plants (EPA, 1990). In the discussion of ammonia the median will be discussed instead of the mean because of large fluctuations over the sample period The average median of ammonia for sites 5 and 6 was 0.57 mg/l, the median for site 4 was 0.08 for the year 1991. The average mean of NO_3+NO_2 for sites 5 and 6 was 0.31 mg/l and .29 mg/l for site 4 (Appendix A). The total inorganic nitrogen for sites 5 and 6 was almost three times what is necessary to stimulate algal growth. Site 4 on the other hand is barely over the amount needed to stimulate algal growth. Some probable sources of nitrogen are: fertilizers, decomposition of organic matter, nitrogen fixing bacteria, and animal and septic waste.

Nitrogen is believed to be the factor limiting algal growth if the total nitrogen (N) to total phosphorus (P) ratio is less than 10:1. Phosphorus is usually the limiting nutrient because it is normally the least available to plants. However, as lakes become more eutrophic, internal phosphorus loads increase and in some cases nitrogen becomes the limiting nutrient (Wetzel, 1983). It is interesting to note that the bay on the east side of the lake is primarily nitrogen limited, averaging a N:P ratio of 2.9. The average of site 5 which is in the main lake away from the bay had an average N:P ratio of 8.17, being about half nitrogen limited and half phosphorus limited. Site 6, furthest away from the east bay had a mean N:P ratio of 10.68 (Appendix A). It seems that the samples which were taken further away from the east bay were increasingly phosphorus limited and according to Wetzel, less eutrophic.

Fecal Coliform Bacteria

Fecal coliform bacteria counts are used as indicators of the presence of human pathogens. Although fecal coliforms are usually not pathogens themselves they are often closely associated with the human pathogens *Salmonella* and *Shigella*. Fecal coliform bacteria live in the digestive tract of warm-blooded animals. Sources of fecal coliform bacteria in lake water are from wildlife on the lake and in the watershed, domestic livestock in the watershed, human sewage in the watershed draining directly into the lake, and failing lakeside septic tank systems.

The South Dakota Surface Water Quality Standards state water is unsafe for immersion recreation if a twenty-four hour composite sample has a bacteria count above 200 colonies per 100 ml. It is also unsafe if any one grab sample is found to be over 400 colonies per 100 ml. Site 4 was in exceedence of this standard 3 times during the sampling period. The standard exceedences were 900 colonies on May 29, 1991, 760 colonies on June 3, 1991, and 1,200 on June 17, 1992. The fecal coliform counts for both sites 5 and 6 were 12 colonies/100 ml. No exceedences at these sites were detected.

Fisheries Impacts

The beneficial use assigned to the fishery of Lake Byron is that of warmwater marginal fish propagation. Parameters set under this beneficial use are used to assure healthy fish populations. The only exceedence of these standards was in regard to the parameter un-ionized ammonia. Un-ionized ammonia is a calculated fraction of ammonia which rises and falls parallel to increases or decreases in pH and water temperature. If concentrations are above 0.05 mg/l fish kills could result. Five times during the study concentrations were above the recommended standard. Two of these exceedences, 0.0574 mg/l on June 21, 1991 and 0.1880 mg/l on July 23, 1991 occurred at site 5. Site 6 had three exceedences; 0.0729 on May 21, 1991; 0.1077 mg/l on June 21, 1991; and .0792 on July 23, 1991. Due to the low ammonia concentrations at site 4, no exceedences occurred (Appendix A).

Lakeside On-Site Wastewater Disposal Systems

There are at present approximately 200 lakeside residences around the shoreline of Lake Byron. Most are located on the south and west shores and all are served by individual on-site wastewater facilities of varying types and working condition, primarily septic tank systems.

Septic tank drainfields located near waterbodies present potential contamination problems with regard to delivery of excessive concentrations of nutrients and bacteria to the nearby lake or stream. Contamination becomes more likely if on-site systems are poorly designed and/or maintained or become clogged or otherwise faulty with advanced age. Potential for system failure is further increased if local soil conditions are unsuitable for wastewater disposal as is often the case in lakeshore areas.

Soil survey maps (Soil Survey of Beadle Co., SD, SCS, 1979) indicate that most clay-based soils surrounding Lake Byron have moderate to severe limitations as sites for septic tank drainage fields due to low permeability. Low permeability (slowly-draining) soils are likely to produce surface failure in on-site wastewater systems. Infrared photo imagery (aerial photography) conducted by EPA (1981) identified 4 lakeside residences with a surface failing on-site wastewater facility. More may have escaped detection due to presence of trees and dense brush.

Potentially significant levels of nutrients and bacteria that may be delivered to Lake Byron by failing on-site wastewater facilities at the present time, may be eliminated by early 1994 with the construction of a centralized sanitary sewer system to process wastewater from all lakeside residences. To this end, a sanitary district (Lake Byron Watershed District) was recently established to sponsor the project; and blueprints for a proposed stabilization pond system have been drawn. The actual construction of the Lake Byron facility with the accompanying wastewater collection system awaits procurement of sufficient funds. The outlook is favorable that funding will be made available in 1993 to begin construction of this needed facility.

Elutriate Analysis

Tabular results of the COE sediment/elutriate tests are presented in Appendix C. Much of the lake sediment is derived from local salt-laden glacial till and parent formations of calcareous shales. This accounts for the high sediment values for calcium, iron, magnesium, aluminum and other metals. Those mineral-laden formations are reflected in local surface and ground waters which often have a high dissolved solids content (e.g. Lake Bryon).

Most of the parameters (metals, organics) did not appear to increase appreciably in the elutriate after test mixing of sediment with the receiving water samples except ammonia, arsenic, manganese, and barium. The latter three elements may have been concentrated (along with ammonia) in a dissolved form in the interstitial water of the sediments to be released to the elutriate upon mixing.

Ammonia (ammonium) is generally the most abundant inorganic form of nitrogen present in the sediments of eutrophic lakes. Disturbing the sediment by dredging may release enough ammonia into the water column to trigger localized algal blooms if other conditions for algal growth are favorable and particularly if the lake were nitrogen limited at the time.

There appears to be little danger of releasing sufficient concentrations of dissolved heavy metals to the water from sediment dredging to create toxic conditions in the lake. The likelihood of toxic conditions being generated by dredging is small because of the considerable buffering capacity of the alkaline water in Lake Byron and the minor concentrations of heavy metals in the lake sediments. Metals, such as mercury, cadmium, barium, chromium, lead, and silver, were present in low concentrations in both sediment and elutriate water, most often less than the detection limits. In all cases the South Dakota Water Standards criteria for these elements were not exceeded. Herbicides

and pesticides probably were also present but occurred at concentrations too low to be quantified by standard methods.

USGS Sediment Survey

The water surface elevation of Lake Byron at the time of the sediment survey in mid-May 1992 was 1247.5 feet MSL. No high water mark (HWM) has been established for this lake but an examination of limited hydrological data suggests the above elevation is close to the HWM. At that point the lake basin is full and water has begun flowing out of the lake outlet or over the top of the spillway. Also at 1247.5 feet MSL elevation the Lake Byron surface area was recorded as 1907 acres, the lake volume was 10,645 acre-feet and the average depth was determined as 5.6 feet. Water-depth contours for Lake Byron are presented in Figure 6. Elevation/area/capacity values for Lake Byron are presented in Table 12 below.

Table 12. -- Elevation/area/capacity data for Lake Byron, South Dakota.

ELEVATION (FEET)	CAPACITY (ACRE-FEET)	AREA (ACRES)
1247.5	10645	1907
1247	10624	1826
1246	10475	1653
1245	10182	1524
1244	9865	1437
1243	9461	1325
1242	8848	1191
1241	7407	992

The volume of recently accumulated lake sediments (from approximately 1935 to the present) was estimated to be 3.7 million cubic yards (2293 acre-feet). Sediment depth contours for Lake Byron (Figure 7) show sediment depths in this top layer range from one to four feet and average 1.4 foot (0.43m) over the lake basin. Interpreted cross-sectional profiles are shown in Figure 8 for selected transects.

Below the recently-deposited layer of loose, soft sediments discussed above, lies a layer of more consolidated sediments which at one time (c. 1935) was dried and oxidized. Lake cores seem to indicate layers of consolidated intermediate material sandwiched

This TMDL is also available in MSWord97 format or in Adobe Acrobat formats. Get Acrobat

SD Department of Environment & Natural Resources
Watershed Protection Program
Total Maximum Daily Load

Lake Byron Watershed, Beadle County South Dakota
March, 1999

These TMDLs were developed in accordance with Section 303(d) of the federal Clean Water Act and guidance developed by the US Environmental Protection Agency. The 1998 303(d) Waterbody List identified Lake Byron as impaired by a measure of Trophic State Index (TSI) which serves as an indicator of the trophic condition of the lake. Individual TMDLs for accumulated sediment and total phosphorus have been developed and are supported below. The recommended restoration alternatives have already been implemented for this project.

TMDL Summary for Total Phosphorus

Waterbody Name	**Lake Byron**
Hydrologic Unit Code (HUC)	10160006
TMDL Pollutant	**Total Phosphorus**
Water Quality Target	Inlake total phosphorus TSI of 70 (yearly average)
TMDL Goal	50% reduction in total phosphorus input
303(d) Status	1998 303(d) Waterbody List, Priority 1, Pages 21, 29, 33
Impaired Beneficial Uses	Warmwater marginal fish life propagation, immersion recreation, limited contact recreation
Reference Document	Lake Assessment Project Report Lake; Final Report Lake Byron Watershed Project

TMDL Summary for Accumulated Sediment

Waterbody Name	**Lake Byron**
Hydrologic Unit Code (HUC)	10160006
TMDL Pollutant	**Accumulated Sediment**
Water Quality Target	Decrease annual inlake sediment accumulation by 1200 tons/year
TMDL Goal	50% reduction in sediment loading
303(d) Status	1998 303(d) Waterbody List, Priority 1, Pages 21, 29, 33
Impaired Beneficial Uses	Warmwater marginal fish life propagation, immersion recreation, limited contact recreation
Reference Document	Lake Assessment Project Report; Final Report Lake Byron Watershed Project

I. Executive Summary:

Lake Byron is a comparatively large prairie pothole lake located in Beadle County, South Dakota (Figure 1). Lake Byron is a meandered lake. Water levels fluctuate widely with the amount of annual rainfall. Lake acreage varies from 1250 acres at low water mark to slightly more than 1900 acres at full capacity.

A USGS survey completed in 1992 established a water surface elevation of 1247.5 feet MSL, a lake capacity of 10,645 acre-feet and a surface area of 1907 acres. At that time average lake depth was determined to be 5.6 feet with a maximum measured depth of 7.0 feet.

The contributing watershed of Lake Byron is approximately 116,140 acres located in Beadle, Spink, and Clark counties, South Dakota (Figure 2). The Foster Creek drainage, which was diverted to the lake in the late 1930's, includes approximately 80 percent of the watershed. Approximately 63 percent of the land in the watershed is cropland with most of the remainder left to grassland and pasture.

Studies completed by DENR during 1979 to 1982 determined that Lake Byron was nutrient enriched. Data collected from the three lake tributaries indicated high concentrations of phosphorus and nitrogen entered Lake Byron (Lake Byron WQSA Report, 1985).

The goal of these TMDLs is to restore the water quality of Lake Bryon to a level that allows the lake to meet its beneficial uses of warmwater marginal fish life propagation, immersion recreation and limited contact recreation.

Stakeholders

Beadle, Spink, Clark Conservation Districts	City of Huron
Lake Byron Development Association	SDGFP
Lake Byron Watershed District	SDDENR
James River Water Development District	NRCS
Beadle County Sportsman's Club	USFWS

Intent to Submit as a Clean Water Act Section 303(d) TMDL

In accordance with Section 303(d) of the Clean Water Act, the South Dakota Department of Environment and Natural Resources submits for EPA, Region VIII review and approval, the total phosphorus and accumulated sediment Total Maximum Daily Loads (TMDLs) for Lake Byron as provided in this summary and attached documents. These TMDLs have been established at a level necessary to meet the applicable water quality standards for nutrients and sediment with consideration of seasonal variation and a margin of safety. By significantly reducing the inflow of sediment and nutrients to Lake Byron, the following designated use classifications will be protected through implementation of this TMDL: immersion recreation, limited contact recreation, and warmwater marginal fish life propagation.

II. Problem Characterization:

Maps

Maps are included that show Lake Byron, Beadle County, South Dakota (Figure 1) and the Lake Byron Watershed (Figure 2).

Waters Covered by TMDL

Lake Byron is the benefactor of this TMDL.

Rational for Geographic Coverage

The contributing watershed of Lake Byron consists primarily of the Foster Creek drainage that was diverted to the lake in the late 1930's to provide supplemental water and stabilize lake levels. The present watershed encompasses approximately 116,140 acres in northeastern South Dakota. Approximately three-fourths of the watershed lies in the James River Basin, a gently undulating plain at elevations of 1240 to 1500 feet msl. Most of the Foster Creek drainage occupies lower watershed elevations (1247 to 1310 feet msl). The area drains south to the James River. Drainage is generally poorly developed in the basin. Much of the precipitation collects in glacier- formed depressions until it evaporates or percolates into the ground. Lake Byron has a history of high in-lake phosphorus and nitrogen concentrations dating back at least 30 years. Much of this nutrient enrichment was probably derived from the watershed that is largely overlain with erodible glacial loams with high organic and nutrient content, and the effects of various agricultural activities on these soils. The main soil in the Foster Creek drainage is Great Bend Silt Loam. According to 1991 data, 63 percent of the watershed acreage is used for crop production with only 28 percent left to grassland. The remaining 9 percent include farmsteads and miscellaneous land uses. These conditions reemphasize the importance of preventing soil erosion in this drainage to reduce the large nutrient loads presently impacting Lake Byron.

Pollutants of Concern

Total Phosphorus
Accumulated Sediment

Use Impairments or Threats

The beneficial uses impaired by excessive loads of total phosphorus and accumulated sediment include warmwater marginal fish life propagation, immersion recreation and limited contact recreation.

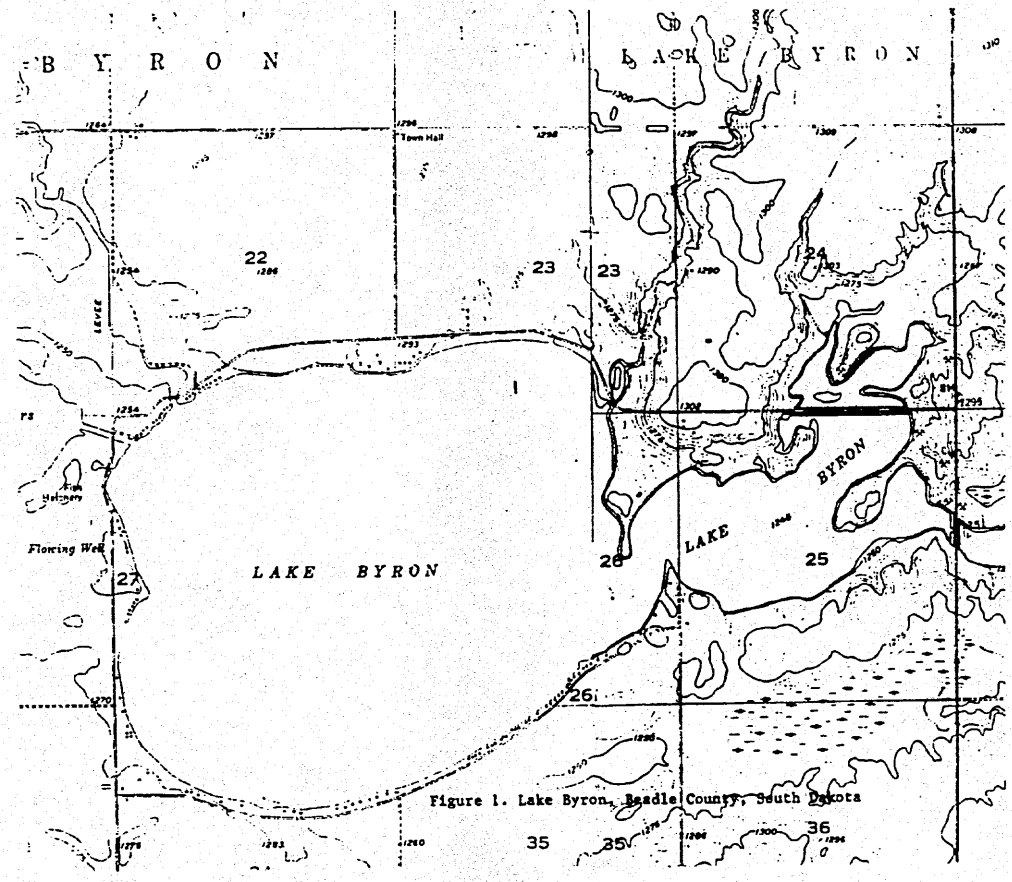
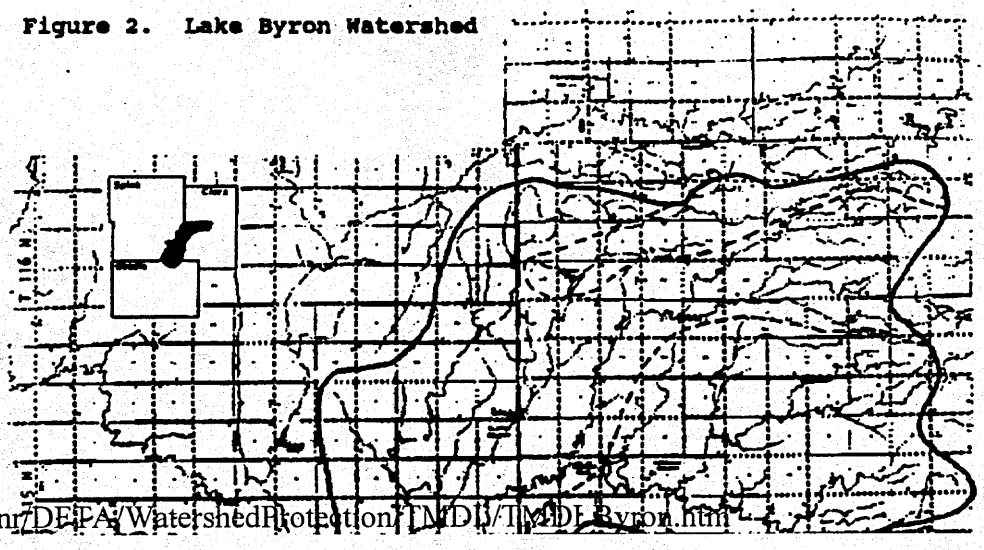


Figure 1. Lake Byron, Beadle County, South Dakota

Figure 1. Lake Byron

Figure 2. Lake Byron Watershed



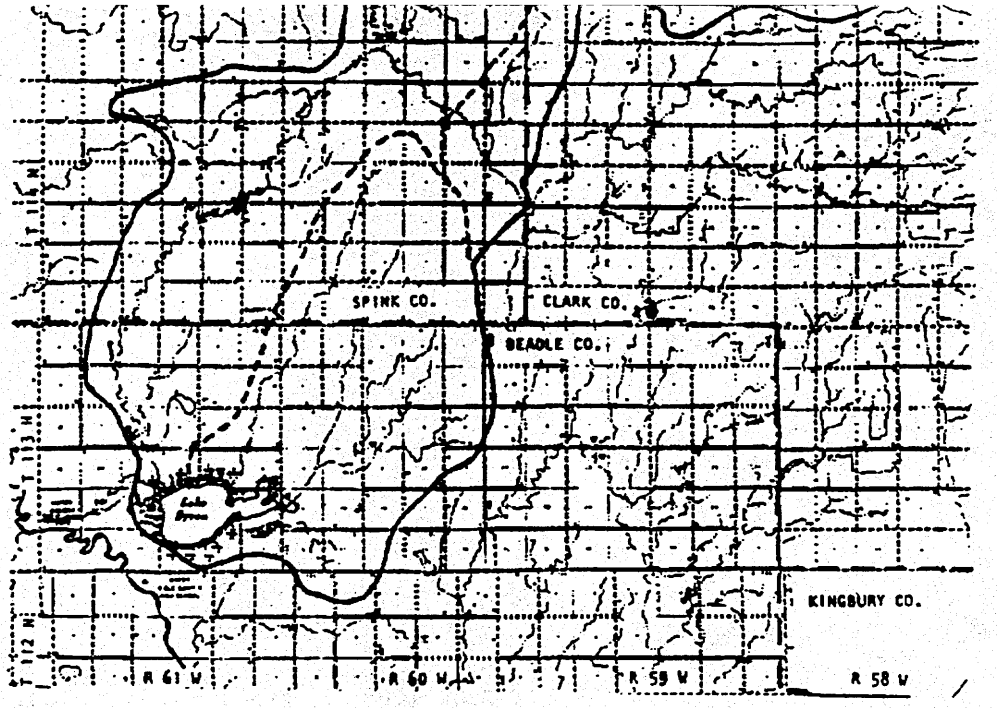


Figure 2 Lake Byron Watershed

Excessive nutrients stimulate aquatic plant growth, especially the blue-green algae *Aphanizomenon flos-aquae*. Accumulated sediment decreases water depth and often covers bottom structures that hold and attract game fish. Shallow water will warm more rapidly than deep water and will hold less oxygen. A shallow warmwater lake with overabundant algae growth will tend to favor rough fish over game fish and the quality of the fishery will decline. Excessive algae growth and in-lake sediment detracts from recreational uses such as swimming and boating. Few people will swim or boat in a green and muddy lake.

A watershed and lakeshore restoration project was initiated by local concerns and funded by a combination of federal, state, and local sources.

Probable sources

The source of sediment has been identified as sheet and rill erosion from cropland, grassland, and woodland, and from gully, streambank, and lakeshore erosion. Watershed nutrients are deposited in the lake along with the sediment. Several animal feeding operations also contribute nutrient loadings to the lake.

TMDL Endpoint

Description

The TMDL for this waterbody is a 50 percent decrease in total phosphorus input and a 50 percent decrease in sediment deposition into Lake Byron.

Endpoint Link to Surface Water Quality Standards

Total phosphorus

For the years 1989 through 1994, TSI total phosphorus values ranged between 83.75 and 90.21. It is estimated that a 50% decrease in total phosphorus inlake will reduce the TSI to at least 73.8. Based on this estimate, the target endpoint has been adjusted to a total phosphorus TSI of 70 as a yearly average.

Accumulated Sediment

The TMDL endpoint shall be a decrease in annual inlake sediment accumulation by 1200 tons/year. The pre-project inlake accumulated sediment was estimated to be 2,400 tons per year (350 tons from tributaries and 2,050 tons from shoreline erosion).

Reducing inflow of sediment and nutrients should lead to better water quality, less enrichment, greater clarity, and should have a positive effect on the fishery of Lake Byron. Reducing nutrients should, over time, reduce the amount and extent of algal blooms and other aquatic vegetation in the lake. Reducing sediment deposition should stabilize lake-bottom habitat in favor of a healthier fishery.

TMDL Analysis and Development

Data Sources

Much of the Lake Byron TMDL is based on the DENR 1992 Lake Assessment Project Report. Implementation activities are based on the Final Report for the Lake Byron Watershed Project prepared by the Beadle Conservation District, 1997.

Analysis Techniques or Models

The Lake Assessment Project, conducted from April, 1991 to late summer of 1992, included water quality monitoring of Lake Byron, Foster Creek, and one of the lake's two minor tributaries. Results of the lake assessment project and follow-up monitoring performed after implementation indicate that the high phosphorus concentrations recorded in the past appear to be decreasing (from 0.437 mg/l, 1991-1992 to 0.234 mg/l, 1998). This improving trend represents a 46 percent reduction in phosphorus. However, additional sampling is recommended to confirm actual improvements.

The mean total phosphorus TSI was 87.1. A 50% decrease in total phosphorus to meet the TMDL goal would reduce the TSI value to 73.8. The TSI measured in early winter 1998 for total phosphorus and Secchi depth was 68.7; however, this reading probably represents minimal phosphorus releases during winter. Again, additional sampling is recommended to establish true values to represent yearly readings.

The Lake Asessment Study indicated that the tributaries were contributing approximately 350 tons of sediment per year to the lake while lakeshore erosion was estimated by NRCS at approximately 2,050 tons per year. A 50% reduction in sediment would cut the sediment load to 1,200 tons per year from both sources combined. Most of the lakeshore erosion was identified from critical areas amounting to 3,410 linear feet of shoreline. A time allowance is required for recent watershed implementation activities to take full effect in reducing sediment delivery to the lake.

The U. S. Geological Survey in Cooperation with DENR and the Beadle Conservation District (BCD) conducted a sediment depth survey. The results of that investigation showed 72.6 million cubic yards of sediment had accumulated in the lake basin to an average depth of approximately 25 feet (7.6m) over the life span of the lake. That volume of sediment represents the loss of approximately ¾ of the lake's water capacity since the basin was formed 8,000 to 10,000 years ago. Sediment removal through dredging may be a considered alternative to the sediment problem if the recommended BMPs do not meet the TMDL goal, but funding for a multi-year dredging project may be a significant challenge. However, it is anticipated that activities implemented in the watershed and along critical shoreline erosion sites will be sufficient to meet the TMDL goal.

A lakeshore inspection was conducted around the periphery of Lake Byron during 1991 by BCD to verify the conclusions made by an earlier shoreline erosion survey conducted by the Soil Conservation Service, and to note any recent changes in the intensity and pattern of lakeshore erosion. Probable sources of additional lake sediments as well as the high nutrient levels found in Lake Byron were investigated by means of a watershed land-use survey conducted by BCD during 1991. This survey located livestock operations, eroding croplands, and other potential sources of nutrients and sediment. A 1985 WQSA study indicated that failing septic tank systems of some lakeshore residences also might be significant contributors of nutrients to the lake.

The lake assessment study concluded that the major sources of nutrients to the lake are likely to be watershed livestock operations and possible dumping of animal waste material into tributary drainage channels. Secondarily, cropland runoff also contributes nutrients. The lake assessment study recommended the following restoration activities: 1) establish animal waste management systems and animal feeding areas; 2) implement Best Management Practices on crop lands and pastures; 3) stabilize stretches of eroding stream and lake banks; 4) plant grass and trees for cover and filter; 5) establish grazing management systems; and 6) construct sediment basins and other applicable measures to further restoration.

Seasonality

Seasonality was inherent in the Lake Byron TMDL since the assessment study evaluated the cumulative impacts of the various seasons on the waterbody. The assessment of the major tributary to Lake Byron (Foster Creek) was performed from spring through autumn. Some of the

management, and grazing management.

Margin of Safety

The margin of safety for the Lake Byron TMDL is that the implementation activities were developed with a high level of detail on a site-specific basis and were based on the technically accurate Lake Assessment Project Report. The report and subsequent implementation were done in a scientifically sound manner that involved on-site investigation, collaborative efforts with professional NRCS field personnel, and quality control data collection, analysis, and interpretation. Adjustments to watershed Best Management Practices will be made as conditions change and are warranted.

The margin of safety continues to be met by accomplishments of the individual implementation objectives as follows (See Implementation section for further explanation of recommendations):

Objective 1. Dissemination of information continues through conservation district newsletters and personal contacts with area producers.

Objective 2. The actual number of conservation tillage acres reported was 4,642; however more acres were planted using no-till or minimum till but not reported for documentation when it was discovered the cost-share for this practice was depleted.

Objective 3. In lieu of planting all 200 acres in filterstrips, the following activities were implemented to slow nutrients and sediment from entering the lake: 300 trees were planted and 7,500 feet of shoreline were fenced to exclude cattle from the riparian zone surrounding the lake and from the lake shore itself.

Objective 4. The streambank sites were stabilized and four ponds were constructed. Two other pond sites were identified; however, the watershed areas above the sites were too large for U. S. Fish and Wildlife technology. One dam was constructed which was not in the original work plan but serves as a sediment trap. It is recommended that these dams be maintained by periodic removal of accumulated sediment.

Objective 5. The assessment study recommended restoration of 3,410 feet of shoreline. A total of 5,000 feet was stabilized during the implementation activity.

Objective 6. Two of three animal waste management systems were installed. One is on hold (one went out of business). Four animal feeding areas were installed. It is hoped that livestock producers in the watershed will elect to have additional systems and areas installed in the future as these features continue to be incorporated into plans and specifications for their operations.

V. Allocation of TMDL Loads or Responsibilities:

Wasteload Allocation

There are no point sources of pollutants of concern in this watershed. Therefore, the "wasteload allocation" component of this TMDL is considered a zero value. The TMDL is considered wholly included within the "load allocation" component.

Load Allocation

Analysis of nutrient and sediment loading to Lake Byron during the Lake Assessment Study revealed that Foster Creek was contributing approximately 93 % of the total yearly phosphorus load and approximately 92 % of the total yearly sediment load to the lake.

Loadings from a monitored unnamed tributary fell within acceptable (permissible) limits during 1991 (Lake Assessment Study, 1992). Sediment from tributary sources is estimated at 350 tons per year. Additional sediment load to the lake is due to shoreline erosion, estimated at approximately 2,050 tons (Lake Assessment Study, 1992).

Allocation of Responsibility

During 1992, the Department of Environment and Natural Resources produced a report of a Lake Assessment Project on Lake Byron conducted from November, 1990 to the summer of 1992. Based upon information available at that time, recommendations made for lake restoration included management of animal waste and animal feeding areas, implementing best management practices in the watershed and stabilizing streambanks and lake shoreline to decrease sediment loading. During

1993, the Beadle Conservation District agreed to sponsor an implementation project to address the specific recommendations of the Lake Assessment Project. The implementation project began during October 1993, and was completed during December 1997. Total expenditures exceeded $850,000 with $211,150 expended from Section 319 EPA grant funds and over $323,000 raised in local match. The specific activities of the implementation project are found in the section VI of this document.

Some goals of the project were realized and exceeded while others were more difficult to attain. The Conservation Reserve Program greatly assisted in getting cropland planted to grass. Grass filterstrips were more difficult to implement. Tree shelterbelts were planted; however not to the degree originally planned. The conservation tillage program was a highly successful portion of the project. More shoreline stabilization was installed than originally planned. Cabin owners around the lake became involved in private stabilization. The SD Department of Game, Fish and Parks stabilized some of their shoreline also. Much was accomplished through the implementation project, but there is a need to stabilize more shoreline of Lake Byron. Many Best Management Practices were implemented in the watershed, but there are always opportunities to do more.

VI. Implementation:

The Section 319 implementation project goal was to restore full beneficial uses of Lake Byron by decreasing the amount of sediment and nutrients entering from the watershed by 50 percent and reducing the fecal coliform bacteria levels to within state standards. To accomplish the goal, six major objectives were developed. Following each objective is the actual work accomplished in implementing the 319 project.

Objective 1. *Implement a full watershed project by making use of the information gained from the Foster Creek Riparian Demonstration Project. To be accomplished by disseminating information gained through the Foster Creek Riparian Demonstration Project to operators in the watershed through news articles, tours, public meetings, existing newsletters and personal contacts.*

Accomplishment: A public meeting was held for operators at the Lake Byron Lodge. A tour was taken to various sites in the watershed as well as viewing of large sections of shoreline stabilization. District Supervisors, NRCS personnel, Department of Agriculture and DENR officials were invited. The district newsletter covered progress regularly. The project coordinator shared information as he made personal contact with operators throughout the watershed.

Objective 2. *Reduce sediment and nutrient loading from the watershed by 50 percent through installation of conservation tillage systems on 5,000 acres of cropland using conservation tillage, crop residue use, pesticide and fertilizer management, grass waterways, and windstrip cropping. Plant 150 acres of trees and 1,000 acres of grass.*

Accomplishment: The conservation tillage was implemented on 4,642 acres using no-till or minimum till. Grazing management plans were completed for 3,500 acres. Operators were instructed in proper use of pesticides and fertilizer. Grass was planted on 980.9 acres. Sixty-eight acres of trees were planted.

Objective 3 *Improve water quality sufficiently to support fish and other aquatic organisms through the restoration of riparian areas by planting 200 acres of grass bufferstrips to include field borders.*

Accomplishment: This was a difficult practice to sell to producers. Seventy acres were planted to filterstrips. Another 7,500 feet along the shoreline was fenced 30 to 50 feet back from the lake to keep cattle out of the lake. A total of 300 Bur Oak trees were planted to assist in stabilizing the shoreline and improve the riparian area.

Objective 4 *Decrease sediment carried by tributaries through the construction of 6 sediment basins and complete 3 streambank stabilization activities to reduce the amount of sediment entering the lake, create wildlife habitat, and provide water for livestock.*

Accomplishment: Four sediment ponds and three streambank stabilization sites were completed. The streambank stabilization activities consisted of planting approximately 100 Bur Oak trees at each of three different sites where beaver had destroyed the previously existing trees. One dam was constructed.

Objective 5 *Reduce sediment entering the lake from shoreline erosion by 50 percent by stabilizing 3,410 feet of the most critical area through complete excavation, rip-rap, grass seeding and fencing.*

Accomplishment: Stabilization of the lake and streambank shoreline was accomplished by the use of the Rosgen-type method of streambank stabilization with the use of native plants, trees, and rocks as much as possible. During the winter of

north shore of Lake Byron. Excavation was done and rip-rap placed. During the summer of 1996, another 800 feet was stabilized near the boat ramp and on the hogsback. Three hundred willow trees were planted on the hogsback area. During the winter of 1997 another 800 feet was stabilized in the northwest park area and along the east side of the south boat ramp. Nearly 40 cabin owners completed shoreline stabilization on private property. All activities resulted in over 5,000 feet of shoreline stabilized.

If the shoreline stabilization is successful in preventing lakeshore erosion, the amount sediment loading to the lake will be decreased by nearly 85% (2,400 tons/year to 350 tons/year) and the goal of the accumulated sediment TMDL will be met. Effectiveness will be measured by the level of success achieved in reducing or preventing future shoreline erosion in the previously identified critical areas.

Objective 6 *Reduce nutrient loading into the lake by constructing ten animal feeding areas and 4 animal waste management systems.*

Accomplishment: Two animal waste management systems were installed. One previously identified site is no longer in business and the other is on hold while the owner is investigating a large commercial hog business. Four animal feeding areas were installed; two of which were highly visible areas near the lake. Both previously had cattle standing in the lake during summer. By moving the feeding areas, the cattle are no longer in the lake.

It is the Best Professional Judgement of DENR that the goal of 50 percent reduction in sediment and nutrient will be accomplished through the implementation activities of the 319 program. The TMDL may be modified in the future after sufficient time for response has elapsed.

VII. Public Participation

Summary of Public Review

The Lake Byron Assessment Project was begun in November, 1990 under a contract/letter of agreement between DENR and the Beadle Conservation District (BCD). The Section 319 Implementation Project began October 1, 1993. Beadle Conservation District agreed to sponsor the project and secure the needed local match. The total budget for implementation was $864,925 with an EPA grant award of $245,275. Accrued local match totaled $323,263. In June, 1995, The project was awarded a South Dakota Consolidated Water Facilities Construction Program Grant in the amount of $30,000 to assist shoreline stabilization activities. The application was presented in public forum to the State Board of Water and Natural Resources for funding consideration.

In addition to EPA and DENR support, funds also were secured from the South Dakota Department of Game, Fish and Parks, the South Dakota Conservation Commission, the James River Water Development District, and the Lake Byron Association. A number of agencies and organizations were involved with various aspects of the implementation project, including:

Beadle, Spink and Clark Conservation Districts: Beadle Conservation District was the project sponsor. All district employees addressed all facets of the project, including planning, information and education, monitoring and follow-up, and assistance with BMP implementation.

Lake Byron Development Association and Lake Byron Watershed District: Provided local direction and financial and administrative support.

Beadle County Commissioners and the City of Huron, South Dakota: Provided manpower, equipment as needed and in-kind financial support.

SD DENR: Provided technical assistance and grant administration.

SD GF&P: Provided technical expertise and in-kind financial support

USDA/NRCS: Provided technical assistance for BMP implementation and financial programs available to install conservation practices.

James River Water Development District: Provided technical and financial support.

Lake Byron landowners and operators: Provided cost share support to install conservation practices.

Beadle County Sportsman's Club: Provided financial and in-kind support.

U. S. Fish and Wildlife Service: Provided financial and in- kind support through the Pond Development Program.

Summary of Public Review

A record of the public involvement in the review of this TMDL as submitted is summarized below:

Electronic media	*Mailings*	*Public Comments Received*
December 1998 Assessment summary added to department website **March 1999** TMDL Summary posted on department website	**Interested Parties** March 10, 1999 **Stakeholders** March 10, 1999 **Daily Newspaper** March 8, 1999	Comments received during project meetings and review of the draft report and findings were considered

VIII. Supporting Development Documents (attached)

Lake Assessment Project Report Lake Byron Beadle County, South Dakota. South Dakota Lake Assessment Program, Division of Water Resources Management, South Dakota Department of Environment and Natural Resources, December, 1992.

Lake Byron Watershed Project, Section 319 Project Implementation Plan. Sponsor: Beadle Conservation District. South Dakota Department of Environment and Natural Resources, July, 1993.

Section 319 Nonpoint Source Control Program Watershed Project Final Report. Lake Byron Watershed Project. Beadle Conservation District, December, 1997.

Lake Byron. 1995 South Dakota Lakes Assessment Final Report. South Dakota Department of Environment and Natural Resources, August, 1996.

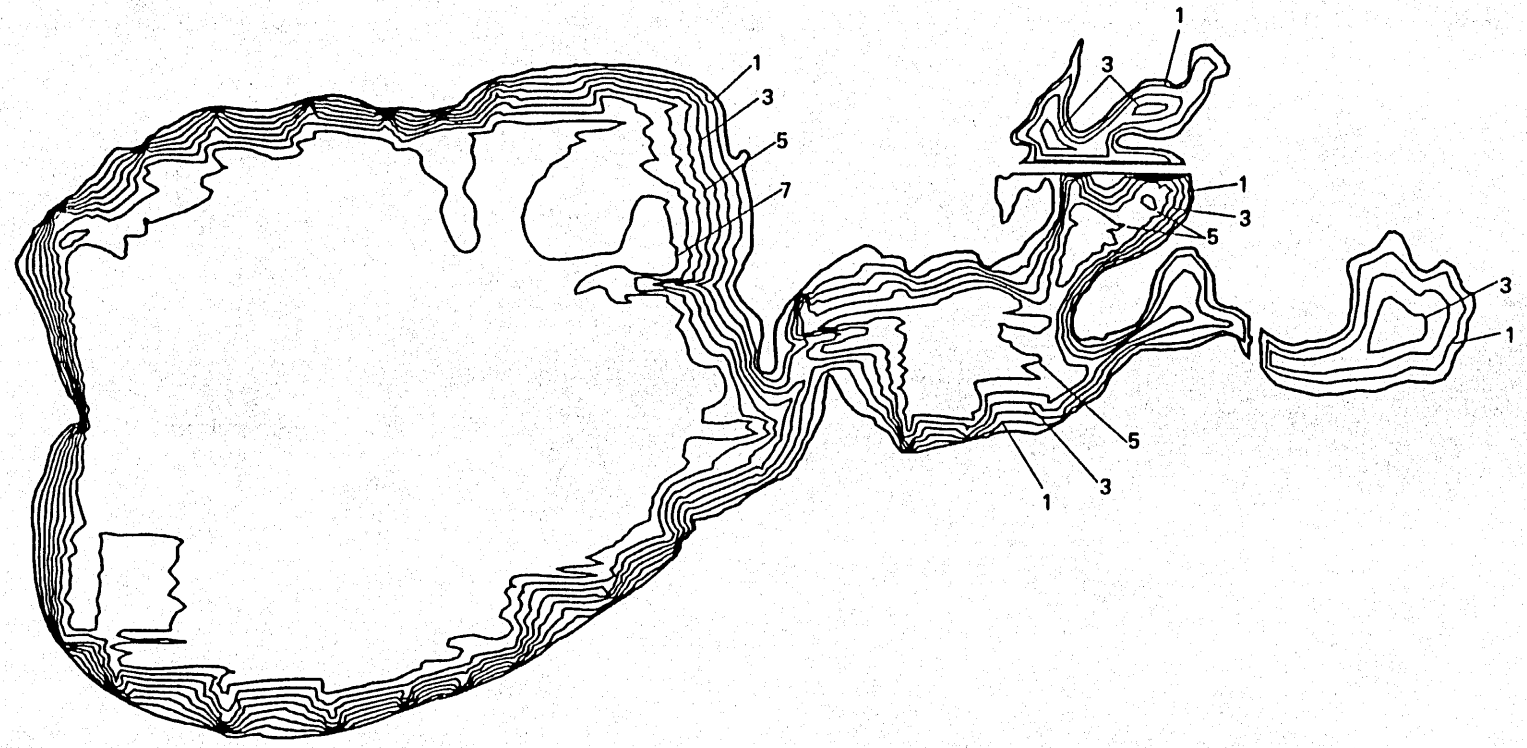


Figure 6.--Water depth contours for Lake Byron, South Dakota. Contours in feet.

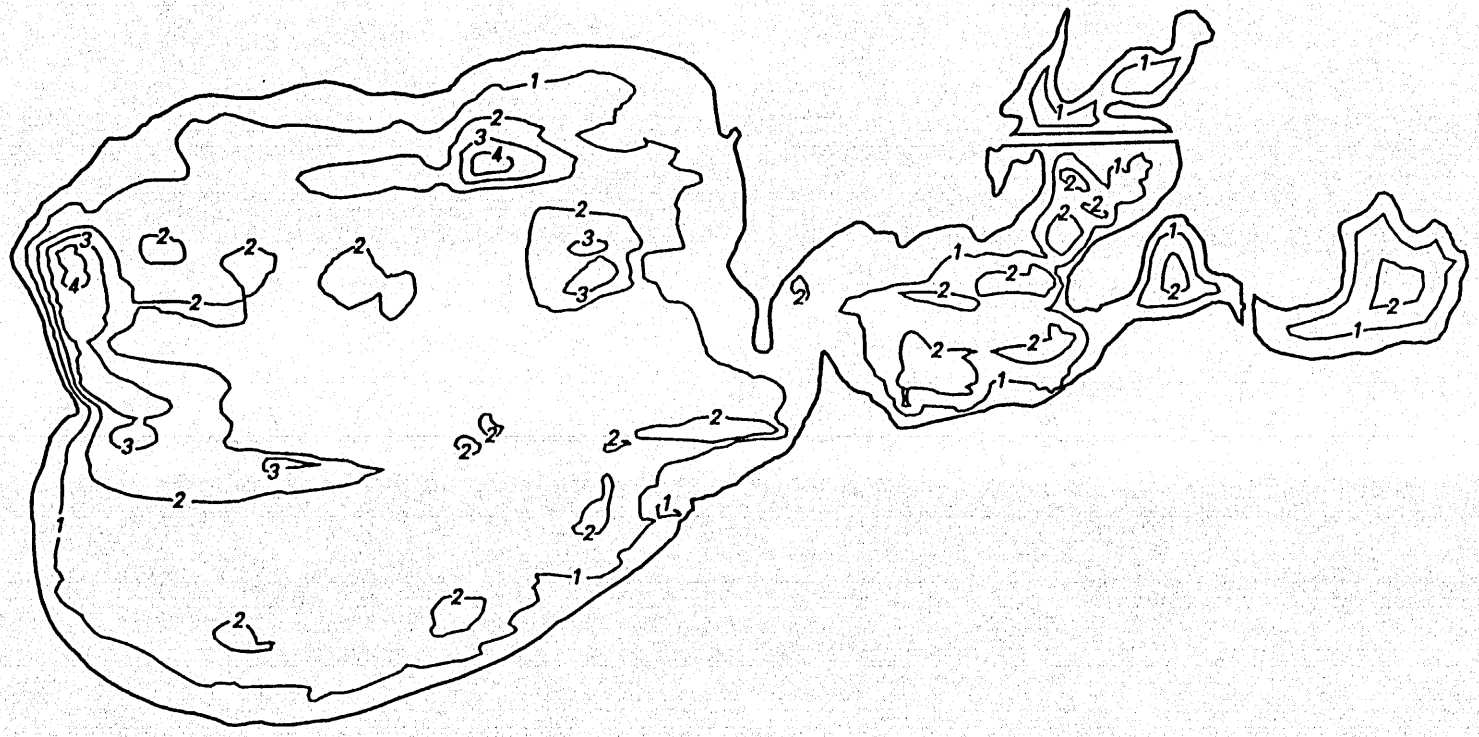


Figure 7.--Loose, soft sediment depth contours for Lake Byron, South Dakota. Contours in feet.

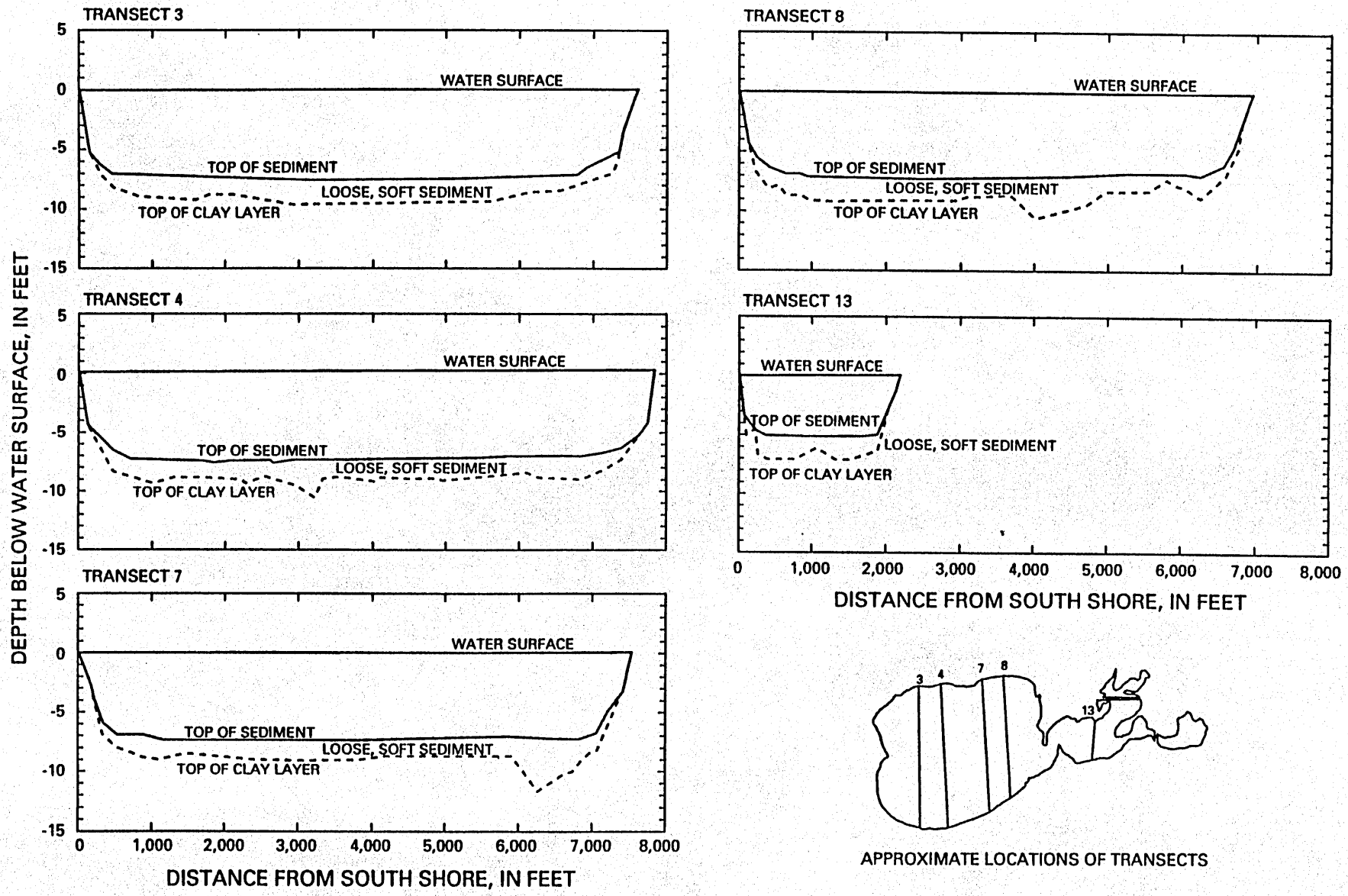


Figure 8.--Interpreted cross-sectional profiles for selected transects for Lake Byron, South Dakota.

between many different layers of a "hard-pan" material. This suggests the lake sediments were dried and oxidized many times during the 8,000 to 10,000 year life span of Lake Byron. Most of the sediments were deposited by non-point source runoff. The estimated mean sediment depth to the original lake bed (glacial till) was 25 feet. The total sediment volume in Lake Byron was estimated at approximately 72.6 million cubic yards.

Obviously, dredging that amount of sediment would be economically prohibitive. Dredging operations, when they become necessary for lake restoration, may have to be limited to relatively small areas of the lake basin where, for example, boating hazards would otherwise exist after lake water levels fell during a dry year. Other areas receiving heavy recreational use could also be considered suitable such as swimming beaches, fishing holes, and boat landings.

Potential dredging sites that will yield the greatest benefit to the lake can be located after a thorough survey of lake basin configuration, sediment maps, and an examination of lake hydrology budgets and past lake history. A detailed presentation of the methods, verification procedures, and results of the Lake Byron sediment survey will presented by USGS in an open-file report that is in preparation at the present time. This publication should be useful in the design of dredging projects at judiciously selected lake sites.

Shoreline Erosion

While no recent surveys of lake shoreline erosion appear to have been conducted, it is believed that the pattern and extent of shoreline erosion at Lake Byron have not changed appreciably in the last decade. In view of this, a comprehensive lake shore survey carried out by SCS during 1981 is presented in this report (Lake Byron WQSA Report, 1985).

The SCS study divided the shoreline into 34 segments of varying length (Figure 9) which were then studied separately to determine the sediment produced from erosion by the "direct volume" method. The amount of erosion, length of the segments, and the intensity of erosion, length of the segments, and the intensity of erosion are indicated in Table 13. It is noted that the most severe lake shore erosion occurred at cut banks located on the relatively undeveloped east end of the lake in segments 20, 25, and 32 with a combined length of 3410 feet. Total contribution of sediment to Lake Byron from shoreline erosion was calculated at 2,051 tons or 1.6 acre-feet per year.

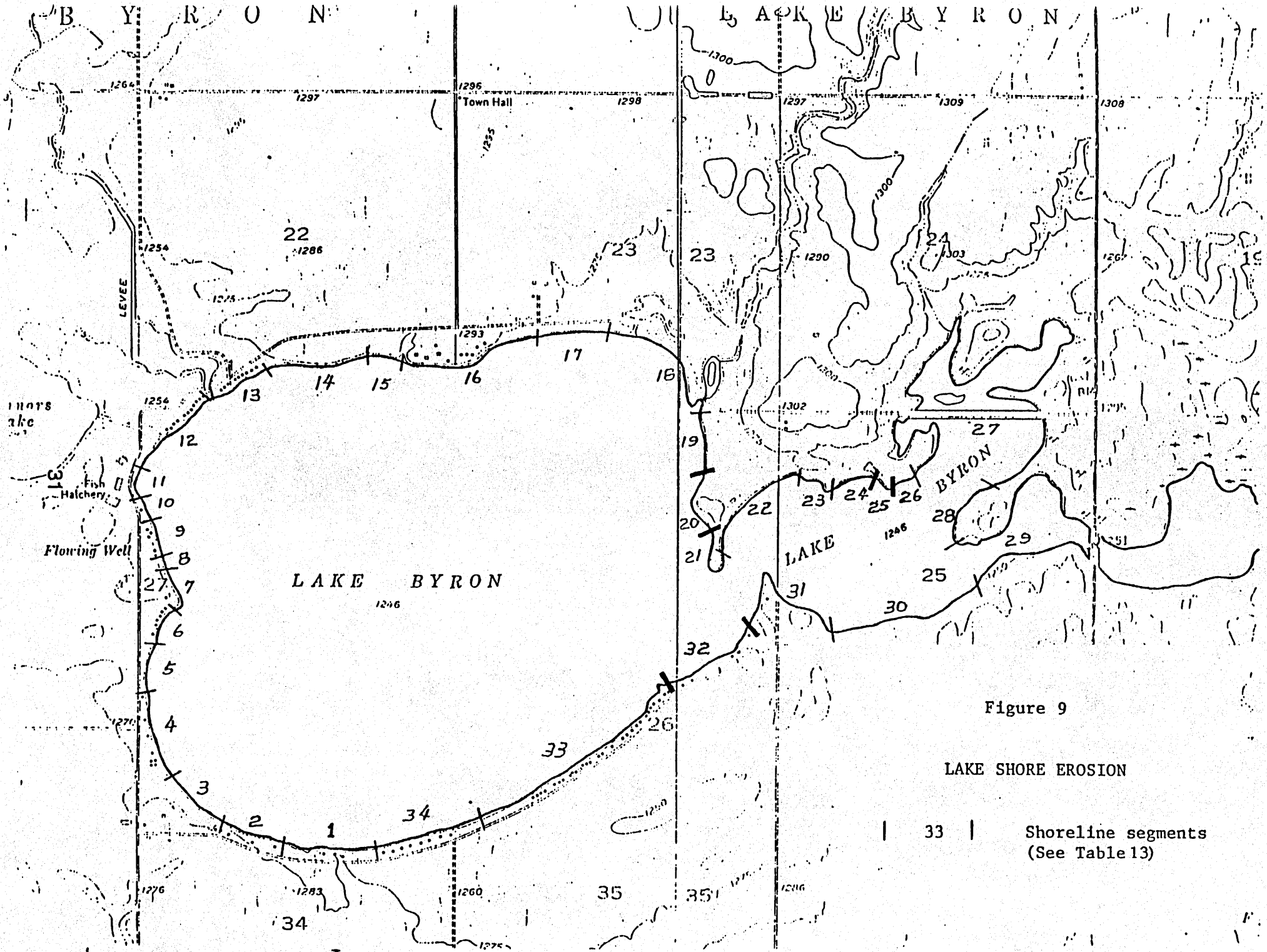


Figure 9

LAKE SHORE EROSION

| 33 | Shoreline segments (See Table 13)

Table 13

LAKE BYRON SHORELINE EROSION [1/]

Segment [2/] (No.)	Sed/Yr. (Tons)	Shoreline Length (Ft.)	Sediment Produced/Ft. of Shoreline (Tons/Lineal Ft.)
1	54.00	1,500	0.036
2	37.80	1,050	0.036
3	50.85	1,130	0.045
4	29.25	1,300	0.023
5	36.45	810	0.045
6	11.70	650	0.018
7	36.45	810	0.045
8	18.90	210	0.090
9	13.50	600	0.023
10	17.28	480	0.036
11	14.85	550	0.027
12	14.40	1,600	0.009
13	18.54	1,030	0.018
14	98.83	1,690	0.056
15	15.66	580	0.027
16	106.20	2,360	0.045
17	21.42	1,190	0.018
18	0	2,400	0
19	68.40	950	0.072
20	393.75	1,250	0.315
21	80.64	1,120	0.072
22	0	1,920	0
23	12.60	700	0.018
24	0	750	0
25	44.55	330	0.135
26	9.00	500	0.018
27	0	6,500	0
28	31.59	1,170	0.027
29	0	6,000	0
30	142.02	2,630	0.054
31	43.20	2,400	0.018
32	247.05	1,830	0.135
33	342.00	3,800	0.090
34	40.50	1,800	0.023
TOTAL	2,051.38	53,590	0.038

1/, Direct volume method used to compute sediment produced.
2/ Segment locations shown on the map of Lake Byron.

Nutrient and Sediment Loadings to Lake Byron

The extent of nutrient and sediment loading in Lake Byron from two of its three tributaries during 1991 was estimated in the final phases of this assessment. Periods of stream flow during that year of above average rainfall extended, with one short interruption, from April 16 through October 28 in Foster Creek (site 2) and from April 16 to October 20 in the unnamed northern tributary to the east (site 3). The third and easternmost tributary (Figure 1) was not monitored during this study due to difficulty in gaining access to a suitable sampling site during a high water year. Table 14 and 15 present total and areal loadings to Lake Byron and the net nutrient and sediment loads accumulated in the lake during 1991.

Table 14. Lake Byron Water, Nutrient and Sediment Mass Balance, April to October 1991.

Parameter	Inflow (Sites 2 & 3)	Outflow (Site 1)	Accumulated
Water Flow[1] acre-feet/yr	7070	768	6302
Total Nitrogen[2] grams/m^2/yr	8.668	.384	8.284
Total Phosphorus[2] grams/m^2/yr	1.127	.038	1.089
Sediment (TSS)[2] grams/m^2/yr	41.434	2.802	38.632

[1]Includes inflow from the James River pipeline for April-Oct. 1991.

[2]Nutrient and sediment loads from the James River pipeline not calculated.

The tabulated values suggest Lake Byron is receiving extremely high loads of phosphorus (TP) and nitrogen (TN) from its large watershed. Not surprisingly, Foster Creek contributed nearly all of this loading - 93% of total phosphorus and nearly 98% of total nitrogen. Sediment loads (total suspended solids) entering the lake from its watershed appeared to be negligible during 1991 with the Foster Creek drainage providing the bulk of incoming suspended sediments. (Table 15, Appendix A).

Due to the relatively small outflow of water from Lake Byron in 1991, most of the incoming nutrients and sediments were retained (accumulated) in the lake (Table 14).

Limited loading data indicate that the Foster Creek drainage is by far the larger contributor of nutrients. Due to much smaller flows in the monitored, unnamed tributary, nutrient loads from this source fell within acceptable (permissible) limits during 1991 (Table 15). However, the excessive loads of total phosphorus and nitrogen from Foster

Table 15. Nutrient and sediment total loads and areal loads to Lake Byron, April 16 to October 26, 1991.

		Total Load (kg/yr)			Areal Load ($g/m^2/yr$)		
Sites	Water Inflow acre-feet/yr	Total Phosphorus	Total Nitrogen	Total Sediment (TSS)	Total Phosphorus	Total Nitrogen	Total Sediment
Foster (#2) Creek	4919	8054	64904	292599	1.051	8.473	38.198
Northern (#3) Tributary	441	580	1497	24789	.076	.195	3.236
James River Pipeline	1710	-	-	-	-	-	-
Total	7070	8634	66401	317388	1.127	8.668	41.434
Permissible Load[1]		536.2	7660	-	.070	1.000	-
Dangerous Load[1]		995.8	15320	-	.130	2.000	-

[1] Vollenweider (1968) phosphorus and nitrogen loadings based on Lake Byron mean depth (<5 meters) and surface area (766 ha = 1893 ac).

'Permissible' loads are those which would cause the receiving lake to become less eutrophic or mesotrophic.

'Dangerous' loads would cause the receiving lake to become eutrophic or remain eutrophic.

Creek may have to be reduced by an estimated 94% and 88%, respectively, to achieve permissible levels of these nutrients that are carried into the lake primarily by snowmelt and rainstorm runoff. The above percentages represent reductions of approximately 9 tons (8 metric tons) of TP and 65 tons (59 metric tons) per year of TN. Only minor reductions in phosphorus loads (<10%) from the unnamed intermittent creek (site 3) would be required to attain the same goal for this minor tributary.

Tributary Water Quality

During this assessment, tributary inlet sites #2 and #3 were sampled a total of 14 times. Water quality data indicated that Foster Creek (site #2) experienced high levels of phosphorus and nitrogen contamination and in turn delivered those high concentrations of contamination to Lake Byron. Incoming sediments (TSS) from both monitored tributaries did not appear to exert as great a potential impact on the lake as nutrients and bacteria during the monitoring period.

Both tributaries were responsible for high levels of coliform bacteria entering the lake. Similarly high levels of nutrients and bacteria in the minor tributary (monitored by site #3) were considered a secondary priority for pollution abatement efforts due to much smaller stream flows in this tributary (mean: 1.14 cfs) compared to those of Foster Creek (mean: 12.65 cfs). The minor easternmost (northeast) tributary that was not sampled during this study is believed to have moderately higher flows than the monitored northern tributary due to a somewhat larger drainage (approximately 12% of the entire watershed versus 7%). Assuming similar levels of contaminants, its impact on Lake Byron could be slightly higher than that of the neighboring stream but still far below that of Foster Creek which is estimated to drain 80% of the Lake Byron watershed.

Fecal Coliform

Fecal coliform (FC) concentrations exceeding 200 per 100 ml of lake water is considered potentially unsafe for immersion recreation as previously discussed. Although this standard does not apply directly to streams, it may be used to illustrate the amount of contamination that may be occurring in the tributaries. During the study period, fecal coliform concentrations exceeded 200/100 ml in 67% of samples taken at the Foster Creek inlet (site #2) and in 69% of samples from Site #3 (Appendix A).

When FC concentrations were averaged for those dates when both tributaries were sampled, FC mean densities were very similar for both sites, approximately 730/100 ml. Clearly, fecal coliform bacteria numbers are excessive in both tributaries. However, the FC problem becomes more serious in Foster Creek where flows averaged more than 10 times higher than those of the minor tributary (Appendix A).

While high tributary FC levels were not reflected in water samples from the main basin of Lake Byron (sites #5 and #6), sources of fecal coliform contamination should be identified and controlled to protect immersion recreation in the lake. For example, coliform numbers were high (340-1200/100 ml) in 1/3 of samples taken from the large slough-like area on the eastern shore of the main lake basin (site #4). A part of those

FC densities may have been derived from waterfowl and other wildlife known to congregate in this wetland while larger FC populations may have entered the sample area from the northeastern tributary.

Nitrogen

Excessive nutrient concentrations are the primary cause of uncontrolled growth of nuisance blue-green algae and aquatic weeds in many state lakes. Both tributaries contributed high concentrations of nitrogen and phosphorus to Lake Byron, particularly Foster Creek (site #2). Total nitrogen averaged 6.0 mg/l at site #2 and 3.7 mg/l at site #3 (Table 16). Approximately half of the total nitrogen recorded for Foster Creek during this study entered Lake Byron during the last week of August 1991 in a period of high stream flow (Appendix A).

Inorganic N (ammonia and nitrates), the form of nitrogen most utilizable by algae, comprised 45% of tributary total nitrogen input. Site #2 accounted for 3.22 mg/l of inorganic nitrogen (54% of TN) and site #3 averaged 1.41 mg/l or 38% of total nitrogen at this tributary inlet. Total nitrogen (TN) concentrations were almost 62% higher in Foster Creek than in the minor tributary during this assessment.

Organic nitrogen made up 55% of tributary nitrogen. Mean organic nitrogen concentration at the Foster Creek inlet site was 2.76 mg/l and site #3 averaged only slightly lower at 2.52 mg/l (Table 16). Concentrations of organic nitrogen usually range below 1.0 mg/l in unpolluted waters (Boyd, 1979). The organic nitrogen values obtained for the Lake Byron tributary inlets strongly suggest organic pollution from animal waste or farm site fertilizer.

Phosphorus

Total phosphorus (TP) levels at tributary sites were approximately twice as high as those in the main lake basin (sites #5 and #6) but slightly to moderately lower than the average concentration at the lake slough site #4 (Tables 11 and 16). The maximum phosphorus levels recorded at site #4 (l.06 mg/l) could have resulted primarily from the proximity of the northeast tributary inlet to this sampling site. Additional sources of phosphorus at site #4 may have included waterfowl waste and decaying wetland vegetation.

Total phosphorus averaged 0.94 mg/l and 0.86 mg/l at sites #2 and #3, respectively. Unlike nitrogen means, there was relatively little difference in TP averages between the two tributaries. Dissolved phosphorus made up 69% (site #2) and 49% (site #3) of total phosphorus at those sites. This compared with 94% for lake basin sites (#5 and #6) and 50% for site #4. These high percentages of dissolved phosphorus may be indicative of water contamination from animal or human wastes and, secondarily, runoff from overfertilized crop land.

Table 16. Tributary Sampling Data Ranges and Mean Values, April 16, 1991 to August 5, 1992 (n = 14, 14, 3).

Parameter	Mean values and ranges for sites		
	Site 2	Site 3	Site 1
D.O. (mg/l)	4.0 (0.0-12.3)	4.8 (0.1-12.8)	5.5 (4.2-7.5)
Field pH (s.u.)	7.6 (6.7-9.6)	7.5 (6.4-8.6)	8.8 (7.9-9.7)
Fecal Coliform (#per/100 ml)	672 (10-3000)	1615 (10-13000)	1673 (10-5000)
Total Alkalinity (mg/l)	284 (138-811)	217 (74-274)	210 (207-214)
Total Solids (mg/l)	1625 (738-2886)	1870 (302-3475)	1634 (1565-1673)
Total Dissolved Solids (mg/l)	1506 (680-2544)	1740 (222-3295)	1550 (1519-1574)
Total Suspended Solids (mg/l)	57 (14-160)	72 (4-276)	27 (12-38)
Total Volatile Solids (mg/l)	31 (2-90)	19 (2-34)	14 (10-22)
Total Non-Volatile Solids (mg/l)	26 (2-70)	53 (2-248)	13 (2-20)
Total Ammonia (mg/l)	2.88 (.02-37.60)	.728 (.02-4.75)	.20 (.02-.52)
Un-ionized Ammonia (mg/l)	.225(.000-2.728)	.011 (.000-.060)	.145 (.003-.389)
Nitrate + Nitrite (mg/l)	.34 (.10-1.40)	.68 (.10-5.5)	.70 (.50-.90)
TKN (mg/l)	5.64 (.87-43.00)	3.25 (.10-5.37)	2.51 (2.16-2.71)
Organic Nitrogen (mg/l)	2.76 (.74-5.69)	2.52 (.70-5.32)	2.30 (2.09-2.63)
Total Nitrogen (mg/l)	5.98 (.97-43.10)	3.70 (.60-14.40)	3.21 (2.86-3.61)
Total Phosphorus (mg/l)	.939 (.302-3.980)	.863 (.246-1.590)	.327 (.26-.420)
Dissolved Phosphorus (mg/l)	.647 (.159-2.560)	.422 (.90-.929)	.212 (.210-.217)

Suspended Solids

Exceedences of the 150 mg/l water quality standard for total suspended solids (TSS) were few at both tributary sites (3) considering that this assessment was conducted during a period of above average rainfall in the watershed (April 1991 to August 1992). However, six readings measuring more than 90 mg/l were recorded for the two sites. They included 160, 120, and 104 mg/l of TSS at the Foster Creek inlet (site #2) and 98, 164, and 276 mg/l at site #3 (Appendix A). While half of these readings were under the TSS limit for marginal warmwater fisheries (Foster Creek and Lake Byron), all of them were considered excessive because those levels of TSS contribute substantially to lake water turbidity.

Total suspended solids averages for the study period were 57 and 72 mg/l for the respective sites. The organic fraction of TSS at Foster Creek (54%) was more than twice that of site #3 (26%).

However, very low dissolved oxygen levels (0-2.3 mg/l) at both sites during late spring and summer, 1991 (Appendix A) strongly suggested considerable quantities of organic matter had been decomposed (oxidized) upstream of both inlet sites. This organic matter (probably animal waste) was likely a product of livestock operations in the watershed. In the process of undergoing decay (oxidation) excessive organic material in a stream may deplete local oxygen supplies faster than they can be replenished from the air.

While it is believed that incoming suspended solids (TSS) added significantly to lake water turbidity during this assessment, calculated sediment loads to Lake Byron from the monitored tributaries were relatively minor. Foster Creek contributed 323 tons of sediment in 1991 and the unnamed monitored tributary (site #3) added only a little over 27 tons for a total of 350 tons or less than 0.3 acre-feet of sediment per year for 1991 (Appendix A).

Drainfield Pipe Discharge

Some distance from the three tributary inflows on the western, eastern and northern lake shoreline, a twin-pipe (12 in. dia.) surface outlet (from an underground tile drainage system immediately south of the lake) discharges to a point on the southern shoreline of Lake Byron in the northwest quarter of section 35 (35-113N-61W) (Figure 1). Two water quality samples taken from the discharge pipe (site #21) in June and July 1991 indicated primarily high levels of suspended solids (221 mg/l), nitrates (0.9 mg/l) and total phosphorus (1.26 mg/l) were entering the lake from this source during stormwater runoff. The values of other measured water quality parameters fell within or below lake averages. The magnitude of impact on the lake from this point source is unknown at this time. However, it is estimated the tile field drains an area of less than 500 acres. Half of this acreage may have been former wetlands converted to cropland 40 to 50 years ago at which time a renewable permit was issued for a pipe discharge to the lake. Considering the relatively small acreage drained (<500 acres) by the tile field, gross impact on Lake Byron is believed to be smaller than that of the northern or northeastern lake tributary.

Watershed Inspection

There are 220 farmsteads/land operators in the Lake Byron watershed, including 45 in Beadle, 75 in Clark, and 100 in Spink County according to a survey conducted in 1991 by Beadle Conservation District personnel (Table 2). The same survey recorded 3,099 acres of highly erodible soils in the drainage, 54% of which were in Beadle County in the general vicinity of Lake Byron. A preliminary inspection of watershed farmsteads/livestock operations indicated that at least four livestock operations will require animal waste management systems (AWMS) and 10 animal feeding areas may need to be established away from natural drainage pathways. The Beadle County Conservation District has recently submitted a proposal for a more comprehensive survey of watershed livestock operations (feedlots and livestock confinement areas) that will rate these facilities according to their relative impact on water quality in the Lake Byron watershed.

CONCLUSIONS

1. Very high concentrations of phosphorus (mean: 0.437 mg/l) were present in Lake Byron during this assessment from April 16, 1991 to August 5, 1992. According to several literature sources, concentrations greater than 0.05 mg/l TP are indicative of extreme eutrophy (hypereutrophy).

2. Dissolved phosphorus (DP) made up nearly 94% of in-lake total phosphorus (sites 5 and 6) during the study strongly suggesting the presence of one or more pollution sources on the lake periphery or in the lake watershed. Most likely contaminants contributing DP may be animal and/or human wastes.

3. Tributary phosphorus (TP) averages were twice as high (0.939 and 0.863 mg/l) as in-lake means (sites 5 and 6) indicating that the two monitored tributaries, particularly Foster Creek, are major contributors of phosphorus to the lake.

4. Mid-lake mean values for organic nitrogen and ammonia were also excessive, 2.3 and 1.0 mg/l, respectively. Values above 1.0 mg/l of organic nitrogen suggest organic pollution from watershed fertilizers (e.g. manure spreading) and animal waste. Five violations for un-ionized ammonia (>0.05 mg/l) were detected for mid-lake stations 5 and 6 during this study. No ammonia violations were recorded at slough site 4.

5. The northern tributary (site 3) ammonia average was slightly lower than the mid-lake mean. However, the average for Foster Creek (2.88 mg/l) was nearly three times as high. This was attributable to a single peak of extremely high ammonia concentration (37.60 mg/l) recorded at the Foster Creek inlet (site 2) on August 26, 1991. The cause or source of this peak is not known at the present time.

6. Low dissolved oxygen levels recorded at both tributary sites in late spring and summer (0.0 - 2.3 mg/l) strongly suggested the presence of large quantities of decomposable organic matter upstream of the monitored inlet sites, probably derived from animal wastes.

7. Water quality monitoring indicated that both phosphorus and nitrogen are present in the main basin of Lake Byron in abundance. Serious limitation is not consistently indicated for either nutrient (mean annual N/P ratio = 9.5/1). Based on these nutrient levels, conditions are favorable for the production of algal blooms or nuisance weed growth, if other growth factors such as micronutrients and water turbidity are not limiting.

8. Lake Byron is experiencing excessive phosphorus and nitrogen loading from the Foster Creek drainage. It was estimated nutrients from this source may have to be reduced by approximately 90% to achieve significant improvements in lake water quality.

9. Calculated sediment loads to Lake Byron from the two monitored tributaries appeared to be minor amounting to only 350 tons (<0.3 acre-feet) per year for 1991.

10. A USGS sediment depth survey conducted in Lake Byron during May 1992 indicated 3.7 million cubic yards of soft sediment had accumulated in the lake basin since the mid 1930's when the lake was dry. This represented an estimated 17% loss of lake capacity in 57 years.

11. A past SCS study indicated shoreline erosion contributed 2,051 tons or 1.6 acre-feet of sediment during 1981. Approximately 3410 linear feet of cut banks on the east side of Lake Byron that are exposed to strong north westerly winds experienced the most severe erosion.

12. In-lake fecal coliform concentrations were low during the monitoring period averaging 12/100 ml at sites 5 and 6. Bacteria densities were far below the lake criterion of 150/100 ml for a marginal warmwater fishery.

13. Tributary fecal coliform (FC) levels exceeded 200/100 ml in 67% of samples from Foster Creek (mean: 672/100ml) and 69% of samples from the northern tributary monitored by site 3 (mean: 1615/100 ml). Although the high tributary FC densities were not reflected in mid-lake samples, the source(s) of these high bacterial levels should be identified to protect immersion recreation in the lake.

14. High fecal coliform densities were also observed on one date at the lake outlet site #1 and on most sampling dates at the slough site #4. Congregating waterfowl and input from the northeast tributary may be responsible for high FC densities at site #4. The reason(s) for the single instance of high FC numbers at site #1 are not clear at this time.

15. Average water clarity (secchi disk visibility) in Lake Byron for 1991 was rated as poor (0.6 meter = 2.0 ft). A large part of this water turbidity may be caused by incoming tributary suspended solids (TSS), shore bank erosion, and resuspension of lake bottom sediments by wind and wave action.

16. Examination of limited past data (1979-82) for in-lake and tributary monitorings suggests nitrogen and phosphorus levels have not changed greatly during the past decade. Similarly high N and P concentrations were found in-lake and entering from the tributaries. In-lake and tributary TSS levels may have been moderately higher 10 years ago.

17. Floating and submerged aquatic weeds have not been reported as a problem in Lake Byron since 1982-83 when a weed harvesting program was completed. However, nuisance algal blooms continue to be a recurring problem.

RECOMMENDATIONS

Based on the results of this study, the DENR recommends the following alternatives for restoration. These recommendations should provide a basis for the development of a complete restoration work plan and subsequent implementation. The recommendations are provided for review only. They are not to be considered as the only possible methods of restoration. In approximate order of importance they are the following:

1. Ag Waste Management Systems

   Installation of animal waste management systems (AWMS) at the feedlots in the watershed would represent an important step to reduce nutrient and fecal coliform bacteria input. Animal waste is a major contaminant to Lake Byron and its tributaries at the present time. Approximately four AWMS's would be needed to contain a large portion of the present feedlot runoff. In addition, 10 animal feeding areas need to be established away from tributary drainage pathways.

2. Best Management Practices on Cropland:

   Best Management practices should be applied to cropland and pastures where necessary, to reduce nutrient loading and sedimentation to the lake. Minimum tillage practices should be stressed as a preferred method of crop residue management on 10,000 acres.

3. Shoreline Erosion:

   Approximately 3410 linear feet of riprapping is needed to stabilize the severe shoreline erosion areas on the east side of Lake Byron.

4. Grass Filterstrips:

   Approximately 200 filterstrips need to be established mostly on the banks of lower Foster Creek to prevent erosion and sedimentation to Lake Byron.

5. Grass Seeding:

   Grass cover needs to be established on 1000 watershed acres to prevent erosion.

6. Sediment Basins:

   Six sediment basins need to be constructed on Foster Creek and smaller watershed tributaries.

7. Tree Planting:

   To stabilize watershed soils and reduce wind erosion, tree planting needs to be carried out on 150 watershed acres.

8. Planned Grazing Systems:

Planned Grazing Systems should be applied on 5000 acres of native range to improve range condition.

9. Centralized Wastewater Facility:

Planning should continue on construction of a centralized sewer system that would serve lakeside residences and eliminate potential nutrient and bacteria contamination to Lake Byron from failing septic tank systems.

10. Selective Lake Dredging:

General sediment removal should be conducted in concert with watershed stabilization measures such as those listed above or, more advantageously, after these activities have been completed and shown to be successful in reducing sediment and nutrient input to the lake. Due to high costs and the large size of the lake basin, extensive dredging is not recommended in this case. Limited dredging may be justified if significant public benefits will result. In Lake Byron, selective dredging has potential for removing possible boating hazards that may develop during low water periods, reducing winter fish kills, improving fishing success at public access areas, and improving conditions at public swimming beaches.

REFERENCES

American Public Health Association, American Waterworks Association, and Water Pollution Control Foundation. 1985. Standard methods for the enumeration of water and wastewater, 10th edition. New York, 1268 pp.

Boyd, C. E., 1979. Water quality in warmwater fish ponds. Auburn University Agricultural Experimental Station, Montgomery, Alabama.

Carlson, R. E., 1977. A trophic state index for lakes. Limnol. Oceanogr. 22:361-369.

Churchill, E. P., Over, Wm. H., 1927. A preliminary report of a biological survey of the lakes in South Dakota. South Dakota Geological and Natural History Survey Series XXVII, No. 6.

Cole, G. A., 1983. Textbook of Limnology. C. V. Mosby Co, St. Louis, Missouri.

Howells, L. W., Stephens, J. C., 1968. Geology and Water Resources of Beadle County, South Dakota - Part II. United States Geological Survey. Bulletin 18-SDGS, Vermillion, South Dakota.

Koth, R. M., 1981. South Dakota lakes classification and inventory. South Dakota Department of Water and Natural Resources, Office of Water Quality. Pierre, South Dakota, 693 pp.

Lind, O. T., 1974. Handbook of common methods in limnology. C. W. Mosby Co., St. Louis, Missouri. 154 pp.

Reckhow, K. H., M. N. Beaulac, and J. T. Simpson, 1980. Modeling phosphorus Loading in Lake Response Under Uncertainty: A Manual and Compilation of Export Coefficients. U.S. Environmental Protection Agency, EPA 440/5-80-011, Washington, D. C., 214 p.

South Dakota Department of Environment and Natural Resources. 1985. Lake Byron Water Quality Study Area Report (WQSA). Water Quality Management Section, DENR, Pierre, South Dakota.

State Lakes Preservation Committee, 1977. A plan for the classification - preservation - restoration of lakes in northeastern South Dakota. State of South Dakota and the Old West Regional Commission. Pierre, South Dakota.

Stewart, W. C., 1992. South Dakota Lakes Survey. South Dakota Department of Environment and Natural Resources, Pierre, SD.

U.S. Environmental Protection Agency, 1974. Methods for chemical analysis of water and wastes. EPA 625/6-74-003. Washington, D. C. 298 pp.

Vollenweider, R. A., 1968. Scientific fundamentals of the eutrophication of lakes and flowing waters, with particular reference to nitrogen and phosphorus as factors in eutrophication. Technical report to OECD, Paris, France, DAS/CS168, 27:1-82.

Wetzel, R. G., 1983. Limnology. W. B. Saunders Company, Philadelphia, 743 p.

ATTACHMENT A

James River Pipeline Water Right

FORM 2: Application for irrigation (type or print)

No. 5027-3 Hydrologic Unit 10160006
Map No. 5027-3 Basin James River
Newspaper Daily Plainsman

Mail to: Water Rights Div.
DWNR, Foss Bldg.
Pierre, SD 57501
(605) 773-3352

Application For Permit To Appropriate Water Within The State Of South Dakota

JUN 1984 DIVISION OF WATER RIGHTS Pierre, SD

Type of Application: Check one or more of the following;

New [x] Vested Right [ ] Future Use [ ]

[ ] Application to amend Permit No.____ with old priority date retained

[ ] Change diversion point(s) [ ] Add diversion point(s) [ ] Change acreage [ ] Other [ ]

[ ] Application to: [ ] Change use [ ] Change diversion point(s) [ ] Add diversion point(s)

[ ] Add Acreage [ ] Increase diversion rate [ ] Other ____ See Permit No.____

[ ] Application to: [ ] Use [ ] Transfer water reserved by Future Use Permit No.____

1. Name of Applicant LAKE BYRON WATER SHED DISTRICT Phone No. 352-1857

Post Office Address 201 Farmers & Merchants Building - Huron (Street, RR or Box) State S.D. 57350 Zip Code

2. Amount of water claimed (c.f.s) 12.0 cfs ~~Total acres irrigated~~ Not to exceed 3400 ~~cfs~~ per yr.
3. Source of Water supply JAMES RIVER
4. Location of point of diversion JAMES RIVER mile 234.25- plus or minus- 1640 ft N., 4440 W of SE corner section 33, Township 113 N.-Range 61 W

County BEADLE

5. Counties where water will be used BEADLE
6. Annual period during which water is to be used When flow is greater then 20 cfs over 3rd street dar
7. List below each forty acre subdivision, or lot, or fraction thereof and show number of acres to be irrigated in each.

Land Description	No. Acres Irr.	Land Description	No. Acres Irr.

Attach sheet if more space is needed

8. Give a brief description of proposed project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

The project involves the pumping of water from the James River to Lake Byron to provide for the stabilization of water levels of the Lake & to provide for the storage of water which could be returned to the James River to provide a supplemental source of water for the City of Huron.

SEE ATTACHMENTS: Preliminary Report
Hydrological Study
Maps

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map (see instruction)

STATE OF SOUTH DAKOTA)
County of Beadle)ss

I, Pat Arbuthnot, Chairman the applicant, certify that I have read the foregoing application, have examined the attached map and that the matters therein stated are true and that I intend, and am able to complete the necessary construction.

Signed Pat Arbuthnot

Subscribed and sworn to before me this 13th day of June 1984

[signature]

8/24/87

WATER PERMIT

The Water Management Board hereby approves Water Permit Application No. 5027-3

Lake Byron Watershed Dist. (Applicant) 201 Farmers & Merchants Bldg Huron (Post Office Address)

South Dakota (State) 57350 (Zip Code) With the following qualifications.

See Attachment A

Date of first receipt of application June 14, 1984.

Date of return to applicant for correction, amendments or changes required —, 19—.

Date of receipt of corrected application —, 19—. Approved December 5, 1984.

The Water Management Board hereby approves this Water Permit No. 5027-3 authorizing the construction of the water use system and the placing of water to beneficial use as stated in the Application and as qualified in the Water Permit approval, subject, however, to the following limitations and conditions:

1. The date from which applicant may claim right is June 14, 1984.
2. One-fifth of the work is to be completed on or before June 5, 1987.
3. The whole of said work is to be completed on or before December 5, 1989.
4. The time limit for proof of beneficial use of water is December 5, 1993.
5. The water appropriated shall be used for the purpose of Lake Stabilization
6. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be unlawfully impaired by this appropriation.
7. The amount of the appropriation herein granted shall not exceed 3400 acre feet per year ~~cubic feet per second~~; neither shall it exceed the capacity of the above described water supply system nor shall it exceed the amount of water needed for beneficial uses served. For irrigation purposes said appropriation must be limited to not more than 2 acre feet per acre per year and be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually and beneficially applied for irrigation on or before December 5, 1993; said water to be used during the following described annual period: Jan. 1 To December 31

WATER MANAGEMENT BOARD

By: John Hatch
Chief Engineer

Division of Water Rights
Dept. of Water and Natural Resources

January 3, 1985

ATTACHMENT A

Permit No. 5027-3, Lake Byron Water Shed District

1. Low flows as needed for downstream domestic use and prior water rights must be bypassed. The minimum bypass at Huron for domestic use is 20 cfs. During the period of April 1 through June 30 of each calendar year, diversions are authorized only when 60 cfs or more are by-passed after diversion for domestic use or prior water rights, unless a lower flow by-pass based upon the need for water in Lake Byron versus the need for water downstream, is authorized by the Chief Engineer. This permit does not authorize diversion of water from the James River after June 30th of each calendar year unless written orders have been so issued by the Chief Engineer. In the management of the James River under this permit, flows will be monitored at all gaging stations, and cutoffs will be timed to insure water supplies for domestic use and prior water rights.

2. This Permit is approved subject to a yearly report being submitted by January 31 to the Chief Engineer on the quantity of water diverted each month in the previous calendar year.

3. Before a controlled release of water occurs, the Lake Byron Watershed District shall collect water quality samples from Lake Byron and the James River, have an approved laboratory analyze the samples, and submit the laboratory results to the Chief Engineer for review by the Division of Environmental Quality. If the results are satisfactory, the Chief Engineer may approve a controlled release of water if:

   a. The quality of the Lake Byron water will not violate James River Stream Standards during a controlled release; or

   b. The quality of water in Lake Byron is equal to or better then the James River water quality.

If, at any time during the controlled release, the James River Stream Standards are violated due to the discharge, the Chief Engineer will require the controlled release of water to cease.

4. The elevation of outlet control structures for Lake Byron and Connors Lake may not exceed elevation 1248.1 feet msl.

APPENDIX A

Water Quality Data

LAKE BYRON LAKE ASSESSMENT REPORT SAMPLING DATA

DATE	TIME	SITE	SAMPLE	TOTAL DEPTH (FT)	WATER TEMP (C)	AIR TEMP (C)	SECCHI DISK (FT)	DO mg/L	FIELD PH units	FECAL /100 ml	TOTAL ALKAL mg/L	TOTAL SOILDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL SOLIDS mg/L	AMMO mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TPO4-P mg/L	DISS-P mg/L	N:P RATIO	CARLSON'S INDEX SECCHI	CARLSON'S INDEX TPO4-P	CL mg/L
19-Nov-90	1430	4	SURFACE	0.36	4.4	12.2	0.15	13.7	7.3	10	262	2,987	2,746	140	50	90	0.09	0.0002	0.10	2.87	2.78	2.97	1.150	0.562	2.58	87.73	105.82	
16-Apr-91	1345	4	SURFACE	0.69	6.7	11.1	0.69	10.8	7.4	10	230	2,411	2,314	30	10	20	0.06	0.0003	0.30	1.67	1.59	1.97	0.522	0.461	3.77	65.44	94.43	
29-Apr-91	1515	4	SURFACE	0.55	6.7	6.1	0.15	9.7	7.1	180	253	2,619	2,381	134	34	100	0.03	0.0001	0.40	2.97	2.94	3.37	0.725	0.298	4.65	97.14	99.17	
06-May-91	1430	4	SURFACE	0.53	7.2	10.0	0.55	12.0	6.5	80	263	2,493	2,354	34	26	8	0.04	0.0000	0.10	1.18	1.14	1.28	0.325		3.94	68.66	87.59	126
21-May-91	900	4	SURFACE	0.27	18.0	22.0	0.27	3.9	8.1	10	264	2,501	2,318	80	22	58	0.06	0.0025	0.10	3.63	3.57	3.73	0.864		4.37	79.07	101.53	162
29-May-91	1140	4	SURFACE	0.61	22.0	22.0	0.08	7.5	8.0	900	260	2,377	1,990	274	76	198	0.21	0.0092	0.10	3.27	3.06	3.37	1.660	0.340	2.01	97.14	111.29	42
03-Jun-91	915	4	SURFACE	1.32	23.0	27.0	0.30	1.2	7.6	760	115	449	424	46	4	42	0.13	0.0025	0.10	1.60	1.37	1.6	0.946	0.739	1.69	77.14	103.01	31
12-Jun-91	1105	4	SURFACE	1.14	25.0	25.0	0.30	1.0	7.7	60	153	679	632	18	16	2	0.59	0.0164	0.60	2.31	1.72	2.91	1.190	0.949	2.45	77.14	108.32	43
01-Jul-91	1025	4	SURFACE	1.37	23.3	22.8	0.24	2.4	7.4	80	212	1,224	1,123	54	22	32	0.31	0.0039	0.70	2.76	2.46	3.46	0.910	0.500	3.80	80.36	102.45	66
23-Jul-91	850	4	SURFACE	1.07	23.9	22.8	0.24	0.2	8.8		288	1,419	1,268	74	22	52	0.02	0.0060	0.50	2.65	2.63	3.15	1.230	0.600	2.56	80.36	106.79	104
26-Aug-91	912	4	SURFACE	0.91	23.9	23.9	0.30	4.0	8.5		301	1,722	1,608	52	14	38			0.16	0.10		0.26	2.090	0.320	0.12	77.14	114.44	
27-Apr-92	1100	4	SURFACE	1.03	9.0	18.0	0.10	8.0		10	298	2,043	1,876	100	30		0.02		0.10	1.93	1.91	2.03	0.362	0.212	5.61	93.14	89.15	
17-Jun-92	1220	4	SURFACE	0.84	18.0	19.0	0.15	6.8		340	335	2,229	2,100	112	26		0.04		0.10	2.12	2.08	2.22	0.564	0.163	3.94	87.14	95.55	
08-Jul-92	920	4	SURFACE	0.99	21.0	22.0	0.08	4.2		1,200	320	2,182	1,978	142	26		0.02		0.10	2.59	2.57	2.69	0.634	0.209	4.24	97.14	97.23	
05-Aug-92	1045	4	SURFACE	1.07	18.5	19.0	0.23	4.0			308	1,916	1,811	36	18		0.02		0.10	2.43	2.41	2.53	0.784	0.536	3.23	81.29	100.30	
	1991	MEAN ——>		0.80	16.7	18.6	0.30	6.0	7.7	232	238	1,698	1,743	85	27	58	0.16	0.0040	0.29	2.26	2.33	2.55	1.057	0.530	2.90	79.76	102.99	85
	1991	MEDIAN —>		0.69	22.0	22.0	0.69	4.0	7.6	80	260	2,377	1,990	54	22	42	0.06	0.0025	0.16	2.65	2.64	2.97	0.946	0.500	2.56	77.14	103.01	66
	1991	MINIMUM —>		0.27	4.4	6.1	0.08	0.2	6.5	10	115	449	424	18	4	2	0.02	0.0000	0.10	0.10	1.14	0.26	0.325	0.298	0.12	65.44	87.59	31
	1991	MAXIMUM —>		1.37	25.0	27.0	0.69	13.7	8.8	900	301	2,987	2,746	274	76	198	0.59	0.0164	0.70	3.63	3.57	3.73	2.090	0.949	4.65	97.14	114.44	162
	1992	MEAN ——>		0.96	16.6	19.5	0.14	5.9		517	315	2,093	1,941	98	26		0.03		0.10	2.27	2.24	2.37	0.566	0.281	4.25	89.68	95.56	
	1992	MEDIAN —>		1.01	18.3	19.0	1.01	5.5		340	313	2,113	1,927	106	27		0.02		0.1	2.275	4.49	2.375	0.599	0.211	4.09	90.14	96.39	
	1992	MINIMUM —>		0.84	9.0	18.0	0.08	4.0		10	298	1,916	1,811	36	18		0.02		0.10	1.93	1.91	2.03	0.362	0.163	3.23	81.29	89.15	
	1992	MAXIMUM —>		1.07	21.0	22.0	0.23	8.0		1,200	335	2,229	2,100	142	30		0.04		0.10	2.59	2.57	2.69	0.784	0.536	5.61	97.14	100.30	

LAKE BYRON LAKE ASSESSMENT REPORT SAMPLING DATA

DATE	TIME	SITE	SAMPLE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	SECCHI DISK (M)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOILDS mg/L	TOTAL DISS. SOLID mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL SOLIDS mg/L	UNIONIZED AMMON mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TPO4-P mg/L	DISS-P mg/L	N:P RATIO	CARLSON'S INDEX SECCHI	CARLSON'S INDEX TPO4-P	CL mg/L
15-Jan-91	1020	5	SURFACE		1.0	-3.3		4.9	6.8	10	353	2,762	2,684	13	6	7	2.92	0.0015	0.50	6.21	3.29	6.71	0.814	1.450	8.24		100.84	
16-Apr-91	1145	5	SURFACE	1.01	4.4	10.0	1.01	11.9	7.4	2	230	1,939	1,831	44	14	30	0.42	0.0013	0.10	2.80	2.38	2.90	0.278	0.142	10.43	59.79	86.34	
21-May-91	1010	5	SURFACE	1.37	16.0	20.0	0.30	9.0	8.6	10	251	2,179	2,001	104	22	82	0.03	0.0036	0.10	2.25	2.22	2.35	0.637		3.69	77.14	97.30	161
12-Jun-91	1000	5	SURFACE	1.83	24.0	24.0	0.61	5.2	8.2	30	198	1,387	1,226	74	32	42	0.74	0.0574	0.70	2.36	1.62	3.06	0.649	0.237	5.57	67.14	95.16	101
23-Jul-91	1300	5	SURFACE	1.83	25.6	26.1	0.30	3.2	11.2	20	229	1,641	1,537	52	14	38	0.19	0.1880	0.50	2.71	2.52	3.21	0.400	0.440	8.03	77.14	90.59	210
17-Dec-91	1000	5	SURFACE	1.83	2.0	0.0		11.0	8.3	2	246	2,070	1,991	6	4	2	0.21	0.0037	0.10	2.72	2.51	2.92	0.216	0.159	13.06		81.70	
21-Jul-92	1355	5	SURFACE	2.29	21.0	18.0	0.38	8.2			269	1,923	1,805	47	16	31	0.05		0.10	1.94	1.99	2.04	0.232	0.043	8.79	73.92	82.73	
1991	MEAN --->			1.57	12.5	12.8	0.56	7.5	8.4	12	251	1,996	1,878	49	15	34	0.75	0.0426	0.33	3.16	2.42	3.51	0.482	0.486	8.17	70.30	91.82	157
1991	MEDIAN --->			1.83	11.2	15.0	0.46	7.1	8.2	10	238	2,005	1,911	48	14	34	3.15	0.0036	0.30	2.72	2.45	2.98	0.476	0.440	8.14	72.14	92.66	161
1991	MINIMUM --->			1.01	1.0	-3.3	0.30	3.2	6.8	2	198	1,387	1,226	6	4	2	0.03	0.0013	0.10	2.25	1.62	2.35	0.216	0.142	3.69	59.79	81.70	101
1991	MAXIMUM --->			1.83	25.6	26.1	1.02	11.9	11.2	30	353	2,762	2,684	104	32	82	2.92	0.1880	0.70	6.21	3.29	6.71	0.814	1.450	13.06	77.14	100.84	210

LAKE BYRON LAKE ASSESSMENT REPORT SAMPLING DATA

DATE	TIME	SITE	SAMPLE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	SECCHI DISK (M)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOILDS mg/L	TOTAL DISS. SOLID mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL SOLIDS mg/L	AMMON mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TPO4-P mg/L	DISS-P mg/L	N:P RATIO	CARLSON'S INDEX SECCHI	CARLSON'S INDEX TPO4-P	CL mg/L
20-Nov-90	1000	6	SURFACE	1.91	4.4	10.0	1.21	11.4	7.7	10	333	2,068	1,966	16	8	8	1.80	0.0107	0.10	4.09	2.29	4.19	0.576	0.366	7.27	57.29	95.85	
16-Jan-91	1125	6	SURFACE		1.0	-2.8		1.5	6.4	10	364	2,758	2,670	16	5	11	3.86	0.0009	0.10	6.62	2.77	6.72	0.834	0.766	8.06		101.19	
16-Apr-91	1100	6	SURFACE	0.94	7.2	10.0	0.94	9.9	7.7	10	242	2,005	1,914	34	16	18	0.62	0.0061	0.10	3.39	2.57	3.49	0.251	0.271	13.90	60.91	93.67	
21-May-91	1030	6	SURFACE	1.86	20.0	18.0	0.46	9.0	8.2	10	240	2,047	1,949	64	18	46	1.23	0.0729	0.30	3.60	2.37	3.90	0.286		13.66	71.29	86.70	93
12-Jun-91	1010	6	SURFACE	2.74	24.0	24.0	0.46	8.5	8.5	30	207	1,661	1,548	28	26	2	0.75	0.1077	0.80	2.66	1.91	3.46	0.319	0.271	10.86	71.29	97.32	129
23-Jul-91	1150	6	SURFACE	2.74	25.6	25.6	0.24	3.6	11.2	10	207	1,686	1,559	40	16	24	0.08	0.0792	0.50	1.21	1.13	1.71	0.290	0.220	5.90	80.36	86.96	133
17-Dec-91	1130	6	SURFACE	0.91	4.0	0.0		11.3		2	249	2,053	1,970	12	10	2	0.15		0.10	2.60	2.45	2.70	0.179	0.070	15.08		78.99	
21-Jul-92	1345	6	SURFACE	1.52	21.0	21.0	0.23	7.1			274	1,996	1,804	72	28		0.02		0.10	1.99	1.97	2.09	0.268	0.249	7.86	81.29	84.70	
1991	MEAN ---->			1.85	12.3	12.1	0.66	7.6	8.3	12	262	2,040	1,942	30	14	16	1.24	0.0462	0.29	3.45	2.21	3.74	0.391	0.331	10.66	66.23	86.41	118
1991	MEDIAN --->			1.89	7.2	10.0	0.46	8.0	8.0	10	249	2,047	1,949	28	16	11	0.62	0.0418	0.10	3.39	2.37	3.49	0.320	0.270	10.86	71.29	86.96	129
1991	MINIMUM --->			0.91	1.0	-2.8	0.24	1.5	6.4	2	207	1,661	1,548	12	5	2	0.08	0.0009	0.10	1.21	1.13	1.71	0.179	0.070	5.90	57.29	78.99	93
1991	MAXIMUM --->			2.74	25.6	25.6	1.21	11.4	11.2	30	364	2,758	2,670	64	26	46	3.86	0.1077	0.80	6.62	2.77	6.72	0.834	0.766	15.08	80.36	101.19	133

LAKE BYRON LAKE ASSESSMENT PROJECT TRIBUTARY SAMPLING DATA

DATE	TIME	SITE	SAMPLE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOLIDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL. SOLIDS mg/L	AMMONIA mg/L	UNIONIZED AMMONIA mg/L	NO3+ mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TOTAL PO4-P mg/L	DISS. PO4-P mg/L	CL mg/L
12-Jun-91	920	1	SURFACE	0.15	23.9	25.0	7.5	8.7	5,000	210	1,673	1,558	38	22	16	0.52	0.042	0.90	2.71	2.19	3.61	0.420	0.217	125
01-Jul-91	910	1	SURFACE	0.27	22.8	21.1	4.2	7.9	10	214	1,585	1,519	12	10	2	0.07	0.003	0.70	2.16	2.09	2.86	0.260	0.210	122
23-Jul-91	1025	1	SURFACE	0.30	25.6	22.8	4.8	9.7	10	207	1,685	1,574	30	10	20	0.02	0.389	0.50	2.65	2.63	3.15	0.300	0.210	132
			MEAN ----->	0.24	24.1	23.0	5.5	8.8	1,673	210	1,634	1,550	27	14	13	0.20	0.145	0.70	2.51	2.303	3.207	0.327	0.212	126
			MEDIAN ---->	0.27	23.9	22.8	4.8	8.7	10	210	1,685	1,558	30	10	16	0.07	0.042	0.70	2.65	2.19	3.15	0.300	0.210	125
			MINIMUM --->	0.15	22.8	21.1	4.2	7.9	10	207	1,585	1,519	12	10	2	0.02	0.003	0.50	2.16	2.09	2.86	0.260	0.210	122
			MAXIMUM --->	0.30	25.6	25.0	7.5	9.7	5,000	214	1,673	1,574	38	22	20	0.52	0.389	0.90	2.71	2.63	3.61	0.420	0.217	132

LAKE BYRON LAKE ASSESSMENT PROJECT TRIBUTARY SAMPLING DATA

DATE	TIME	SITE	SAMPLE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOLIDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL SOLIDS mg/L	AMMONIA mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TOTAL PO4-P mg/L	DISS. PO4-P mg/L	CL mg/L
16-Apr-91	930	2	SURFACE	0.61	5.0	10.0	9.3	7.3	500	246	2,886	2,544	46	14	32	0.50	0.0012	1.40	3.06	2.56	4.46	0.834	0.488	
29-Apr-91	1345	2	SURFACE	0.53	6.1	5.6	9.4	6.8	70	193	2,493	2,360	42	24	18	0.02	0.0000	0.10	2.55	2.53	2.65	0.447	0.325	
06-May-91	1350	2	SURFACE	0.61	6.1	12.8	5.9	6.7	120	201	1,885	1,592	22	16	6	0.21	0.0001	0.80	1.03	0.82	1.63	0.302	0.190	94
21-May-91	945	2	SURFACE	0.53	16.0	20.0	2.3	7.8	520	304	2,471	2,221	160	90	70	0.43	0.0091	0.10	3.51	3.06	3.61	0.848		327
29-May-91	1110	2	SURFACE	0.46	20.0	25.0	2.0	7.5	1,950	138	811	685	80	26	54	0.13	0.0016	0.10	0.87	0.74	0.97	0.576	0.393	37
03-Jun-91	1045	2	SURFACE	0.99	23.0	28.0	0.8	7.3	360	140	896	853	54	12	42	0.24	0.0023	0.10	0.99	0.75	1.09	0.627	0.525	16
12-Jun-91	930	2	SURFACE	1.30	23.0	22.0	0.2	7.6	630	195	738	680	42	38	4	0.11	0.0021	0.60	1.61	1.50	2.21	1.150	0.854	36
01-Jul-91	935	2	SURFACE	1.22	22.6	20.0	0.6	7.3	360	260	1,120	1,088	16	14	2	0.27	0.0026	0.70	2.09	1.82	2.79	0.780	0.680	79
23-Jul-91	1000	2	SURFACE	0.91	23.9	22.2	0.0	9.6	10	206	1,670	1,581	24	12	12	0.27	0.1827	0.50	4.97	4.70	5.47	0.570		136
26-Aug-91	845	2	SURFACE	0.64	23.0	23.0	0.5	8.2	420	611	1,730	1,586	120	70	50	37.60	2.7279	0.10	43.00	5.40	43.10	3.980	2.560	
27-Apr-92	1005	2	SURFACE	0.99	9.0	7.0	12.3			259	1,602	1,476	50	36	14	0.02		0.10	4.23	4.21	4.33	0.611	0.159	
17-Jun-92	1200	2	SURFACE	0.69	19.0	23.0	5.5		3,000	340	1,910	1,803	104	76	28	0.02		0.10	5.71	5.69	5.81	0.930	0.664	
06-Jul-92	855	2	SURFACE	0.91	18.0	22.5	2.6			257	1,536	1,457	20	2	18	0.02		0.10	2.93	2.91	3.03	0.574	0.222	
05-Aug-92	1005	2	SURFACE	1.07					130	400	1,195	1,152	14	6	8	0.52		0.10	2.48	1.96	2.58	0.920	0.701	
1991	MEAN ----->			0.80	17.1	18.9	3.1	7.6	494	272	1,650	1,519	61	32	29	3.98	0.2930	0.43	6.37	2.39	6.80	1.011	0.752	103
1991	MEDIAN --->			0.73	21.4	21.0	1.4	7.4	390	204	1,678	1,584	44	20	25	0.26	0.0022	0.30	2.32	2.18	2.72	0.704	0.507	79
1991	MINIMUM --->			0.46	5.0	5.6	0.0	6.7	10	138	738	680	16	12	2	0.02	0.0000	0.10	0.87	0.74	0.97	0.302	0.190	16
1991	MAXIMUM --->			1.30	23.9	28.0	9.4	9.6	1,950	611	2,886	2,544	160	90	70	37.60	2.7279	1.40	43.00	5.40	43.10	3.980	2.560	327
1992	MEAN ----->			0.91	15.3	17.5	6.8		1,565	314	1,561	1,472	47	30	17	0.15		0.10	3.84	3.69	3.94	0.759	0.437	
1992	MEDIAN --->			0.80	18.0	23.0	5.5		1,565	300	1,569	1,467	35	21	16	0.02		0.10	3.58	3.56	3.68	0.766	0.443	
1992	MINIMUM --->			0.69	9.0	7.0	2.6		130	257	1,195	1,152	14	2	6	0.02		0.10	2.48	1.96	2.58	0.574	0.159	
1992	MAXIMUM --->			1.07	19.0	23.0	12.3		3,000	400	1,910	1,803	104	76	28	0.52		0.10	5.71	5.69	5.81	0.930	0.701	

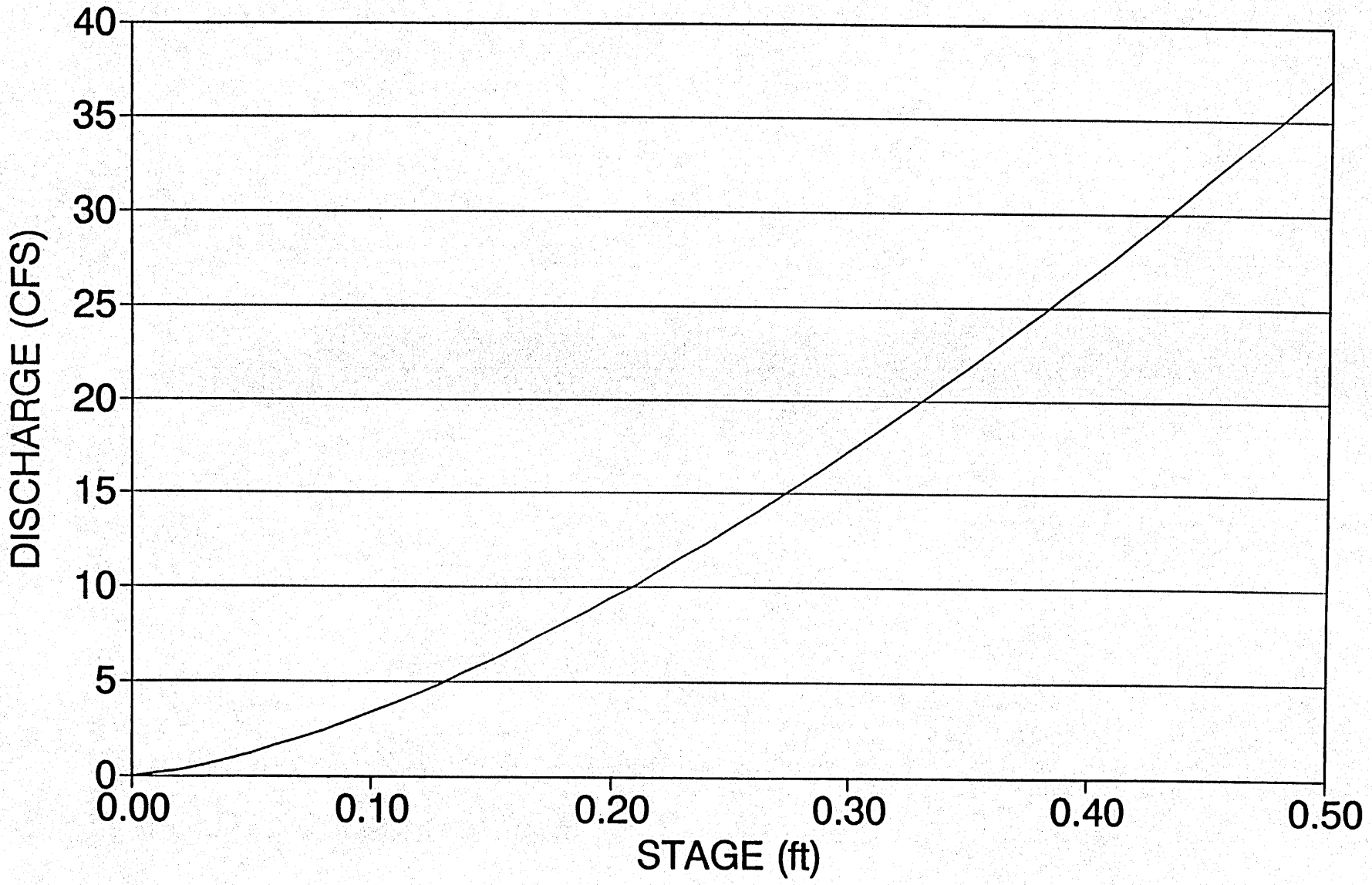
LAKE BYRON LAKE ASSESSMENT PROJECT TRIBUTARY SAMPLING DATA

DATE	TIME	SITE	SAMPLE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOLIDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL SOLIDS mg/L	AMMONIA mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TOTAL PO4-P mg/L	DISS. PO4-P mg/L	CL mg/L
16-Apr-91	1315	3	SURFACE	0.38	11.1	11.1	12.8	7.8	40	274	3,263	3,120	48	16	32	4.75	0.0601	5.50	8.90	4.15	14.40	0.732	0.488	
29-Apr-91	1415	3	SURFACE	0.38	6.7	6.1	10.6	6.8	550	264	3,677	3,475	26	2	24	0.05	0.0000	0.10	5.37	5.32	5.47	0.861	0.197	
06-May-91	1400	3	SURFACE	0.46	7.6	7.6	11.6	6.4	300	350	3,077	2,933	58	30	28	1.81	0.0007	0.90	3.80	1.99	4.70	0.576	0.339	240
21-May-91	915	3	SURFACE	0.28	19.0	22.0	1.0	7.7	270	222	3,485	3,295	38	18	20	0.85	0.0154	0.10	5.45	4.60	5.55	0.868		170
29-May-91	1125	3	SURFACE	0.38	21.0	22.0	2.2	7.6	2,200	199	1,332	1,223	40	30	10	0.82	0.0137	0.10	3.90	3.08	4.00	1.590	0.929	138
03-Jun-91	1015	3	SURFACE	0.53	23.0	25.0	1.8	7.3	300	74	302	263	54	8	46	0.12	0.0012	0.10	2.01	1.89	2.11	0.854	0.810	16
12-Jun-91	1115	3	SURFACE	1.45	25.0	26.0	0.7	7.5	640	175	558	536	4	2	2	0.04	0.0007	0.60	1.57	1.53	2.17	1.090	0.881	38
01-Jul-91	1005	3	SURFACE	1.07	23.3	21.1	1.1	7.2	830	233	1,507	1,403	38	2	36	0.41	0.0033	0.70	2.38	1.97	3.08	0.710	0.460	118
23-Jul-91	915	3	SURFACE	0.65	23.3	21.1	0.1	6.5		237	1,724	1,613	44	20	24	0.02	0.0028	0.50	2.82	2.80	3.32	0.450	0.260	137
26-Aug-91	855	3	SURFACE	0.67	23.9	23.9	0.8	6.6	60	224	1,802	1,614	98	28	70			0.50	0.10		0.60	2.540	0.250	
27-Apr-92	1030	3	SURFACE	0.69	6.0	14.0	11.0		10	246	1,853	1,751	76	34	42	0.02		0.10	1.87	1.85	1.97	0.252	0.203	
17-Jun-92	1210	3	SURFACE	0.61	19.0	16.0	4.6		2,700	181	1,271	1,108	164	26	138	0.41		0.10	1.69	1.28	1.79	0.661	0.425	
08-Jul-92	910	3	SURFACE	0.76	16.5	22.0	2.5		13,000	92	476	222	276	28	248	0.07		0.10	0.77	0.70	0.87	0.657	0.352	
05-Aug-92	1035	3	SURFACE	0.84	19.0	19.0	7.0		100	264	1,881	1,806	43	18	25	0.10		0.10	1.75	1.65	1.85	0.246	0.090	
1991	MEAN ----->			0.65	16.4	16.8	4.3	7.54	577	225	2,071	1,948	45	16	29	0.99	0.0109	0.91	3.63	3.04	4.54	1.027	0.490	122
1991	MEDIAN ---->			0.50	22.0	21.6	1.5	7.55	300	229	1,763	1,614	42	17	26	0.41	0.0028	0.50	3.31	2.80	3.66	0.858	0.460	137
1991	MINIMUM --->			0.28	6.7	6.1	0.1	6.4	40	74	302	263	4	2	2	0.02	0.0000	0.10	0.10	1.53	0.60	0.450	0.197	16
1991	MAXIMUM --->			1.45	25.0	26.0	12.8	8.6	2,200	350	3,677	3,475	98	30	70	4.75	0.0601	5.50	8.90	5.32	14.40	2.540	0.929	240
1992	MEAN ----->			0.72	15.6	18.3	6.3		3,953	196	1,370	1,222	140	27	113	0.15		0.10	1.52	1.37	1.62	0.454	0.268	
1992	MEDIAN ---->			0.72	17.8	18.5	5.9		1,400	214	1,562	1,430	120	27	90	0.09		0.10	1.72	1.47	1.82	0.455	0.278	
1992	MINIMUM --->			0.61	6.0	14.0	2.5		10	92	476	222	43	18	25	0.02		0.10	0.77	0.70	0.87	0.246	0.090	
1992	MAXIMUM --->			0.84	19.0	22.0	11.0		13,000	264	1,881	1,806	276	34	248	0.41		0.10	1.87	1.85	1.97	0.661	0.425	

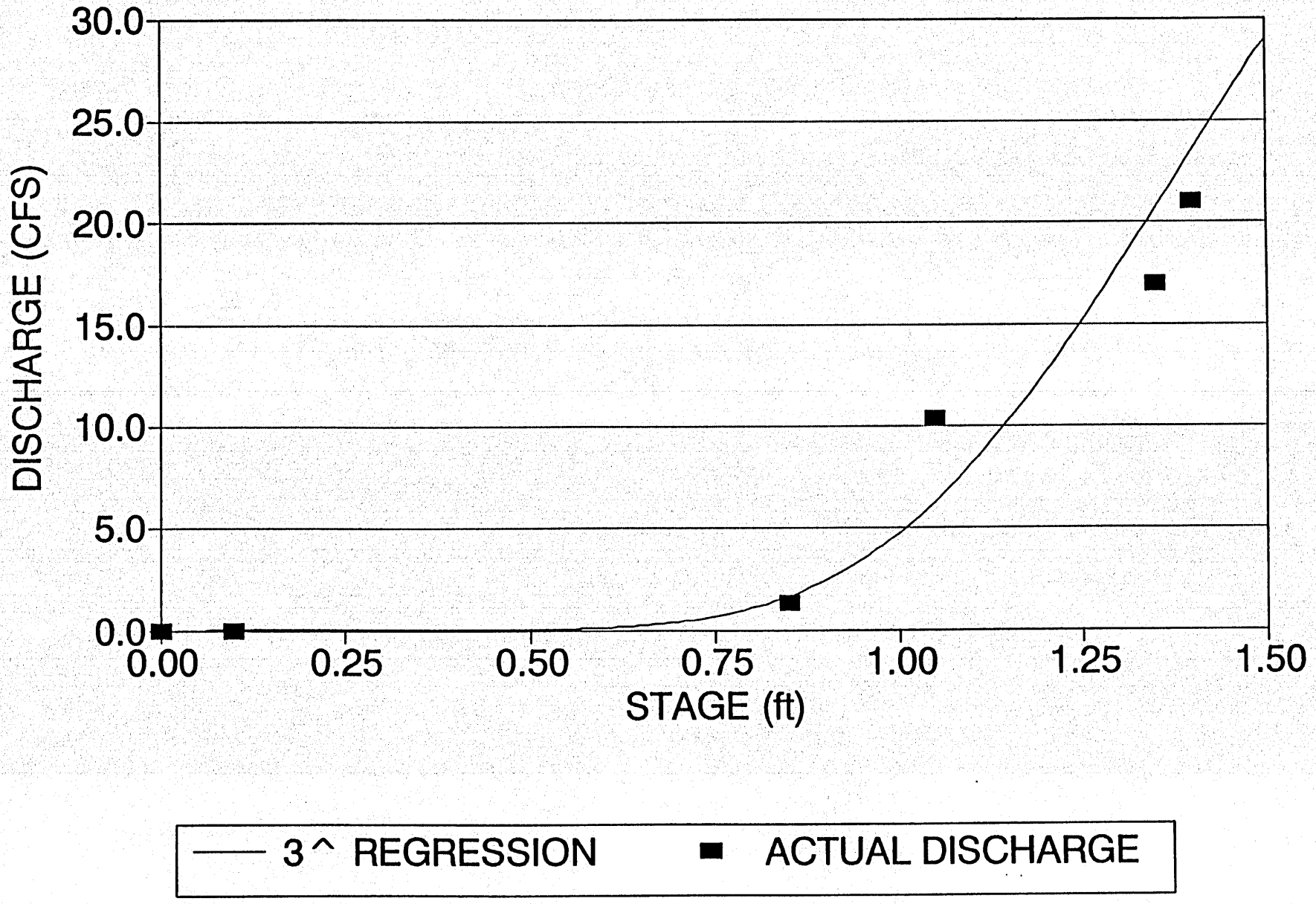
APPENDIX B

Stream Flow and Loading Data

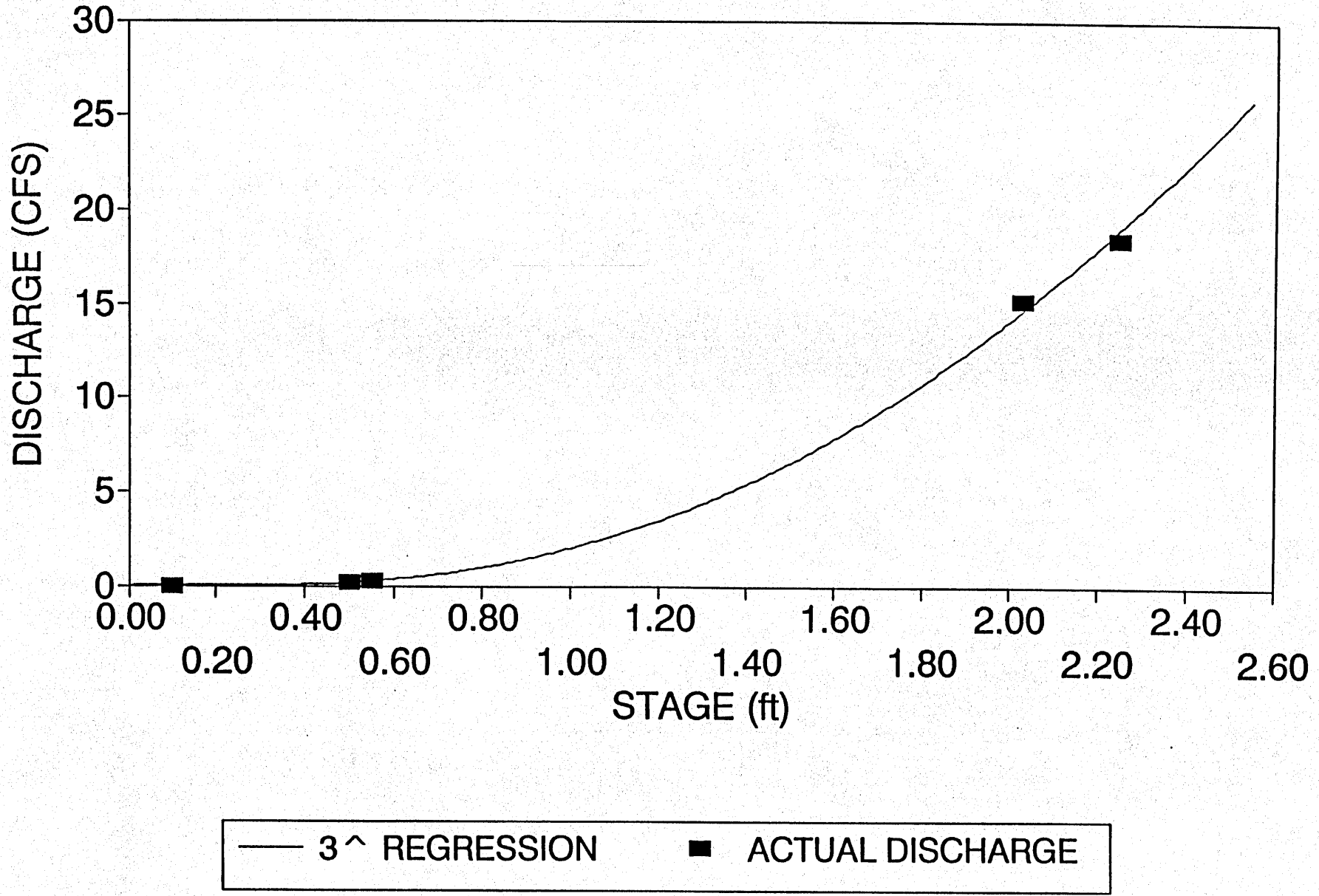
REGRESSION LINE
FOR SITE #1 -- LAKE BYRON -- 1991-1992



REGRESSION LINE vs. ACTUAL FLOWS
FOR SITE #2 -- LAKE BYRON -- 1991-1992



REGRESSION LINE vs. ACTUAL FLOWS
FOR SITE #3 -- LAKE BYRON -- 1991-92



LAKE BYRON SITE#1 DAILY CONCENTRATIONS

DATE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOLIDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL SOLIDS mg/L	AMMONIA mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TOTAL PO4-P mg/L	DISS. PO4-P mg/L	CL mg/L
12-Jun-91	0.15	23.9	25.0	7.5	8.7	5,000	210	1,673	1,558	38	22	16	0.52	0.0424	0.90	2.71	2.19	3.61	0.420	0.217	125.0
13-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
14-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
15-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
16-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
17-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
18-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
19-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
20-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
21-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
22-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
23-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
24-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
25-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
26-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
27-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
28-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
29-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
30-Jun-91	0.21	23.3	23.1	5.9	8.3	2,505	212	1,619	1,539	25	16	9	0.30	0.0225	0.80	2.44	2.14	3.24	0.340	0.214	123.5
01-Jul-91	0.27	22.8	21.1	4.2	7.9	10	214	1,565	1,519	12	10	2	0.07	0.0026	0.70	2.16	2.09	2.86	0.260	0.210	122.0
02-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
03-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
04-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
05-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
06-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
07-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
08-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
09-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
10-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
11-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
12-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
13-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
14-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
15-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
16-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
17-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
18-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
19-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
20-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
21-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
22-Jul-91	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
23-Jul-91	0.30	25.6	22.8	4.8	9.7	10	207	1,665	1,574	30	10	20	0.02	0.3889	0.50	2.65	2.63	3.15	0.300	0.210	132.0
DAILY MEAN	0.25	23.8	22.5	5.2	8.6	1,196	211	1,618	1,543	23	13	10	0.16	0.1178	0.69	2.43	2.26	3.12	0.309	0.212	125.5
DAILY MEDIAN	0.29	24.2	21.9	4.5	8.8	10	211	1,615	1,547	21	10	11	0.05	0.1957	0.60	2.41	2.36	3.01	0.280	0.210	127.0
DAILY MINIMUM	0.15	22.8	21.1	4.2	7.9	10	207	1565	1519	12	10	2	0.02	0.0026	0.50	2.16	2.09	2.86	0.260	0.210	122.0
DAILY MAXIMUM	0.30	25.6	25.0	7.5	9.7	5000	214	1673	1574	38	22	20	0.52	0.3889	0.90	2.71	2.63	3.61	0.420	0.217	132.0

LAKE BYRON SITE #1 LOADINGS

DATE	STAGE (FT)	FLOW CFS	LETERS PER DAY	TOTAL ALKAL KG/DAY	TOTAL SOLIDS KG/DAY	TOTAL DISS. SOLIDS KG/DAY	TOTAL SUSP. SOLIDS KG/DAY	TOTAL VOLATILE SOLIDS KG/DAY	TOTAL NON-VOL. SOLIDS KG/DAY	AMMONI KG/DAY	UNIONIZED AMMONI KG/DAY	NO3+2 KG/DAY	TKN-N KG/DAY	ORGANIC NITROGEN KG/DAY	TOTAL NITROGEN KG/DAY	TOTAL PO4-P KG/DAY	DISS. PO4-P KG/DAY	CL KG/DAY
12-Jun-91	0.15	6.11	14,948,491	3,139	25,009	23,290	568	329	239	8	1	13	41	33	54	6	3	1,869
13-Jun-91	0.05	1.18	2,876,838	610	4,658	4,426	72	46	26	1	0	2	7	6	9	1	1	355
14-Jun-91	0.10	3.33	8,136,928	1,725	13,174	12,519	203	130	73	2	0	7	20	17	26	3	2	1,005
15-Jun-91	0.20	9.41	23,014,708	4,879	37,261	35,408	575	368	207	7	1	18	56	49	74	8	5	2,842
16-Jun-91	0.20	9.41	23,014,708	4,879	37,261	35,408	575	368	207	7	1	18	56	49	74	8	5	2,842
17-Jun-91	0.13	4.93	12,060,783	2,557	19,526	18,556	302	193	109	4	0	10	29	26	39	4	3	1,490
18-Jun-91	0.23	11.60	28,382,603	6,017	45,951	43,667	710	454	255	8	1	23	69	61	92	10	6	3,505
19-Jun-91	0.15	6.11	14,948,491	3,169	24,202	22,998	374	239	135	4	0	12	36	32	48	5	3	1,846
20-Jun-91	0.18	8.03	19,650,302	4,166	31,814	30,232	491	314	177	6	0	16	48	42	64	7	4	2,427
21-Jun-91	0.20	9.41	23,014,708	4,879	37,261	35,408	575	368	207	7	1	18	56	49	74	8	5	2,842
22-Jun-91	0.18	8.03	19,650,302	4,166	31,814	30,232	491	314	177	6	0	16	48	42	64	7	4	2,427
23-Jun-91	0.16	6.73	16,467,984	3,491	26,662	25,336	412	263	148	5	0	13	40	35	53	6	4	2,034
24-Jun-91	0.23	11.60	28,382,603	6,017	45,951	43,667	710	454	255	8	1	23	69	61	92	10	6	3,505
25-Jun-91	0.18	8.03	19,650,302	4,166	31,814	30,232	491	314	177	6	0	16	48	42	64	7	4	2,427
26-Jun-91	0.20	9.41	23,014,708	4,879	37,261	35,408	575	368	207	7	1	18	56	49	74	8	5	2,842
27-Jun-91	0.28	15.58	38,123,917	8,082	61,723	58,654	953	610	343	11	1	30	93	82	123	13	8	4,708
28-Jun-91	0.25	13.15	32,164,032	6,819	52,074	49,484	804	515	289	9	1	26	78	69	104	11	7	3,972
29-Jun-91	0.25	13.15	32,164,032	6,819	52,074	49,484	804	515	289	9	1	26	78	69	104	11	7	3,972
30-Jun-91	0.20	9.41	23,014,708	4,879	37,261	35,408	575	368	207	7	1	18	56	49	74	8	5	2,842
01-Jul-91	0.23	11.60	28,382,603	6,074	44,419	43,113	341	284	57	2	0	20	61	59	81	7	6	3,463
02-Jul-91	0.28	15.58	38,123,917	8,025	61,570	58,959	801	381	419	2	7	23	92	90	115	11	8	4,842
03-Jul-91	0.25	13.15	32,164,032	6,771	51,945	49,742	675	322	354	1	6	19	77	76	97	9	7	4,085
04-Jul-91	0.27	14.76	36,099,910	7,599	58,301	55,829	758	361	397	2	7	22	87	85	108	10	8	4,585
05-Jul-91	0.20	9.41	23,014,708	4,845	37,169	35,592	483	230	253	1	5	14	55	54	69	6	5	2,923
06-Jul-91	0.23	11.60	28,382,603	5,975	45,838	43,894	596	284	312	1	6	17	68	67	85	8	6	3,605
07-Jul-91	0.20	9.41	23,014,708	4,845	37,169	35,592	483	230	253	1	5	14	55	54	69	6	5	2,923
08-Jul-91	0.20	9.41	23,014,708	4,845	37,169	35,592	483	230	253	1	5	14	55	54	69	6	5	2,923
09-Jul-91	0.23	11.60	28,382,603	5,975	45,838	43,894	596	284	312	1	6	17	68	67	85	8	6	3,605
10-Jul-91	0.27	14.76	36,099,910	7,599	58,301	55,829	758	361	397	2	7	22	87	85	108	10	8	4,585
11-Jul-91	0.25	13.15	32,164,032	6,771	51,945	49,742	675	322	354	1	6	19	77	76	97	9	7	4,085
12-Jul-91	0.32	19.04	46,578,494	9,805	75,224	72,034	978	466	512	2	9	28	112	110	140	13	10	5,915
13-Jul-91	0.31	18.15	44,412,274	9,349	71,726	68,684	933	444	489	2	9	27	107	105	133	12	9	5,640
14-Jul-91	0.20	9.41	23,014,708	4,845	37,169	35,592	483	230	253	1	5	14	55	54	69	6	5	2,923
15-Jul-91	0.20	9.41	23,014,708	4,845	37,169	35,592	483	230	253	1	5	14	55	54	69	6	5	2,923
16-Jul-91	0.19	8.71	21,310,364	4,486	34,416	32,956	448	213	234	1	4	13	51	50	64	6	4	2,706
17-Jul-91	0.17	7.37	18,035,735	3,797	29,128	27,892	379	180	198	1	4	11	43	43	54	5	4	2,291
18-Jul-91	0.16	6.73	16,467,984	3,467	26,596	25,468	346	165	181	1	3	10	40	39	49	5	3	2,091
19-Jul-91	0.10	3.33	8,136,928	1,713	13,141	12,584	171	81	90	0	2	5	20	19	24	2	2	1,033
20-Jul-91	0.09	2.84	6,947,431	1,462	11,220	10,744	146	69	76	0	1	4	17	16	21	2	1	882
21-Jul-91	0.07	1.95	4,765,490	1,003	7,696	7,370	100	48	52	0	1	3	11	11	14	1	1	605
22-Jul-91	0.50	1.00	2,446,576	515	3,951	3,784	51	24	27	0	0	1	6	6	7	1	1	311
23-Jul-91	0.05	0.50	1,223,288	253	2,037	1,925	37	12	24	0	0	1	3	3	4	0	0	161
MEAN (KG/DAY)	0.21	9	22,568,544	4,767	36,473	34,815	511	285	226	4	3	16	55	51	70	7	5	2,830
MEDIAN (KG\DAY)	0.20	9	23,014,708	4,845	37,169	35,408	491	299	221	2	1	16	55	50	69	7	5	2,842
MINIMUM (KG\DAY)	0.05	1	1,223,288	253	2,037	1,925	37	12	24	0	0	1	3	3	4	0	0	161
MAXIMUM (KG\DAY)	0.50	19	46,578,494	9,805	75,224	72,034	978	610	512	11	9	30	112	110	140	13	10	5,915
LOAD IN KILOGRAMS\YEAR				200,198	1,531,884	1,462,218	21,466	11,985	9,482	147	111	653	2,289	2,142	2,943	290	201	118,858
LOAD IN POUNDS\YEAR				441,436	3,377,805	3,224,190	47,333	26,426	20,907	325	244	1,441	5,048	4,723	6,489	640	442	262,082
LOAD IN TONS\YEAR				220.7	1,688.9	1,612.1	23.7	13.2	10.5	0.2	0.1	0.7	2.5	2.4	3.2	0.3	0.2	131.0

TOTAL INPUT FROM SITE #1 ---- 947,848,863 LETERS\YEAR ---- 250,421,670 GALLONS\YEAR ---- 768.4 ACRE-FEET\YEAR

LAKE BYRON SITE#2 DAILY CONCENTRATIONS

DATE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOLIDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL. SOLIDS mg/L	AMMONIA mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TOTAL PO4-P mg/L	DISS. PO4-P mg/L	CL mg/L
16-Apr-91	0.61	5.0	10.0	9.3	7.3	500	248	2,886	2,544	46	14	32	0.50	0.0012	1.40	3.06	2.56	4.46	0.834	0.488	79.0
17-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
18-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
19-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
20-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
21-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
22-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
23-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
24-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
25-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
26-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
27-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
28-Apr-91	0.57	5.6	7.8	9.4	7.1	285	221	2,690	2,452	44	19	25	0.26	0.0006	0.75	2.81	2.55	3.56	0.641	0.407	79.0
29-Apr-91	0.53	6.1	5.6	9.4	6.8	70	193	2,493	2,360	42	24	18	0.02	0.0000	0.10	2.55	2.53	2.65	0.447	0.325	79.0
30-Apr-91	0.57	6.1	9.2	7.7	6.8	95	197	2,089	1,976	32	20	12	0.12	0.0001	0.35	1.79	1.68	2.14	0.375	0.258	86.3
01-May-91	0.57	6.1	9.2	7.7	6.8	95	197	2,089	1,976	32	20	12	0.12	0.0001	0.35	1.79	1.68	2.14	0.375	0.258	86.3
02-May-91	0.57	6.1	9.2	7.7	6.8	95	197	2,089	1,976	32	20	12	0.12	0.0001	0.35	1.79	1.68	2.14	0.375	0.258	86.3
03-May-91	0.57	6.1	9.2	7.7	6.8	95	197	2,089	1,976	32	20	12	0.12	0.0001	0.35	1.79	1.68	2.14	0.375	0.258	86.3
04-May-91	0.57	6.1	9.2	7.7	6.8	95	197	2,089	1,976	32	20	12	0.12	0.0001	0.35	1.79	1.68	2.14	0.375	0.258	86.3
05-May-91	0.57	6.1	9.2	7.7	6.8	95	197	2,089	1,976	32	20	12	0.12	0.0001	0.35	1.79	1.68	2.14	0.375	0.258	86.3
06-May-91	0.61	6.1	12.8	5.9	6.7	120	201	1,685	1,592	22	16	6	0.21	0.0001	0.60	1.03	0.82	1.63	0.302	0.190	93.6
07-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
08-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
09-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
10-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
11-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
12-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
13-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
14-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
15-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
16-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
17-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
18-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
19-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
20-May-91	0.57	12.1	16.4	4.1	7.3	320	253	2,078	1,907	91	53	38	0.32	0.0046	0.35	2.27	1.95	2.62	0.575	0.349	210.2
21-May-91	0.53	18.0	20.0	2.3	7.8	520	304	2,471	2,221	160	90	70	0.43	0.0091	0.10	3.51	3.06	3.61	0.848	0.507	326.7
22-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
23-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
24-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
25-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
26-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
27-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
28-May-91	0.50	19.0	22.5	2.2	7.7	1,235	221	1,641	1,453	120	58	62	0.28	0.0054	0.10	2.19	1.91	2.29	0.712	0.450	181.8
29-May-91	0.46	20.0	25.0	2.0	7.5	1,950	138	811	685	80	26	54	0.13	0.0016	0.10	0.87	0.74	0.97	0.576	0.393	36.9
30-May-91	0.72	21.5	26.5	1.4	7.4	1,155	139	855	769	87	19	48	0.19	0.0020	0.10	0.93	0.75	1.03	0.602	0.459	26.5
31-May-91	0.60	21.5	25.0	1.3	7.5	1,223	153	815	726	64	26	39	0.15	0.0019	0.23	1.09	0.93	1.31	0.732	0.541	31.5
01-Jun-91	0.60	21.5	25.0	1.3	7.5	1,223	153	815	726	64	26	39	0.15	0.0019	0.23	1.09	0.93	1.31	0.732	0.541	31.5
02-Jun-91	0.60	21.5	25.0	1.3	7.5	1,223	153	815	726	64	26	39	0.15	0.0019	0.23	1.09	0.93	1.31	0.732	0.541	31.5
03-Jun-91	0.99	23.0	28.0	0.8	7.3	360	140	896	853	54	12	42	0.24	0.0023	0.10	0.99	0.75	1.09	0.627	0.525	16.0
04-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
05-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
06-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
07-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
08-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
09-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
10-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
11-Jun-91	1.14	23.0	25.0	0.5	7.5	495	168	818	767	48	25	23	0.18	0.0022	0.35	1.30	1.13	1.65	0.889	0.690	26.0
12-Jun-91	1.30	23.0	22.0	0.2	7.6	630	195	738	680	42	38	4	0.11	0.0021	0.60	1.61	1.50	2.21	1.150	0.854	36.0
13-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	864	29	26	3	0.19	0.0024	0.65	1.65	1.66	2.50	0.965	0.767	57.5

LAKE BYRON SITE#2 DAILY CONCENTRATIONS

14-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
15-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
16-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
17-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
18-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
19-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
20-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
21-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
22-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
23-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
24-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
25-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
26-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
27-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
28-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
29-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
30-Jun-91	1.26	22.9	21.0	0.4	7.5	495	238	929	884	29	26	3	0.19	0.0024	0.65	1.85	1.66	2.50	0.965	0.767	57.5
01-Jul-91	1.22	22.8	20.0	0.6	7.3	360	280	1,120	1,068	16	14	2	0.27	0.0026	0.70	2.09	1.82	2.79	0.780	0.660	79.0
02-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
03-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
04-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
05-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
06-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
07-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
08-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
09-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
10-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
11-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
12-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
13-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
14-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
15-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
16-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
17-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
18-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
19-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
20-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
21-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
22-Jul-91	1.07	23.3	21.1	0.3	6.5	185	243	1,395	1,335	20	13	7	0.27	0.0927	0.60	3.53	3.26	4.13	0.675	0.594	107.5
23-Jul-91	0.91	23.9	22.2	0.0	9.6	10	206	1,670	1,581	24	12	12	0.27	0.1827	0.50	4.97	4.70	5.47	0.570	0.507	136.0
24-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
25-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
26-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
27-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
28-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
29-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
30-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
31-Jul-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
01-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
02-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
03-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
04-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
05-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
06-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
07-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
08-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
09-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
10-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
11-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
12-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
13-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
14-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
15-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
16-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
17-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5

LAKE BYRON SITE#2 DAILY CONCENTRATIONS

18-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
19-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
20-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
21-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
22-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
23-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
24-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
25-Aug-91	0.88	23.4	22.6	0.3	8.9	215	509	1,700	1,584	72	41	31	18.94	1.4553	0.30	23.99	5.05	24.29	2.275	1.534	107.5
26-Aug-91	0.84	23.0	23.0	0.5	8.2	420	811	1,730	1,586	120	70	50	37.60	2.7279	0.10	43.00	5.40	43.10	3.980	2.560	79.0
27-Aug-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
28-Aug-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
29-Aug-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
30-Aug-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
31-Aug-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
01-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
02-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
03-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
04-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
05-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
06-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
07-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
08-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
09-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
10-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
11-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
12-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
13-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
14-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
15-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
16-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
17-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
18-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
19-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
20-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
21-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
22-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
23-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
24-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
25-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
26-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
27-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
28-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
29-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
30-Sep-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
01-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
02-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
03-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
04-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
05-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
06-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
07-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
08-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
09-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
10-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
11-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
12-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
13-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
14-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
15-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
16-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
17-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
18-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
19-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
20-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
21-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0

22-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
23-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
24-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
25-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
26-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
27-Oct-91	0.78	22.2	22.0	1.0	7.8	405	507	1,704	1,585	82	45	38	18.93	1.3650	0.20	22.66	3.79	22.91	2.342	1.533	79.0
28-Oct-91	0.73	21.4	21.0	1.4	7.4	390	204	1,678	1,584	44	20	25	0.26	0.0022	0.30	2.32	2.18	2.72	0.704	0.507	79.0
DAILY MEAN -------	0.84	20.0	20.3	1.8	7.9	389	364	1,639	1,523	64	36	28	9.49	0.7026	0.36	12.63	3.16	13.01	1.508	1.028	95.9
DAILY MEDIAN ----	0.78	22.2	22.0	1.0	7.8	405	266	1,702	1,585	72	41	31	0.38	0.0927	0.30	3.53	3.26	4.30	0.965	0.767	79.0
DAILY MINIMUM --	0.46	5.0	5.6	0.0	6.7	10	138	738	680	16	12	2	0.02	0.0000	0.10	0.87	0.74	0.97	0.302	0.190	16.0
DAILY MAXIMUM -	1.30	23.9	26.0	9.4	9.6	1,950	811	2,686	2,544	160	90	70	37.60	2.7279	1.40	43.00	5.40	43.10	3.980	2.560	326.7

LAKE BYRON SITE#2 DAILY CONCENTRATIONS

LAKE BYRON SITE#2 LOADINGS

DATE	STAGE (FT)	FLOW CFS	LITERS PER DAY	TOTAL ALKAL KG/DAY	TOTAL SOLIDS KG/DAY	TOTAL DISS. SOLIDS KG/DAY	TOTAL SUSP. SOLIDS KG/DAY	TOTAL VOLATILE SOLIDS KG/DAY	TOTAL NON-VOL. SOLIDS KG/DAY	AMMONIA KG/DAY	UNIONIZED AMMONIA KG/DAY	NO3+2 KG/DAY	TKN-N KG/DAY	ORGANIC NITROGEN KG/DAY	TOTAL NITROGEN KG/DAY	TOTAL PO4-P KG/DAY	DISS. PO4-P KG/DAY	CL KG/DAY
16-Apr-91	0.95	3.44	8,415,785	2,087	24,288	21,410	387	118	269	4	0.0	12	26	22	38	7	4	665
17-Apr-91	1.13	9.33	22,829,156	5,034	61,399	55,977	1,004	434	571	6	0.0	17	64	58	81	15	9	1,804
18-Apr-91	1.24	14.59	35,690,692	7,870	95,990	87,514	1,570	678	892	9	0.0	27	100	91	127	23	15	2,820
19-Apr-91	1.29	17.28	42,267,447	9,320	113,678	103,640	1,860	803	1,057	11	0.0	32	119	108	150	27	17	3,339
20-Apr-91	1.32	18.95	46,351,171	10,220	124,661	113,653	2,039	881	1,159	12	0.0	35	130	118	165	30	19	3,662
21-Apr-91	1.35	20.64	50,496,777	11,135	135,811	123,818	2,222	959	1,262	13	0.0	38	142	129	180	32	21	3,989
22-Apr-91	1.35	20.64	50,496,777	11,135	135,811	123,818	2,222	959	1,262	13	0.0	38	142	129	180	32	21	3,989
23-Apr-91	1.35	20.64	50,496,777	11,135	135,811	123,818	2,222	959	1,262	13	0.0	38	142	129	180	32	21	3,989
24-Apr-91	1.32	18.95	46,351,171	10,220	124,661	113,653	2,039	881	1,159	12	0.0	35	130	118	165	30	19	3,662
25-Apr-91	1.31	18.39	44,981,326	9,918	120,977	110,294	1,979	855	1,125	12	0.0	34	126	114	160	29	18	3,554
26-Apr-91	1.33	19.51	47,727,904	10,524	128,364	117,029	2,100	907	1,193	12	0.0	36	134	121	170	31	19	3,771
27-Apr-91	1.45	26.28	64,298,291	14,178	172,930	157,659	2,829	1,222	1,607	17	0.0	48	180	164	229	41	26	5,080
28-Apr-91	1.42	24.61	60,208,177	13,276	161,930	147,630	2,649	1,144	1,505	16	0.0	45	169	153	214	39	24	4,756
29-Apr-91	1.35	20.64	50,496,777	9,746	125,888	119,172	2,121	1,212	909	1	0.0	5	129	128	134	23	16	3,989
30-Apr-91	1.45	26.28	64,298,291	12,667	134,319	127,053	2,058	1,286	772	7	0.0	23	115	108	138	24	17	5,549
01-May-91	1.40	23.48	57,446,135	11,317	120,005	113,514	1,838	1,149	689	7	0.0	20	103	96	123	22	15	4,956
02-May-91	1.37	21.78	53,277,284	10,496	111,296	105,276	1,705	1,066	639	6	0.0	19	95	89	114	20	14	4,598
03-May-91	1.48	27.91	68,292,890	13,454	142,664	134,947	2,185	1,366	820	8	0.0	24	122	114	146	26	18	5,894
04-May-91	1.45	26.28	64,298,291	12,667	134,319	127,053	2,058	1,286	772	7	0.0	23	115	108	138	24	17	5,549
05-May-91	1.08	7.33	17,939,093	3,534	37,475	35,448	574	359	215	2	0.0	6	32	30	38	7	5	1,548
06-May-91	0.87	1.94	4,739,036	953	7,985	7,545	104	76	28	1	0.0	3	5	4	8	1	1	444
07-May-91	0.79	0.99	2,419,036	611	5,027	4,612	220	128	92	1	0.0	1	5	5	6	1	1	508
08-May-91	0.68	0.32	793,629	200	1,649	1,513	72	42	30	0	0.0	0	2	2	2	0	0	167
09-May-91	0.64	0.20	496,851	125	1,032	947	45	26	19	0	0.0	0	1	1	1	0	0	104
10-May-91	0.73	0.55	1,356,879	343	2,820	2,587	123	72	52	0	0.0	0	3	3	4	1	0	285
11-May-91	0.80	1.08	2,646,690	668	5,500	5,046	241	140	101	1	0.0	1	6	5	7	2	1	556
12-May-91	0.67	0.29	708,346	179	1,472	1,350	64	36	27	0	0.0	0	2	1	2	0	0	149
13-May-91	0.63	0.18	439,394	111	913	838	40	23	17	0	0.0	0	1	1	1	0	0	92
14-May-91	0.65	0.23	560,491	142	1,165	1,069	51	30	21	0	0.0	0	1	1	1	0	0	118
15-May-91	0.68	0.32	793,629	200	1,649	1,513	72	42	30	0	0.0	0	2	2	2	0	0	167
16-May-91	0.75	0.66	1,657,800	419	3,445	3,161	151	88	63	1	0.0	1	4	3	4	1	1	348
17-May-91	0.85	1.65	4,045,044	1,021	8,406	7,712	368	214	154	1	0.0	1	9	8	11	2	1	850
18-May-91	0.70	0.40	989,739	250	2,057	1,887	90	52	38	0	0.0	0	2	2	3	1	0	208
19-May-91	0.70	0.40	989,739	250	2,057	1,887	90	52	38	0	0.0	0	2	2	3	1	0	208
20-May-91	0.72	0.50	1,223,928	309	2,543	2,333	111	65	47	0	0.0	0	3	2	3	1	0	257
21-May-91	0.72	0.50	1,223,928	372	3,024	2,718	196	110	86	1	0.0	0	4	4	4	1	1	400
22-May-91	0.75	0.68	1,657,800	366	2,720	2,409	199	96	103	0	0.0	0	4	3	4	1	1	301
23-May-91	0.78	0.90	2,207,039	488	3,622	3,207	265	128	137	1	0.0	0	5	4	5	2	1	401
24-May-91	0.75	0.68	1,657,800	366	2,720	2,409	199	96	103	0	0.0	0	4	3	4	1	1	301
25-May-91	0.60	0.12	299,480	66	491	435	36	17	19	0	0.0	0	1	1	1	0	0	54
26-May-91	0.60	0.12	299,480	66	491	435	36	17	19	0	0.0	0	1	1	1	0	0	54
27-May-91	0.65	0.23	560,491	124	920	814	67	33	35	0	0.0	0	1	1	1	0	0	102
28-May-91	0.90	2.43	5,941,331	1,313	9,750	8,633	713	345	368	2	0.0	1	13	11	14	4	3	1,080
29-May-91	0.25	0.00	526	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0
30-May-91	0.20	0.00	192	0	0	0	0	0	0	0	0.0	0	0	0	0	0	0	0
31-May-91	0.40	0.00	12,191	2	10	9	1	0	0	0	0.0	0	0	0	0	0	0	0
01-Jun-91	1.10	8.10	19,815,578	3,027	16,140	14,381	1,268	505	763	3	0.0	4	21	18	26	15	11	623
02-Jun-91	1.00	4.71	11,531,978	1,762	9,393	8,369	738	294	444	2	0.0	3	13	11	15	8	6	363
03-Jun-91	1.10	8.10	19,815,578	2,774	17,794	16,903	1,070	238	832	5	0.0	2	20	15	22	12	10	317
04-Jun-91	1.05	6.27	15,329,055	2,566	12,539	11,750	736	383	353	3	0.0	5	20	17	25	14	11	399
05-Jun-91	1.20	12.56	30,718,080	5,145	25,127	23,545	1,474	768	707	5	0.1	11	40	35	51	27	21	799
06-Jun-91	1.30	17.83	43,619,662	7,306	35,681	33,434	2,094	1,090	1,003	8	0.1	15	57	49	72	39	30	1,134
07-Jun-91	1.35	20.64	50,496,777	8,458	41,306	38,706	2,424	1,262	1,161	9	0.1	18	66	57	83	45	35	1,313
08-Jun-91	1.40	23.48	57,446,135	9,622	46,991	44,032	2,757	1,436	1,321	10	0.1	20	75	65	95	51	40	1,494
09-Jun-91	1.50	28.97	70,885,653	11,873	57,984	54,334	3,403	1,772	1,630	12	0.2	25	92	80	117	63	49	1,843
10-Jun-91	1.40	23.48	57,446,135	9,622	46,991	44,032	2,757	1,436	1,321	10	0.1	20	75	65	95	51	40	1,494
11-Jun-91	1.40	23.48	57,446,135	9,622	46,991	44,032	2,757	1,436	1,321	10	0.1	20	75	65	95	51	40	1,494
12-Jun-91	1.40	23.48	57,446,135	11,202	42,395	39,063	2,413	2,183	230	6	0.1	34	92	86	127	66	49	2,068
13-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303

LAKE BYRON SITE#2 LOADINGS

14-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
15-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
16-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
17-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
18-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
19-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
20-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
21-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
22-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
23-Jun-91	1.40	23.48	57,446,135	13,643	53,367	50,782	1,666	1,494	172	11	0.1	37	106	95	144	55	44	3,303
24-Jun-91	1.42	24.61	60,208,177	14,299	55,933	53,224	1,746	1,565	181	11	0.1	39	111	100	151	58	46	3,462
25-Jun-91	1.45	26.26	64,298,291	15,271	59,733	56,840	1,865	1,672	193	12	0.2	42	119	107	161	62	49	3,697
26-Jun-91	1.45	26.26	64,298,291	15,271	59,733	56,840	1,865	1,672	193	12	0.2	42	119	107	161	62	49	3,697
27-Jun-91	1.45	26.26	64,298,291	15,271	59,733	56,840	1,865	1,672	193	12	0.2	42	119	107	161	62	49	3,697
28-Jun-91	1.43	25.17	61,579,956	14,625	57,208	54,437	1,786	1,601	185	12	0.1	40	114	102	154	59	47	3,541
29-Jun-91	1.43	25.17	61,579,956	14,625	57,208	54,437	1,786	1,601	185	12	0.1	40	114	102	154	59	47	3,541
30-Jun-91	1.45	26.26	64,298,291	15,271	59,733	56,840	1,865	1,672	193	12	0.2	42	119	107	161	62	49	3,697
01-Jul-91	1.45	26.26	64,298,291	16,004	72,014	69,957	1,029	900	129	17	0.2	45	134	117	179	50	44	5,080
02-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
03-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
04-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
05-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
06-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
07-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
08-Jul-91	1.47	27.37	66,974,148	16,275	93,429	89,377	1,339	871	469	18	6.2	40	236	218	277	45	40	7,200
09-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
10-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
11-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
12-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
13-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
14-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
15-Jul-91	1.40	23.48	57,446,135	13,959	80,137	76,662	1,149	747	402	16	5.3	34	203	187	237	39	34	6,175
16-Jul-91	1.37	21.78	53,277,284	12,946	74,322	71,099	1,066	693	373	14	4.9	32	188	174	220	36	32	5,727
17-Jul-91	1.37	21.78	53,277,284	12,946	74,322	71,099	1,066	693	373	14	4.9	32	188	174	220	36	32	5,727
18-Jul-91	1.37	21.78	53,277,284	12,946	74,322	71,099	1,066	693	373	14	4.9	32	188	174	220	36	32	5,727
19-Jul-91	1.35	20.64	50,496,777	12,271	70,443	67,388	1,010	656	353	14	4.7	30	178	165	209	34	30	5,426
20-Jul-91	1.32	18.95	46,351,171	11,263	64,660	61,856	927	603	324	13	4.3	28	164	151	191	31	28	4,963
21-Jul-91	1.32	18.95	46,351,171	11,263	64,860	61,856	927	603	324	13	4.3	28	164	151	191	31	28	4,963
22-Jul-91	1.30	17.83	43,619,662	10,600	60,849	58,210	872	567	305	12	4.0	26	154	142	180	29	26	4,669
23-Jul-91	1.25	15.11	36,977,564	7,617	61,753	58,462	887	444	444	10	6.6	18	184	174	202	21	19	5,029
24-Jul-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
25-Jul-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
26-Jul-91	1.30	17.83	43,619,662	22,181	74,153	69,072	3,141	1,788	1,352	826	63.5	13	1,046	220	1,059	99	67	4,689
27-Jul-91	1.27	16.18	39,596,319	20,135	67,314	62,701	2,851	1,623	1,227	750	57.6	12	950	200	962	90	61	4,257
28-Jul-91	1.26	15.65	38,279,813	19,465	65,076	60,616	2,756	1,569	1,187	725	55.7	11	918	193	930	87	59	4,115
29-Jul-91	1.26	15.65	38,279,813	19,465	65,076	60,616	2,756	1,569	1,187	725	55.7	11	918	193	930	87	59	4,115
30-Jul-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
31-Jul-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
01-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
02-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
03-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
04-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
05-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
06-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
07-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
08-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
09-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
10-Aug-91	1.25	15.11	36,977,564	18,803	62,862	58,554	2,662	1,516	1,146	700	53.8	11	887	187	898	84	57	3,975
11-Aug-91	1.20	12.56	30,718,060	15,620	52,221	48,642	2,212	1,259	952	582	44.7	9	737	155	748	70	47	3,302
12-Aug-91	1.20	12.56	30,718,060	15,620	52,221	48,642	2,212	1,259	952	582	44.7	9	737	155	748	70	47	3,302
13-Aug-91	1.18	11.59	28,350,215	14,416	48,195	44,893	2,041	1,162	879	537	41.3	9	680	143	688	64	43	3,048
14-Aug-91	1.17	11.12	27,196,977	13,831	46,238	43,070	1,958	1,115	843	515	39.6	8	652	137	661	62	42	2,924
15-Aug-91	1.15	10.20	24,965,696	12,695	42,442	39,533	1,798	1,024	774	473	36.3	7	599	126	606	57	38	2,684
16-Aug-91	1.10	8.10	19,815,578	10,076	33,686	31,378	1,427	812	614	375	28.8	6	475	100	481	45	30	2,130
17-Aug-91	1.05	6.27	15,329,055	7,795	26,059	24,274	1,104	628	475	290	22.3	5	368	77	372	35	24	1,648

LAKE BYRON SITE#2 LOADINGS

18-Aug-91	1.05	6.27	15,329,055	7,795	26,059	24,274	1,104	628	475	290	22.3	5	368	77	372	35	24	1,648
19-Aug-91	1.12	6.91	21,798,640	11,085	37,058	34,518	1,570	894	676	413	31.7	7	523	110	529	50	33	2,343
20-Aug-91	1.37	21.78	53,277,284	27,091	90,571	84,365	3,836	2,184	1,652	1,009	77.5	16	1,278	269	1,294	121	82	5,727
21-Aug-91	1.37	21.78	53,277,284	27,091	90,571	84,365	3,836	2,184	1,652	1,009	77.5	16	1,278	269	1,294	121	82	5,727
22-Aug-91	1.37	21.78	53,277,284	27,091	90,571	84,365	3,836	2,184	1,652	1,009	77.5	16	1,278	269	1,294	121	82	5,727
23-Aug-91	1.37	21.78	53,277,284	27,091	90,571	84,365	3,836	2,184	1,652	1,009	77.5	16	1,278	269	1,294	121	82	5,727
24-Aug-91	1.37	21.78	53,277,284	27,091	90,571	84,365	3,836	2,184	1,652	1,009	77.5	16	1,278	269	1,294	121	82	5,727
25-Aug-91	1.37	21.78	53,277,284	27,091	90,571	84,365	3,836	2,184	1,652	1,009	77.5	16	1,278	269	1,294	121	82	5,727
26-Aug-91	1.37	21.78	53,277,284	43,208	92,170	84,498	6,393	3,729	2,664	2,003	145.3	5	2,291	288	2,296	212	136	4,209
27-Aug-91	1.35	20.64	50,496,777	25,814	86,034	80,025	4,141	2,272	1,894	956	68.9	10	1,144	191	1,157	118	77	3,989
28-Aug-91	1.30	17.83	43,619,662	22,126	74,317	69,126	3,577	1,963	1,636	826	59.5	9	988	165	999	102	67	3,446
29-Aug-91	1.30	17.83	43,619,662	22,126	74,317	69,126	3,577	1,963	1,636	826	59.5	9	988	165	999	102	67	3,446
30-Aug-91	1.25	15.11	36,977,564	18,757	63,001	58,600	3,032	1,664	1,387	700	50.5	7	838	140	847	87	57	2,921
31-Aug-91	1.20	12.56	30,718,060	15,582	52,336	48,680	2,519	1,382	1,152	581	41.9	6	696	116	704	72	47	2,427
01-Sep-91	1.20	12.56	30,718,060	15,582	52,336	48,680	2,519	1,382	1,152	581	41.9	6	696	116	704	72	47	2,427
02-Sep-91	1.17	11.12	27,198,977	13,797	46,340	43,104	2,230	1,224	1,020	515	37.1	5	616	103	623	64	42	2,149
03-Sep-91	1.17	11.12	27,198,977	13,797	46,340	43,104	2,230	1,224	1,020	515	37.1	5	616	103	623	64	42	2,149
04-Sep-91	1.16	10.66	26,070,566	13,224	44,418	41,315	2,138	1,173	978	493	35.6	5	591	99	597	61	40	2,060
05-Sep-91	1.15	10.20	24,965,696	12,664	42,535	39,564	2,047	1,123	936	473	34.1	5	566	95	572	58	38	1,972
06-Sep-91	1.15	10.20	24,965,696	12,664	42,535	39,564	2,047	1,123	936	473	34.1	5	566	95	572	58	38	1,972
07-Sep-91	1.14	9.76	23,885,024	12,116	40,694	37,852	1,959	1,075	896	452	32.6	5	541	90	547	56	37	1,887
08-Sep-91	1.13	9.33	22,829,156	11,580	38,895	36,179	1,872	1,027	856	432	31.2	5	517	86	523	53	35	1,804
09-Sep-91	1.12	8.91	21,798,640	11,057	37,139	34,545	1,787	981	817	413	29.8	4	494	83	499	51	33	1,722
10-Sep-91	1.12	8.91	21,798,640	11,057	37,139	34,545	1,787	981	817	413	29.8	4	494	83	499	51	33	1,722
11-Sep-91	1.11	8.50	20,793,969	10,548	35,428	32,953	1,705	936	780	394	28.4	4	471	79	476	49	32	1,643
12-Sep-91	1.11	8.50	20,793,969	10,548	35,428	32,953	1,705	936	780	394	28.4	4	471	79	476	49	32	1,643
13-Sep-91	1.12	8.91	21,798,640	11,057	37,139	34,545	1,787	981	817	413	29.8	4	494	83	499	51	33	1,722
14-Sep-91	1.12	8.91	21,798,640	11,057	37,139	34,545	1,787	981	817	413	29.8	4	494	83	499	51	33	1,722
15-Sep-91	1.12	8.91	21,798,640	11,057	37,139	34,545	1,787	981	817	413	29.8	4	494	83	499	51	33	1,722
16-Sep-91	1.12	8.91	21,798,640	11,057	37,139	34,545	1,787	981	817	413	29.8	4	494	83	499	51	33	1,722
17-Sep-91	1.02	5.30	12,967,884	6,578	22,094	20,551	1,063	584	486	245	17.7	3	294	49	297	30	20	1,024
18-Sep-91	1.02	5.30	12,967,884	6,578	22,094	20,551	1,063	584	486	245	17.7	3	294	49	297	30	20	1,024
19-Sep-91	1.01	5.00	12,236,176	6,207	20,847	19,391	1,003	551	459	232	16.7	2	277	46	280	29	19	967
20-Sep-91	0.99	4.44	10,855,113	5,506	18,494	17,203	890	488	407	205	14.8	2	246	41	249	25	17	858
21-Sep-91	0.99	4.44	10,855,113	5,506	18,494	17,203	890	488	407	205	14.8	2	246	41	249	25	17	858
22-Sep-91	0.98	4.17	10,205,358	5,177	17,387	16,173	837	459	383	193	13.9	2	231	39	234	24	16	806
23-Sep-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
24-Sep-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
25-Sep-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
26-Sep-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
27-Sep-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
28-Sep-91	0.96	3.67	8,986,035	4,558	15,310	14,241	737	404	337	170	12.3	2	204	34	206	21	14	710
29-Sep-91	0.96	3.67	8,986,035	4,558	15,310	14,241	737	404	337	170	12.3	2	204	34	206	21	14	710
30-Sep-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
01-Oct-91	1.00	4.71	11,531,978	5,850	19,648	18,275	946	519	432	218	15.7	2	261	44	264	27	18	911
02-Oct-91	1.00	4.71	11,531,978	5,850	19,648	18,275	946	519	432	218	15.7	2	261	44	264	27	18	911
03-Oct-91	1.00	4.71	11,531,978	5,850	19,648	18,275	946	519	432	218	15.7	2	261	44	264	27	18	911
04-Oct-91	0.98	4.17	10,205,358	5,177	17,387	16,173	837	459	383	193	13.9	2	231	39	234	24	16	806
05-Oct-91	0.97	3.92	9,582,438	4,861	16,326	15,186	786	431	359	181	13.1	2	217	36	220	22	15	757
06-Oct-91	0.96	3.67	8,986,035	4,558	15,310	14,241	737	404	337	170	12.3	2	204	34	206	21	14	710
07-Oct-91	0.95	3.44	8,415,785	4,269	14,338	13,337	690	379	316	159	11.5	2	191	32	193	20	13	665
08-Oct-91	0.94	3.22	7,871,283	3,993	13,411	12,474	645	354	295	149	10.7	2	178	30	180	18	12	622
09-Oct-91	0.94	3.22	7,871,283	3,993	13,411	12,474	645	354	295	149	10.7	2	178	30	180	18	12	622
10-Oct-91	0.93	3.01	7,352,066	3,729	12,526	11,651	603	331	276	139	10.0	1	167	28	168	17	11	581
11-Oct-91	0.93	3.01	7,352,066	3,729	12,526	11,651	603	331	276	139	10.0	1	167	28	168	17	11	581
12-Oct-91	0.92	2.80	6,857,710	3,479	11,684	10,868	562	309	257	130	9.4	1	155	26	157	16	11	542
13-Oct-91	0.91	2.61	6,387,642	3,240	10,883	10,123	524	287	240	121	8.7	1	145	24	146	15	10	505
14-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
15-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
16-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
17-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
18-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
19-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
20-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
21-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469

22-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
23-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
24-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
25-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
26-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
27-Oct-91	0.90	2.43	5,941,331	3,014	10,123	9,416	487	267	223	112	8.1	1	135	23	136	14	9	469
28-Oct-91	0.90	2.43	5,941,331	1,209	9,967	9,408	261	119	149	2	0.0	2	14	13	16	4	3	469
MEAN (KG/DAY) ----------	1.14	12.65	30,959,878	10,205	47,895	44,832	1,493	886	609	221	16.8	14	317	96	331	41	29	2,595
MEDIAN (KG/DAY) --------	1.20	12.56	30,718,060	11,057	46,340	43,104	1,339	871	407	18	6.2	8	174	95	191	35	28	2,099
MINIMUM (KG/DAY) ------	0.20	0.00	191.72	0.03	0.16	0.15	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
MAXIMUM (KG/DAY) -----	1.50	28.97	70,885,653	43,208	172,930	157,659	6,393	3,729	2,664	2,003	145.3	48	2,291	288	2,298	212	136	7,200
LOAD IN KILOGRAMS/YEAR ----------				2,000,121	9,387,382	8,787,049	292,599	173,673	119,397	43,384	3,301	2,789	62,069	18,736	64,904	8,054	5,718	508,682
LOAD IN POUNDS/YEAR ----------				4,410,266	20,699,176	19,375,443	645,181	382,949	263,271	95,662	7,280	6,149	136,861	41,313	143,114	17,758	12,608	1,121,644
LOAD IN TONS/YEAR ----------				2,205.1	10,349.6	9,687.7	322.6	191.5	131.6	47.8	3.6	3.1	68.4	20.7	71.6	8.9	6.3	560.8

TOTAL INPUT FROM SITE #2 ---- 6,068,136,063 LITERS/YEAR ---- 1,603,201,553 GALLONS/YEAR ---- 4,919 ACRE-FEET/YEAR

LAKE BYRON SITE #3 DAILY CONCENTRATIONS

DATE	TOTAL DEPTH (M)	WATER TEMP (C)	AIR TEMP (C)	DO mg/L	FIELD PH units	FECAL COLONIES /100 ml	TOTAL ALKAL mg/L	TOTAL SOLIDS mg/L	TOTAL DISS. SOLIDS mg/L	TOTAL SUSP. SOLIDS mg/L	TOTAL VOLATILE SOLIDS mg/L	TOTAL NON-VOL. SOLIDS mg/L	AMMONIA mg/L	UNIONIZED AMMONIA mg/L	NO3+2 mg/L	TKN-N mg/L	ORGANIC NITROGEN mg/L	TOTAL NITROGEN mg/L	TOTAL PO4-P mg/L	DISS. PO4-P mg/L	CL mg/L
16-Apr-91	0.38	11.1	11.1	12.6	7.6	40	274	3,263	3,120	48	16	32	4.75	0.0601	5.50	8.90	4.15	14.40	0.732	0.488	137.0
17-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
18-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
19-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
20-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
21-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
22-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
23-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
24-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
25-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
26-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
27-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
28-Apr-91	0.38	8.9	8.6	11.7	7.3	295	269	3,470	3,298	37	9	28	2.40	0.0301	2.80	7.14	4.74	9.94	0.797	0.343	137.0
29-Apr-91	0.38	8.7	8.1	10.6	8.8	550	264	3,677	3,475	26	2	24	0.05	0.0000	0.10	5.37	5.32	5.47	0.861	0.197	137.0
30-Apr-91	0.42	7.2	6.9	11.1	8.6	425	307	3,377	3,204	42	16	26	0.93	0.0004	0.50	4.59	3.66	5.09	0.719	0.268	188.5
01-May-91	0.42	7.2	6.9	11.1	8.6	425	307	3,377	3,204	42	16	26	0.93	0.0004	0.50	4.59	3.66	5.09	0.719	0.268	188.5
02-May-91	0.42	7.2	6.9	11.1	8.6	425	307	3,377	3,204	42	16	26	0.93	0.0004	0.50	4.59	3.66	5.09	0.719	0.268	188.5
03-May-91	0.42	7.2	6.9	11.1	8.6	425	307	3,377	3,204	42	16	26	0.93	0.0004	0.50	4.59	3.66	5.09	0.719	0.268	188.5
04-May-91	0.42	7.2	6.9	11.1	8.6	425	307	3,377	3,204	42	16	26	0.93	0.0004	0.50	4.59	3.66	5.09	0.719	0.268	188.5
05-May-91	0.42	7.2	6.9	11.1	8.6	425	307	3,377	3,204	42	16	26	0.93	0.0004	0.50	4.59	3.66	5.09	0.719	0.268	188.5
06-May-91	0.46	7.8	7.8	11.6	8.4	300	350	3,077	2,933	58	30	28	1.81	0.0007	0.90	3.80	1.99	4.70	0.576	0.339	240.0
07-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
08-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
09-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
10-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
11-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
12-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
13-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
14-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
15-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
16-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
17-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
18-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
19-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
20-May-91	0.37	13.4	14.9	8.3	7.1	285	286	3,271	3,114	48	24	24	1.33	0.0081	0.50	4.63	3.30	5.13	0.722	0.400	204.8
21-May-91	0.28	19.0	22.0	1.0	7.7	270	222	3,465	3,295	38	18	20	0.85	0.0154	0.10	5.45	4.60	5.55	0.868	0.460	169.5
22-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
23-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
24-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
25-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
26-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
27-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
28-May-91	0.33	20.0	22.0	1.6	7.7	1,235	211	2,399	2,259	39	24	15	0.84	0.0146	0.10	4.68	3.84	4.78	1.229	0.695	153.5
29-May-91	0.38	21.0	22.0	2.2	7.6	2,200	199	1,332	1,223	40	30	10	0.62	0.0137	0.10	3.90	3.08	4.00	1.590	0.929	137.5
30-May-91	0.46	22.0	23.5	2.0	7.5	1,250	137	817	743	47	19	28	0.47	0.0074	0.10	2.96	2.49	3.06	1.222	0.770	76.5
31-May-91	0.46	22.0	23.5	2.0	7.5	1,250	137	817	743	47	19	28	0.47	0.0074	0.10	2.96	2.49	3.06	1.222	0.770	76.5
01-Jun-91	0.46	22.0	23.5	2.0	7.5	1,250	137	817	743	47	19	28	0.47	0.0074	0.10	2.96	2.49	3.06	1.222	0.770	76.5
02-Jun-91	0.46	22.0	23.5	2.0	7.5	1,250	137	817	743	47	19	28	0.47	0.0074	0.10	2.96	2.49	3.06	1.222	0.770	76.5
03-Jun-91	0.53	23.0	25.0	1.8	7.3	300	74	302	263	54	8	46	0.12	0.0012	0.10	2.01	1.89	2.11	0.854	0.610	15.5
04-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
05-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
06-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
07-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
08-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
09-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
10-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
11-Jun-91	0.99	24.0	26.5	1.3	7.4	470	125	430	400	29	5	24	0.08	0.0009	0.35	1.79	1.71	2.14	0.972	0.746	26.8
12-Jun-91	1.45	25.0	26.0	0.7	7.5	640	175	558	536	4	2	2	0.04	0.0007	0.60	1.57	1.53	2.17	1.090	0.881	38.1
13-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1

LAKE BYRON SITE #3 DAILY CONCENTRATIONS

14-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
15-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
16-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
17-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
18-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
19-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
20-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
21-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
22-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
23-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
24-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
25-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
26-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
27-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
28-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
29-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
30-Jun-91	1.26	24.2	24.6	0.9	7.4	735	204	1,033	970	21	2	19	0.23	0.0020	0.65	1.98	1.75	2.63	0.900	0.671	78.1
01-Jul-91	1.07	23.3	21.1	1.1	7.2	830	233	1,507	1,403	38	2	36	0.41	0.0033	0.70	2.38	1.97	3.06	0.710	0.460	118.0
02-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
03-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
04-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
05-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
06-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
07-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
08-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
09-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
10-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
11-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
12-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
13-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
14-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
15-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
16-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
17-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
18-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
19-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
20-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
21-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
22-Jul-91	0.96	23.3	21.1	0.6	7.9	565	235	1,616	1,508	41	11	30	0.22	0.0030	0.60	2.60	2.39	3.20	0.580	0.360	127.5
23-Jul-91	0.85	23.3	21.1	0.1	6.5	300	237	1,724	1,613	44	20	24	0.02	0.0028	0.50	2.82	2.80	3.32	0.450	0.280	137.0
24-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
25-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
26-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
27-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
28-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
29-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
30-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
31-Jul-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
01-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
02-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
03-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
04-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
05-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
06-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
07-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
08-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
09-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
10-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
11-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
12-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
13-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
14-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
15-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
16-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
17-Aug-91	0.76	23.6	22.5	0.5	6.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0

LAKE BYRON SITE #3 DAILY CONCENTRATIONS

18-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
19-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
20-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
21-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
22-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
23-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
24-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
25-Aug-91	0.76	23.6	22.5	0.5	8.6	180	231	1,763	1,614	71	24	47	0.22	0.0028	0.50	1.46	2.80	1.96	1.495	0.255	137.0
26-Aug-91	0.67	23.9	23.9	0.8	8.6	60	224	1,802	1,614	98	28	70	0.41	0.0028	0.50	0.10	2.80	0.60	2.540	0.250	137.0
27-Aug-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
28-Aug-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
29-Aug-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
30-Aug-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
31-Aug-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
01-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
02-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
03-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
04-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
05-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
06-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
07-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
08-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
09-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
10-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
11-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
12-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
13-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
14-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
15-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
16-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
17-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
18-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
19-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
20-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
21-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
22-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
23-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
24-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
25-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
26-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
27-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
28-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
29-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
30-Sep-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
01-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
02-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
03-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
04-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
05-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
06-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
07-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
08-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
09-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
10-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
11-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
12-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
13-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
14-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
15-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
16-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
17-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
18-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
19-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
20-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
21-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0

22-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
23-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
24-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
25-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
26-Oct-91	0.58	22.9	22.7	1.1	8.1	180	226	1,783	1,614	70	23	48	0.41	0.0028	0.50	1.71	2.80	2.13	1.699	0.355	137.0
27-Oct-91	0.50	22.0	21.6	1.5	7.6	300	229	1,763	1,614	42	17	26	0.41	0.0028	0.50	3.31	2.80	3.66	0.858	0.460	137.0
MEAN----------	0.69	20.9	20.7	2.5	7.8	388	229	1,913	1,776	53	18	36	0.57	0.0055	0.66	2.66	2.84	3.29	1.219	0.412	131.3
MEDIAN-------	0.58	22.9	22.5	1.1	7.9	285	226	1,783	1,614	48	23	32	0.41	0.0028	0.50	1.79	2.80	2.14	1.229	0.355	137.0
MINIMUM------	0.28	6.7	6.1	0.1	6.4	40	74	302	263	4	2	2	0.02	0.0000	0.10	0.10	1.53	0.60	0.450	0.197	15.5
MAXIMUM-----	1.45	25.0	28.0	12.8	8.6	2,200	350	3,677	3,475	98	30	70	4.75	0.0601	5.50	8.90	5.32	14.40	2.540	0.929	240.0

LAKE BYRON SITE #3 DAILY CONCENTRATIONS

LAKE BYRON SITE #3 LOADINGS

DATE	STAGE (FT)	FLOW CFS	LITERS PER DAY	TOTAL ALKAL KG/DAY	TOTAL SOLIDS KG/DAY	TOTAL DISS. SOLIDS KG/DAY	TOTAL SUSP. SOLIDS KG/DAY	TOTAL VOLATILE SOLIDS KG/DAY	TOTAL NON-VOL SOLIDS KG/DAY	AMMONIA KG/DAY	UNIONIZED AMMONIA KG/DAY	NO3+2 KG/DAY	TKN-N KG/DAY	ORGANIC NITROGEN KG/DAY	TOTAL NITROGEN KG/DAY	TOTAL PO4-P KG/DAY	DISS. PO4-P KG/DAY	CL KG/DAY
16-Apr-91	0.35	0.05	113,044	31.0	368.9	352.7	5.4	1.8	3.6	0.5	0.0068	0.6	1.0	0.5	1.6	0.1	0.1	15.5
17-Apr-91	0.28	0.02	43,739	11.8	151.8	144.2	1.6	0.4	1.2	0.1	0.0013	0.1	0.3	0.2	0.4	0.0	0.0	6.0
18-Apr-91	0.25	0.01	26,410	7.1	91.6	87.1	1.0	0.2	0.7	0.1	0.0008	0.1	0.2	0.1	0.3	0.0	0.0	3.6
19-Apr-91	0.23	0.01	18,041	4.9	62.6	59.5	0.7	0.2	0.5	0.0	0.0005	0.1	0.1	0.1	0.2	0.0	0.0	2.5
20-Apr-91	0.20	0.00	9,344	2.5	32.4	30.8	0.3	0.1	0.3	0.0	0.0003	0.0	0.1	0.0	0.1	0.0	0.0	1.3
21-Apr-91	0.20	0.00	9,344	2.5	32.4	30.8	0.3	0.1	0.3	0.0	0.0003	0.0	0.1	0.0	0.1	0.0	0.0	1.3
22-Apr-91	0.17	0.00	4,214	1.1	14.6	13.9	0.2	0.0	0.1	0.0	0.0001	0.0	0.0	0.0	0.0	0.0	0.0	0.6
23-Apr-91	0.17	0.00	4,214	1.1	14.6	13.9	0.2	0.0	0.1	0.0	0.0001	0.0	0.0	0.0	0.0	0.0	0.0	0.6
24-Apr-91	0.17	0.00	4,214	1.1	14.6	13.9	0.2	0.0	0.1	0.0	0.0001	0.0	0.0	0.0	0.0	0.0	0.0	0.6
25-Apr-91	0.17	0.00	4,214	1.1	14.6	13.9	0.2	0.0	0.1	0.0	0.0001	0.0	0.0	0.0	0.0	0.0	0.0	0.6
26-Apr-91	0.32	0.03	77,736	20.9	269.7	256.3	2.9	0.7	2.2	0.2	0.0023	0.2	0.6	0.4	0.8	0.1	0.0	10.6
27-Apr-91	0.37	0.06	141,948	38.2	492.6	468.1	5.3	1.3	4.0	0.3	0.0043	0.4	1.0	0.7	1.4	0.1	0.0	19.4
28-Apr-91	0.42	0.10	235,590	63.4	817.5	776.9	8.7	2.1	6.6	0.6	0.0071	0.7	1.7	1.1	2.3	0.2	0.1	32.3
29-Apr-91	0.42	0.10	235,590	62.2	866.3	818.7	6.1	0.5	5.7	0.0	0.0000	0.0	1.3	1.3	1.3	0.2	0.0	32.3
30-Apr-91	0.52	0.22	532,215	163.4	1,797.3	1,705.2	22.4	8.5	13.8	0.5	0.0002	0.3	2.4	1.9	2.7	0.4	0.1	100.3
01-May-91	0.45	0.13	308,149	94.6	1,040.6	987.3	12.9	4.9	8.0	0.3	0.0001	0.2	1.4	1.1	1.6	0.2	0.1	58.1
02-May-91	0.44	0.12	282,502	86.7	954.0	905.1	11.9	4.5	7.3	0.3	0.0001	0.1	1.3	1.0	1.4	0.2	0.1	53.3
03-May-91	0.55	0.27	654,110	200.8	2,208.9	2,095.8	27.5	10.5	17.0	0.6	0.0002	0.3	3.0	2.4	3.3	0.5	0.2	123.3
04-May-91	0.47	0.15	364,026	111.8	1,229.3	1,166.3	15.3	5.8	9.5	0.3	0.0001	0.2	1.7	1.3	1.9	0.3	0.1	68.6
05-May-91	0.45	0.13	308,149	94.6	1,040.6	987.3	12.9	4.9	8.0	0.3	0.0001	0.2	1.4	1.1	1.6	0.2	0.1	58.1
06-May-91	0.50	0.19	459,869	161.0	1,415.0	1,348.8	26.7	13.8	12.9	0.8	0.0003	0.4	1.7	0.9	2.2	0.3	0.2	110.4
07-May-91	0.50	0.19	459,869	131.5	1,504.2	1,432.0	22.1	11.0	11.0	0.6	0.0037	0.2	2.1	1.5	2.4	0.3	0.2	94.2
08-May-91	0.51	0.20	495,173	141.6	1,619.7	1,542.0	23.8	11.9	11.9	0.7	0.0040	0.2	2.3	1.6	2.5	0.4	0.2	101.4
09-May-91	0.52	0.22	532,215	152.2	1,740.9	1,657.3	25.5	12.8	12.8	0.7	0.0043	0.3	2.5	1.8	2.7	0.4	0.2	109.0
10-May-91	0.55	0.27	654,110	187.1	2,139.6	2,036.9	31.4	15.7	15.7	0.9	0.0053	0.3	3.0	2.2	3.4	0.5	0.3	133.9
11-May-91	0.57	0.30	744,680	213.0	2,435.8	2,318.9	35.7	17.9	17.9	1.0	0.0060	0.4	3.4	2.5	3.8	0.5	0.3	152.5
12-May-91	0.56	0.29	698,443	199.8	2,284.6	2,175.0	33.5	16.8	16.8	0.9	0.0056	0.3	3.2	2.3	3.6	0.5	0.3	143.0
13-May-91	0.55	0.27	654,110	187.1	2,139.6	2,036.9	31.4	15.7	15.7	0.9	0.0053	0.3	3.0	2.2	3.4	0.5	0.3	133.9
14-May-91	0.55	0.27	654,110	187.1	2,139.6	2,036.9	31.4	15.7	15.7	0.9	0.0053	0.3	3.0	2.2	3.4	0.5	0.3	133.9
15-May-91	0.53	0.23	571,029	163.3	1,867.8	1,778.2	27.4	13.7	13.7	0.8	0.0046	0.3	2.6	1.9	2.9	0.4	0.2	116.9
16-May-91	0.51	0.20	495,173	141.6	1,619.7	1,542.0	23.8	11.9	11.9	0.7	0.0040	0.2	2.3	1.6	2.5	0.4	0.2	101.4
17-May-91	0.50	0.19	459,869	131.5	1,504.2	1,432.0	22.1	11.0	11.0	0.6	0.0037	0.2	2.1	1.5	2.4	0.3	0.2	94.2
18-May-91	0.49	0.17	426,268	121.9	1,394.3	1,327.4	20.5	10.2	10.2	0.6	0.0034	0.2	2.0	1.4	2.2	0.3	0.2	87.3
19-May-91	0.48	0.14	335,311	95.9	1,096.8	1,044.2	16.1	8.0	8.0	0.4	0.0027	0.2	1.6	1.1	1.7	0.2	0.1	68.7
20-May-91	0.45	0.13	308,149	88.1	1,008.0	959.6	14.8	7.4	7.4	0.4	0.0025	0.2	1.4	1.0	1.6	0.2	0.1	63.1
21-May-91	0.44	0.12	282,502	62.7	978.9	930.8	10.7	5.1	5.7	0.2	0.0044	0.0	1.5	1.3	1.6	0.2	0.1	47.9
22-May-91	0.45	0.13	308,149	64.9	739.1	696.1	12.0	7.4	4.6	0.3	0.0045	0.0	1.4	1.2	1.5	0.4	0.2	47.3
23-May-91	0.48	0.14	335,311	70.6	804.2	757.5	13.1	8.0	5.0	0.3	0.0049	0.0	1.6	1.3	1.6	0.4	0.2	51.5
24-May-91	0.48	0.14	335,311	70.6	804.2	757.5	13.1	8.0	5.0	0.3	0.0049	0.0	1.6	1.3	1.6	0.4	0.2	51.5
25-May-91	0.45	0.13	308,149	64.9	739.1	696.1	12.0	7.4	4.6	0.3	0.0045	0.0	1.4	1.2	1.5	0.4	0.2	47.3
26-May-91	0.47	0.15	364,026	76.6	873.1	822.3	14.2	8.7	5.5	0.3	0.0053	0.0	1.7	1.4	1.7	0.4	0.3	55.9
27-May-91	0.49	0.17	426,268	89.7	1,022.4	962.9	16.6	10.2	6.4	0.4	0.0062	0.0	2.0	1.6	2.0	0.5	0.3	65.4
28-May-91	0.60	0.37	895,129	188.4	2,147.0	2,022.1	34.9	21.5	13.4	0.7	0.0130	0.1	4.2	3.4	4.3	1.1	0.6	137.4
29-May-91	0.85	1.19	2,922,067	581.5	3,892.2	3,573.7	116.9	87.7	29.2	2.4	0.0401	0.3	11.4	9.0	11.7	4.6	2.7	401.8
30-May-91	0.78	0.90	2,205,241	301.0	1,801.7	1,636.5	103.6	41.9	61.7	1.0	0.0164	0.2	6.5	5.5	6.7	2.7	1.7	168.7
31-May-91	1.45	5.96	14,589,302	1,991.4	11,919.5	10,839.9	685.7	277.2	408.5	6.9	0.1086	1.5	43.1	36.3	44.6	17.6	11.2	1,116.1
01-Jun-91	3.15	42.50	103,981,339	14,193.5	84,952.8	77,256.1	4,887.1	1,975.6	2,911.5	48.9	0.7739	10.4	307.3	258.4	317.7	127.1	80.0	7,954.6
02-Jun-91	2.25	19.02	46,543,850	6,353.2	38,026.3	34,582.1	2,187.6	884.3	1,303.2	21.9	0.3464	4.7	137.5	115.7	142.2	56.9	35.8	3,560.6
03-Jun-91	2.03	14.67	35,894,609	2,656.2	10,840.2	9,440.3	1,938.3	287.2	1,651.2	4.3	0.0420	3.6	72.1	67.6	75.7	30.7	21.9	556.4
04-Jun-91	1.45	5.96	14,589,302	1,816.4	6,273.4	5,828.4	423.1	72.9	350.1	1.2	0.0137	5.1	26.1	24.9	31.2	14.2	10.9	391.0
05-Jun-91	1.00	2.00	4,867,491	606.5	2,101.6	1,952.6	141.7	24.4	117.3	0.4	0.0046	1.7	8.7	8.4	10.5	4.8	3.6	131.0
06-Jun-91	0.95	1.70	4,165,367	518.6	1,791.1	1,664.1	120.8	20.8	100.0	0.3	0.0039	1.5	7.5	7.1	8.9	4.0	3.1	111.8
07-Jun-91	0.93	1.59	3,895,500	485.0	1,675.1	1,556.3	113.0	19.5	93.5	0.3	0.0037	1.4	7.0	6.7	8.3	3.8	2.9	104.4
08-Jun-91	0.94	1.67	4,083,277	508.4	1,755.8	1,631.3	118.4	20.4	98.0	0.3	0.0038	1.4	7.3	7.0	8.7	4.0	3.0	109.4
09-Jun-91	0.94	1.65	4,029,089	501.6	1,732.5	1,609.6	116.8	20.1	96.7	0.3	0.0038	1.4	7.2	6.9	8.6	3.9	3.0	108.0
10-Jun-91	0.95	1.70	4,165,367	518.6	1,791.1	1,664.1	120.8	20.8	100.0	0.3	0.0039	1.5	7.5	7.1	8.9	4.0	3.1	111.8
11-Jun-91	0.95	1.70	4,165,367	518.6	1,791.1	1,664.1	120.8	20.8	100.0	0.3	0.0039	1.5	7.5	7.1	8.9	4.0	3.1	111.8
12-Jun-91	0.95	1.70	4,165,367	726.9	2,324.3	2,232.6	16.7	8.3	8.3	0.2	0.0029	2.5	6.5	6.4	9.0	4.5	3.7	158.7
13-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1

LAKE BYRON SITE #3 LOADINGS

14-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
15-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
16-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
17-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
18-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
19-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
20-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
21-Jun-91	0.90	1.43	3,510,744	716.2	3,624.8	3,403.7	73.7	7.0	66.7	0.8	0.0070	2.3	6.9	6.1	9.2	3.2	2.4	274.0
22-Jun-91	0.90	1.43	3,510,744	716.2	3,624.8	3,403.7	73.7	7.0	66.7	0.8	0.0070	2.3	6.9	6.1	9.2	3.2	2.4	274.0
23-Jun-91	0.88	1.34	3,267,455	666.6	3,373.6	3,167.8	68.6	6.5	62.1	0.7	0.0065	2.1	6.5	5.7	8.6	2.9	2.2	255.0
24-Jun-91	0.87	1.29	3,149,734	642.5	3,252.1	3,053.7	66.1	6.3	59.8	0.7	0.0062	2.0	6.2	5.5	8.3	2.8	2.1	245.8
25-Jun-91	0.90	1.43	3,510,744	716.2	3,624.8	3,403.7	73.7	7.0	66.7	0.8	0.0070	2.3	6.9	6.1	9.2	3.2	2.4	274.0
26-Jun-91	0.90	1.43	3,510,744	716.2	3,624.8	3,403.7	73.7	7.0	66.7	0.8	0.0070	2.3	6.9	6.1	9.2	3.2	2.4	274.0
27-Jun-91	0.90	1.43	3,510,744	716.2	3,624.8	3,403.7	73.7	7.0	66.7	0.8	0.0070	2.3	6.9	6.1	9.2	3.2	2.4	274.0
28-Jun-91	0.90	1.43	3,510,744	716.2	3,624.8	3,403.7	73.7	7.0	66.7	0.8	0.0070	2.3	6.9	6.1	9.2	3.2	2.4	274.0
29-Jun-91	0.95	1.70	4,165,367	849.7	4,300.7	4,038.3	87.5	8.3	79.1	0.9	0.0083	2.7	8.2	7.3	10.9	3.7	2.8	325.1
30-Jun-91	1.02	2.12	5,195,548	1,059.9	5,364.4	5,037.1	109.1	10.4	98.7	1.2	0.0103	3.4	10.3	9.1	13.6	4.7	3.5	405.5
01-Jul-91	1.10	2.67	6,539,404	1,523.7	9,854.9	9,174.8	248.5	13.1	235.4	2.7	0.0213	4.6	15.6	12.9	20.1	4.6	3.0	771.6
02-Jul-91	1.30	4.37	10,700,199	2,514.5	17,286.2	16,135.9	438.7	117.7	321.0	2.3	0.0322	6.4	27.8	25.5	34.2	6.2	3.9	1,364.3
03-Jul-91	1.03	2.19	5,353,732	1,258.1	8,649.0	8,073.4	219.5	58.9	160.6	1.2	0.0161	3.2	13.9	12.8	17.1	3.1	1.9	682.6
04-Jul-91	1.01	2.06	5,040,138	1,184.4	8,142.3	7,600.5	206.6	55.4	151.2	1.1	0.0152	3.0	13.1	12.0	16.1	2.9	1.8	642.6
05-Jul-91	1.01	2.06	5,040,138	1,184.4	8,142.3	7,600.5	206.6	55.4	151.2	1.1	0.0152	3.0	13.1	12.0	16.1	2.9	1.8	642.6
06-Jul-91	1.01	2.06	5,040,138	1,184.4	8,142.3	7,600.5	206.6	55.4	151.2	1.1	0.0152	3.0	13.1	12.0	16.1	2.9	1.8	642.6
07-Jul-91	1.00	2.00	4,887,491	1,148.6	7,895.7	7,370.3	200.4	53.8	146.6	1.1	0.0147	2.9	12.7	11.7	15.6	2.8	1.8	623.2
08-Jul-91	1.00	2.00	4,887,491	1,148.6	7,895.7	7,370.3	200.4	53.8	146.6	1.1	0.0147	2.9	12.7	11.7	15.6	2.8	1.8	623.2
09-Jul-91	1.00	2.00	4,887,491	1,148.6	7,895.7	7,370.3	200.4	53.8	146.6	1.1	0.0147	2.9	12.7	11.7	15.6	2.8	1.8	623.2
10-Jul-91	1.00	2.00	4,887,491	1,148.6	7,895.7	7,370.3	200.4	53.8	146.6	1.1	0.0147	2.9	12.7	11.7	15.6	2.8	1.8	623.2
11-Jul-91	1.00	2.00	4,887,491	1,148.6	7,895.7	7,370.3	200.4	53.8	146.6	1.1	0.0147	2.9	12.7	11.7	15.6	2.8	1.8	623.2
12-Jul-91	0.99	1.94	4,737,599	1,113.3	7,653.6	7,144.3	194.2	52.1	142.1	1.0	0.0142	2.8	12.3	11.3	15.2	2.7	1.7	604.0
13-Jul-91	0.97	1.82	4,446,037	1,044.8	7,182.6	6,704.6	182.3	48.9	133.4	1.0	0.0134	2.7	11.6	10.6	14.2	2.6	1.6	566.9
14-Jul-91	0.96	1.76	4,304,346	1,011.5	6,953.7	6,491.0	176.5	47.3	129.1	0.9	0.0129	2.6	11.2	10.3	13.8	2.5	1.5	548.8
15-Jul-91	0.96	1.76	4,304,346	1,011.5	6,953.7	6,491.0	176.5	47.3	129.1	0.9	0.0129	2.6	11.2	10.3	13.8	2.5	1.5	548.8
16-Jul-91	0.92	1.54	3,764,588	884.7	6,081.7	5,677.0	154.3	41.4	112.9	0.8	0.0113	2.3	9.8	9.0	12.0	2.2	1.4	480.0
17-Jul-91	0.90	1.43	3,510,744	825.0	5,671.6	5,294.2	143.9	38.6	105.3	0.8	0.0106	2.1	9.1	8.4	11.2	2.0	1.3	447.6
18-Jul-91	0.88	1.34	3,267,455	767.9	5,278.6	4,927.3	134.0	35.9	98.0	0.7	0.0098	2.0	8.5	7.8	10.5	1.9	1.2	416.6
19-Jul-91	0.86	1.24	3,034,609	713.1	4,902.4	4,576.2	124.4	33.4	91.0	0.7	0.0091	1.8	7.9	7.2	9.7	1.8	1.1	386.9
20-Jul-91	0.85	1.19	2,922,067	686.7	4,720.6	4,406.5	119.8	32.1	87.7	0.6	0.0088	1.8	7.6	7.0	9.4	1.7	1.1	372.6
21-Jul-91	0.85	1.19	2,922,067	686.7	4,720.6	4,406.5	119.8	32.1	87.7	0.6	0.0088	1.8	7.6	7.0	9.4	1.7	1.1	372.6
22-Jul-91	0.85	1.19	2,922,067	686.7	4,720.6	4,406.5	119.8	32.1	87.7	0.6	0.0088	1.8	7.6	7.0	9.4	1.7	1.1	372.6
23-Jul-91	0.80	0.98	2,397,541	568.2	4,133.4	3,867.2	105.5	48.0	57.5	0.0	0.0066	1.2	6.8	6.7	8.0	1.1	0.6	328.5
24-Jul-91	0.80	0.98	2,397,541	552.6	4,226.9	3,868.4	170.2	57.5	112.7	0.5	0.0066	1.2	3.5	6.7	4.7	3.6	0.6	328.5
25-Jul-91	0.77	0.86	2,112,772	487.0	3,724.8	3,409.0	150.0	50.7	99.3	0.5	0.0058	1.1	3.1	5.9	4.1	3.2	0.5	289.4
26-Jul-91	0.79	0.94	2,300,156	530.2	4,055.2	3,711.3	163.3	55.2	108.1	0.5	0.0063	1.2	3.4	6.4	4.5	3.4	0.6	315.1
27-Jul-91	0.84	1.15	2,812,092	648.2	4,957.7	4,537.3	199.7	67.5	132.2	0.6	0.0078	1.4	4.1	7.9	5.5	4.2	0.7	385.3
28-Jul-91	0.82	1.06	2,599,779	599.2	4,583.4	4,194.7	184.6	62.4	122.2	0.6	0.0072	1.3	3.8	7.3	5.1	3.9	0.7	356.2
29-Jul-91	0.80	0.98	2,397,541	552.6	4,226.9	3,868.4	170.2	57.5	112.7	0.5	0.0066	1.2	3.5	6.7	4.7	3.6	0.6	328.5
30-Jul-91	0.80	0.98	2,397,541	552.6	4,226.9	3,868.4	170.2	57.5	112.7	0.5	0.0066	1.2	3.5	6.7	4.7	3.6	0.6	328.5
31-Jul-91	0.80	0.98	2,397,541	552.6	4,226.9	3,868.4	170.2	57.5	112.7	0.5	0.0066	1.2	3.5	6.7	4.7	3.6	0.6	328.5
01-Aug-91	0.81	1.02	2,497,409	575.7	4,402.9	4,029.6	177.3	59.9	117.4	0.5	0.0069	1.2	3.6	7.0	4.9	3.7	0.6	342.1
02-Aug-91	0.83	1.11	2,704,668	623.4	4,768.3	4,364.0	192.0	64.9	127.1	0.6	0.0075	1.4	3.9	7.6	5.3	4.0	0.7	370.5
03-Aug-91	0.83	1.11	2,704,668	623.4	4,768.3	4,364.0	192.0	64.9	127.1	0.6	0.0075	1.4	3.9	7.6	5.3	4.0	0.7	370.5
04-Aug-91	0.82	1.06	2,599,779	599.2	4,583.4	4,194.7	184.6	62.4	122.2	0.6	0.0072	1.3	3.8	7.3	5.1	3.9	0.7	356.2
05-Aug-91	0.81	1.02	2,497,409	575.7	4,402.9	4,029.6	177.3	59.9	117.4	0.5	0.0069	1.2	3.6	7.0	4.9	3.7	0.6	342.1
06-Aug-91	0.81	1.02	2,497,409	575.7	4,402.9	4,029.6	177.3	59.9	117.4	0.5	0.0069	1.2	3.6	7.0	4.9	3.7	0.6	342.1
07-Aug-91	0.83	1.11	2,704,668	623.4	4,768.3	4,364.0	192.0	64.9	127.1	0.6	0.0075	1.4	3.9	7.6	5.3	4.0	0.7	370.5
08-Aug-91	0.85	1.19	2,922,067	673.5	5,151.6	4,714.6	207.5	70.1	137.3	0.6	0.0081	1.5	4.3	8.2	5.7	4.4	0.7	400.3
09-Aug-91	0.85	1.19	2,922,067	673.5	5,151.6	4,714.6	207.5	70.1	137.3	0.6	0.0081	1.5	4.3	8.2	5.7	4.4	0.7	400.3
10-Aug-91	0.84	1.15	2,812,092	648.2	4,957.7	4,537.3	199.7	67.5	132.2	0.6	0.0078	1.4	4.1	7.9	5.5	4.2	0.7	385.3
11-Aug-91	0.83	1.11	2,704,668	623.4	4,768.3	4,364.0	192.0	64.9	127.1	0.6	0.0075	1.4	3.9	7.6	5.3	4.0	0.7	370.5
12-Aug-91	0.81	1.02	2,497,409	575.7	4,402.9	4,029.6	177.3	59.9	117.4	0.5	0.0069	1.2	3.6	7.0	4.9	3.7	0.6	342.1
13-Aug-91	0.81	1.02	2,497,409	575.7	4,402.9	4,029.6	177.3	59.9	117.4	0.5	0.0069	1.2	3.6	7.0	4.9	3.7	0.6	342.1
14-Aug-91	0.80	0.98	2,397,541	552.6	4,226.9	3,868.4	170.2	57.5	112.7	0.5	0.0066	1.2	3.5	6.7	4.7	3.6	0.6	328.5
15-Aug-91	0.80	0.98	2,397,541	552.6	4,226.9	3,868.4	170.2	57.5	112.7	0.5	0.0066	1.2	3.5	6.7	4.7	3.6	0.6	328.5
16-Aug-91	0.79	0.94	2,300,156	530.2	4,055.2	3,711.3	163.3	55.2	108.1	0.5	0.0063	1.2	3.4	6.4	4.5	3.4	0.6	315.1
17-Aug-91	0.77	0.86	2,112,772	487.0	3,724.8	3,409.0	150.0	50.7	99.3	0.5	0.0058	1.1	3.1	5.9	4.1	3.2	0.5	289.4

LAKE BYRON SITE #3 LOADINGS

18-Aug-91	0.75	0.79	1,935,104	446.0	3,411.6	3,122.3	137.4	46.4	90.9	0.4	0.0053	1.0	2.8	5.4	3.8	2.9	0.5	265.1
19-Aug-91	0.76	0.83	2,022,733	466.2	3,566.1	3,263.7	143.6	48.5	95.1	0.4	0.0056	1.0	3.0	5.7	4.0	3.0	0.5	277.1
20-Aug-91	0.77	0.86	2,112,772	487.0	3,724.6	3,409.0	150.0	50.7	99.3	0.5	0.0058	1.1	3.1	5.9	4.1	3.2	0.5	289.4
21-Aug-91	0.76	0.83	2,022,733	466.2	3,566.1	3,263.7	143.6	48.5	95.1	0.4	0.0056	1.0	3.0	5.7	4.0	3.0	0.5	277.1
22-Aug-91	0.76	0.83	2,022,733	466.2	3,566.1	3,263.7	143.6	48.5	95.1	0.4	0.0056	1.0	3.0	5.7	4.0	3.0	0.5	277.1
23-Aug-91	0.75	0.79	1,935,104	446.0	3,411.6	3,122.3	137.4	46.4	90.9	0.4	0.0053	1.0	2.8	5.4	3.8	2.9	0.5	265.1
24-Aug-91	0.75	0.79	1,935,104	446.0	3,411.6	3,122.3	137.4	46.4	90.9	0.4	0.0053	1.0	2.8	5.4	3.8	2.9	0.5	265.1
25-Aug-91	0.72	0.69	1,686,479	388.7	2,973.3	2,721.1	119.7	40.5	79.3	0.4	0.0046	0.8	2.5	4.7	3.3	2.5	0.4	231.0
26-Aug-91	0.71	0.66	1,608,287	360.3	2,898.1	2,595.8	157.6	45.0	112.6	0.7	0.0044	0.8	0.2	4.5	1.0	4.1	0.4	220.3
27-Aug-91	0.70	0.63	1,532,402	346.7	2,731.5	2,472.9	107.3	34.5	73.6	0.6	0.0042	0.8	2.6	4.3	3.3	2.6	0.5	209.9
28-Aug-91	0.69	0.60	1,458,799	330.1	2,600.3	2,354.1	102.1	32.8	70.0	0.6	0.0040	0.7	2.5	4.1	3.1	2.5	0.5	199.9
29-Aug-91	0.65	0.49	1,186,754	268.5	2,115.4	1,915.1	83.1	26.7	57.0	0.5	0.0033	0.6	2.0	3.3	2.5	2.0	0.4	162.6
30-Aug-91	0.64	0.46	1,124,211	254.4	2,003.9	1,814.2	78.7	25.3	54.0	0.5	0.0031	0.6	1.9	3.1	2.4	1.9	0.4	154.0
31-Aug-91	0.63	0.43	1,063,804	240.7	1,896.2	1,716.7	74.5	23.9	51.1	0.4	0.0029	0.5	1.8	3.0	2.3	1.8	0.4	145.7
01-Sep-91	0.62	0.41	1,005,506	227.5	1,792.3	1,622.6	70.4	22.6	48.3	0.4	0.0028	0.5	1.7	2.8	2.1	1.7	0.4	137.8
02-Sep-91	0.61	0.39	949,290	214.8	1,692.1	1,531.9	66.5	21.4	45.6	0.4	0.0026	0.5	1.6	2.7	2.0	1.6	0.3	130.1
03-Sep-91	0.59	0.34	842,993	190.7	1,502.6	1,360.4	59.0	19.0	40.5	0.3	0.0023	0.4	1.4	2.4	1.8	1.4	0.3	115.5
04-Sep-91	0.57	0.30	744,680	168.5	1,327.4	1,201.7	52.1	16.8	35.7	0.3	0.0021	0.4	1.3	2.1	1.6	1.3	0.3	102.0
05-Sep-91	0.50	0.19	459,869	104.0	819.7	742.1	32.2	10.3	22.1	0.2	0.0013	0.2	0.8	1.3	1.0	0.8	0.2	63.0
06-Sep-91	0.53	0.23	571,029	129.2	1,017.9	921.5	40.0	12.8	27.4	0.2	0.0016	0.3	1.0	1.6	1.2	1.0	0.2	78.2
07-Sep-91	0.54	0.25	611,649	138.4	1,090.3	987.0	42.8	13.8	29.4	0.3	0.0017	0.3	1.0	1.7	1.3	1.0	0.2	83.8
08-Sep-91	0.54	0.25	611,649	138.4	1,090.3	987.0	42.8	13.8	29.4	0.3	0.0017	0.3	1.0	1.7	1.3	1.0	0.2	83.8
09-Sep-91	0.50	0.19	459,869	104.0	819.7	742.1	32.2	10.3	22.1	0.2	0.0013	0.2	0.8	1.3	1.0	0.8	0.2	63.0
10-Sep-91	0.49	0.17	426,268	96.4	759.8	687.9	29.8	9.6	20.5	0.2	0.0012	0.2	0.7	1.2	0.9	0.7	0.2	58.4
11-Sep-91	0.49	0.17	426,268	96.4	759.8	687.9	29.8	9.6	20.5	0.2	0.0012	0.2	0.7	1.2	0.9	0.7	0.2	58.4
12-Sep-91	0.49	0.17	426,268	96.4	759.8	687.9	29.8	9.6	20.5	0.2	0.0012	0.2	0.7	1.2	0.9	0.7	0.2	58.4
13-Sep-91	0.48	0.16	394,332	89.2	702.9	636.4	27.6	8.9	18.9	0.2	0.0011	0.2	0.7	1.1	0.8	0.7	0.1	54.0
14-Sep-91	0.52	0.22	532,215	120.4	948.7	858.9	37.3	12.0	25.5	0.2	0.0015	0.3	0.9	1.5	1.1	0.9	0.2	72.9
15-Sep-91	0.52	0.22	532,215	120.4	948.7	858.9	37.3	12.0	25.5	0.2	0.0015	0.3	0.9	1.5	1.1	0.9	0.2	72.9
16-Sep-91	0.50	0.19	459,869	104.0	819.7	742.1	32.2	10.3	22.1	0.2	0.0013	0.2	0.8	1.3	1.0	0.8	0.2	63.0
17-Sep-91	0.49	0.17	426,268	96.4	759.8	687.9	29.8	9.6	20.5	0.2	0.0012	0.2	0.7	1.2	0.9	0.7	0.2	58.4
18-Sep-91	0.45	0.13	308,149	69.7	549.3	497.3	21.6	6.9	14.8	0.1	0.0008	0.2	0.5	0.9	0.7	0.5	0.1	42.2
19-Sep-91	0.44	0.12	282,502	63.9	503.6	455.9	19.8	6.4	13.6	0.1	0.0008	0.1	0.5	0.8	0.6	0.5	0.1	38.7
20-Sep-91	0.44	0.12	282,502	63.9	503.6	455.9	19.8	6.4	13.6	0.1	0.0008	0.1	0.5	0.8	0.6	0.5	0.1	38.7
21-Sep-91	0.42	0.10	235,590	53.3	419.9	380.2	16.5	5.3	11.3	0.1	0.0006	0.1	0.4	0.7	0.5	0.4	0.1	32.3
22-Sep-91	0.38	0.08	158,145	35.8	281.9	255.2	11.1	3.6	7.6	0.1	0.0004	0.1	0.3	0.4	0.3	0.3	0.1	21.7
23-Sep-91	0.38	0.08	158,145	35.8	281.9	255.2	11.1	3.6	7.6	0.1	0.0004	0.1	0.3	0.4	0.3	0.3	0.1	21.7
24-Sep-91	0.42	0.10	235,590	53.3	419.9	380.2	16.5	5.3	11.3	0.1	0.0006	0.1	0.4	0.7	0.5	0.4	0.1	32.3
25-Sep-91	0.41	0.09	214,245	48.5	381.9	345.7	15.0	4.8	10.3	0.1	0.0006	0.1	0.4	0.6	0.5	0.4	0.1	29.4
26-Sep-91	0.40	0.08	194,250	43.9	346.3	313.5	13.6	4.4	9.3	0.1	0.0005	0.1	0.3	0.5	0.4	0.3	0.1	26.6
27-Sep-91	0.39	0.07	175,565	39.7	312.9	283.3	12.3	4.0	8.4	0.1	0.0005	0.1	0.3	0.5	0.4	0.3	0.1	24.1
28-Sep-91	0.39	0.07	175,565	39.7	312.9	283.3	12.3	4.0	8.4	0.1	0.0005	0.1	0.3	0.5	0.4	0.3	0.1	24.1
29-Sep-91	0.37	0.06	141,948	32.1	253.0	229.1	9.9	3.2	6.8	0.1	0.0004	0.1	0.2	0.4	0.3	0.2	0.1	19.4
30-Sep-91	0.36	0.05	126,930	28.7	226.3	204.8	8.9	2.9	6.1	0.1	0.0003	0.1	0.2	0.4	0.3	0.2	0.0	17.4
01-Oct-91	0.36	0.05	126,930	28.7	226.3	204.8	8.9	2.9	6.1	0.1	0.0003	0.1	0.2	0.4	0.3	0.2	0.0	17.4
02-Oct-91	0.35	0.05	113,044	25.6	201.5	182.4	7.9	2.5	5.4	0.0	0.0003	0.1	0.2	0.3	0.2	0.2	0.0	15.5
03-Oct-91	0.35	0.05	113,044	25.6	201.5	182.4	7.9	2.5	5.4	0.0	0.0003	0.1	0.2	0.3	0.2	0.2	0.0	15.5
04-Oct-91	0.34	0.04	100,247	22.7	178.7	161.8	7.0	2.3	4.8	0.0	0.0003	0.1	0.2	0.3	0.2	0.2	0.0	13.7
05-Oct-91	0.33	0.04	88,493	20.0	157.7	142.8	6.2	2.0	4.2	0.0	0.0002	0.0	0.2	0.2	0.2	0.2	0.0	12.1
06-Oct-91	0.30	0.02	59,024	13.4	105.2	95.3	4.1	1.3	2.8	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	8.1
07-Oct-91	0.30	0.02	59,024	13.4	105.2	95.3	4.1	1.3	2.8	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	8.1
08-Oct-91	0.31	0.03	67,928	15.4	121.1	109.6	4.8	1.5	3.3	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	9.3
09-Oct-91	0.30	0.02	59,024	13.4	105.2	95.3	4.1	1.3	2.8	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	8.1
10-Oct-91	0.30	0.02	59,024	13.4	105.2	95.3	4.1	1.3	2.8	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	8.1
11-Oct-91	0.30	0.02	59,024	13.4	105.2	95.3	4.1	1.3	2.8	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	8.1
12-Oct-91	0.30	0.02	59,024	13.4	105.2	95.3	4.1	1.3	2.8	0.0	0.0002	0.0	0.1	0.2	0.1	0.1	0.0	8.1
13-Oct-91	0.28	0.02	43,739	9.9	78.0	70.6	3.1	1.0	2.1	0.0	0.0001	0.0	0.1	0.1	0.1	0.1	0.0	6.0
14-Oct-91	0.37	0.06	141,948	32.1	253.0	229.1	9.9	3.2	6.8	0.1	0.0004	0.1	0.2	0.4	0.3	0.2	0.1	19.4
15-Oct-91	0.25	0.01	26,410	6.0	47.1	42.6	1.8	0.6	1.3	0.0	0.0001	0.0	0.0	0.1	0.1	0.0	0.0	3.6
16-Oct-91	0.25	0.01	26,410	6.0	47.1	42.6	1.8	0.6	1.3	0.0	0.0001	0.0	0.0	0.1	0.1	0.0	0.0	3.6
17-Oct-91	0.25	0.01	26,410	6.0	47.1	42.6	1.8	0.6	1.3	0.0	0.0001	0.0	0.0	0.1	0.1	0.0	0.0	3.6
18-Oct-91	0.25	0.01	26,410	6.0	47.1	42.6	1.8	0.6	1.3	0.0	0.0001	0.0	0.0	0.1	0.1	0.0	0.0	3.6
19-Oct-91	0.24	0.01	21,938	5.0	39.1	35.4	1.5	0.5	1.1	0.0	0.0001	0.0	0.0	0.1	0.0	0.0	0.0	3.0
20-Oct-91	0.23	0.01	18,041	4.1	32.2	29.1	1.3	0.4	0.9	0.0	0.0000	0.0	0.0	0.1	0.0	0.0	0.0	2.5
21-Oct-91	0.20	0.00	9,344	2.1	16.7	15.1	0.7	0.2	0.4	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	1.3

22-Oct-91	0.20	0.00	9,344	2.1	16.7	15.1	0.7	0.2	0.4	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	1.3
23-Oct-91	0.20	0.00	9,344	2.1	16.7	15.1	0.7	0.2	0.4	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	1.3
24-Oct-91	0.19	0.00	7,294	1.7	13.0	11.8	0.5	0.2	0.4	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	1.0
25-Oct-91	0.19	0.00	7,294	1.7	13.0	11.8	0.5	0.2	0.4	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	1.0
26-Oct-91	0.19	0.00	7,294	1.7	13.0	11.8	0.5	0.2	0.4	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	1.0
27-Oct-91	0.18	0.00	5,598	1.3	9.9	9.0	0.2	0.1	0.1	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.8
MEAN---------	0.66	1.14	2,792,125	504.1	3,268.7	3,017.4	127.1	39.7	87.4	0.9	0.0115	1.1	6.6	6.6	7.7	3.0	1.6	258.6
MEDIAN-------	0.60	0.37	895,129	213.0	1,797.3	1,664.1	52.1	11.0	29.4	0.4	0.0044	0.4	2.5	2.7	3.1	1.3	0.3	123.3
MINIMUM------	0.17	0.00	4,214	1.1	9.9	9.0	0.2	0.0	0.1	0.0	0.0000	0.0	0.0	0.0	0.0	0.0	0.0	0.8
MAXIMUM-----	3.15	42.50	103,981,339	14,193.5	84,952.8	77,258.1	4,887.1	1,975.6	2,911.5	48.9	0.7739	10.4	307.3	258.4	317.7	127.1	80.0	7,954.6
LOAD IN KILOGRAMS/YEAR ----------				98,306	637,400	588,400	24,789	7,747	17,052	172	2.2	208	1,292	1,279	1,497	580	309	50,419
LOAD IN POUNDS/YEAR ----------				216,765	1,405,466	1,297,423	54,661	17,083	37,600	379	4.9	454	2,850	2,820	3,300	1,279	681	111,175
LOAD IN TONS/YEAR ----------				108.4	702.7	648.7	27.3	8.5	18.8	0.2	0.0	0.2	1.4	1.4	1.6	0.6	0.3	55.6

TOTAL INPUT FROM SITE #3 ----- 544,464,467 LITERS/YEAR ----- 143,847,512 GALLONS/YEAR ----- 441.4 ACRE-FEET/YEAR

LAKE BYRON SITE #3 LOADINGS

APPENDIX C

Elutriate Sample Data

12 SEP 1990

DEPARTMENT OF THE ARMY
MISSOURI RIVER DIVISION, CORPS OF ENGINEERS
DIVISION LABORATORY
OMAHA, NEBRASKA 68102

Subject: Standard Elutriate Test on Sediment and Water From Lake Byron Sites 1 and Site 2 (South Dakota) RS#2 (Final)

Project: South Dakota Water and Natural Resorces
Intended Use:
Source of Material: Lake Byron Sites 1 and Site 2 (South Dakota)

Submitted by: CEMRO-PD-P
Date Sampled: 06-26-90 , **Date Received:** 06-27-90
Method of Test or Specification: EPA and Standard Methods

References: 1. Omaha District Letter Request dated 05-09-90
2. Lake Byron, Beadle County South Dakota
3. MRD Lab Sample Identifications: 90/270A

-- REMARKS --

1. One gallon sediment and three gallons receiving water collected from Lake Byron, South Dakota were submitted in the laboratory for Standard Elutriate Test followed by analyses of various parameters. The test results are given on the attached sheet.

2. Sediment results are based on dry weight of the sediment.

3. The symbol "<" indicates less than the detection limit. The detection limit is given.

4. Ms. Ann Denholm was notified of the results on 09/06/90.

Submitted by,

RICHARD L DONOVAN, P.E.
Acting Director, MRD Laboratory

Arora/gm/444-4318

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: South Dakota Department of Water and Natural Resource
Date Sample Taken: 25 Jun 90
Customer Sample Id: Lake Byron Sites 1
Date Sample Received: 27 Jun 90
MRD Lab Sample No: M-1243
Sample Description: Water and Sediment
Sample Container: 3-1gal glass (water) and 1-1gal glass (sediment)
Time Sample Taken: 1:45
Comments: Lake Byron (Beadle Co.) South Dakota

Analysis	Sediment Result	Units	Receiving Water Result	Units	Elutriate Water Result	Units
Ca and Mg Hardness			557	mg/L	480	mg/L
Ammonia Nitrogen			0.12	mg/L	2.9	mg/L
Chemical Oxygen Demand			2.0	mg/L	57	mg/L
Total Cyanide			<0.02	mg/L	<0.02	mg/L
Nitrate-Nitrite Nitrogen			0.45	mg/L	0.07	mg/L
Total Phosphorus			0.18	mg/L	0.47	mg/L
Total Kjeldahl Nitrogen			2.0	mg/L	5.3	mg/L
Oil and Grease			<5	mg/L	<5	mg/L
Antimony	<0.05	mg/Kg	2	ug/L	5	ug/L
Arsenic	7.3	mg/Kg	9	ug/L	20	ug/L
Barium	270	mg/Kg	70	ug/L	130	ug/L
Beryllium	1.1	mg/Kg	<1	ug/L	<1	ug/L
Cadmium	<0.1	mg/Kg	<0.1	ug/L	<0.1	ug/L
Chromium	24	mg/Kg	3	ug/L	2	ug/L
Copper	42	mg/Kg	<10	ug/L	<10	ug/L
Iron	30000	mg/Kg	830	ug/L	10	ug/L
Lead	31	mg/Kg	<1	ug/L	<1	ug/L
Magnesium	18000	mg/Kg	85	mg/L	71	mg/L
Manganese	3700	mg/Kg	45	ug/L	3300	ug/L
Mercury	<0.10	mg/Kg	<0.2	ug/L	<0.2	ug/L
Selenium	0.32	mg/Kg	<1	ug/L	<1	ug/L
Zinc	130	mg/Kg	60	ug/L	<10	ug/L
Nickel	45	mg/Kg	5	ug/L	5	ug/L
Aluminum	32000	mg/Kg	190	ug/L	<50	ug/L
Calcium	66000	mg/Kg	83	mg/L	75	mg/L
Sodium	170	mg/Kg	300	mg/L	280	mg/L
Potassium	6200	mg/Kg	43	mg/L	48	mg/L
Silver	<1	mg/Kg	<10	ug/L	<10	ug/L
Simazine (Princep)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Metribuzin (Lexone)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Atrazine (Aatrex)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Aldrin	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
alpha-BHC	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
beta-BHC	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
gamma-BHC (Lindane)	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Mirex	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Chlordane	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
P'P"DDD	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
P'P"DDE	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
P'P"DDT	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Dieldrin	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Endosulfan I	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Propachlor (Ramrod)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Metolachlor (Dual)	<10	ug/Kg	<0.1	ug/L	0.23	ug/L
Alachlor (Lasso)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Diazinon	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Endrin	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Heptachlor	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Heptachlor epoxide	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Methoxychlor	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Toxaphene	<500	ug/Kg	<0.50	ug/L	<0.50	ug/L
PCB-1016	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L
PCB-1221	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L
PCB-1232	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L
PCB-1242	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L
PCB-1248	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L
PCB-1254	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L
PCB-1260	<100	ug/Kg	<0.10	ug/L	<0.10	ug/L

DEPARTMENT OF THE ARMY
Missouri River Division, Corps of Engineers
Division Laboratory
Omaha, Nebraska

Project: South Dakota Department of Water and Natural Resource
Date Sample Taken: 26 Jun 90 Customer Sample Id: Lake Byron Sites 2
Date Sample Received: 27 Jun 90 MRD Lab Sample No: M-1242
Sample Description: Water and Sediment Sample Container: 3-1gal glass (water) and 1-1gal glass (sediment)
Time Sample Taken: 1:45
Comments: Lake Byron (Beadle Co.) South Dakota

Analysis	Sediment Result	Units	Receiving Water Result	Units	Elutriate Water Result	Units
Ca and Mg Hardness			571	mg/L	520	mg/L
Ammonia Nitrogen			0.10	mg/L	3.2	mg/L
Chemical Oxygen Demand			49	mg/L	55	mg/L
Total Cyanide			<0.02	mg/L	<0.02	mg/L
Nitrate-Nitrite Nitrogen			0.34	mg/L	0.06	mg/L
Total Phosphorus			0.18	mg/L	0.80	mg/L
Total Kjeldahl Nitrogen			2.4	mg/L	5.3	mg/L
Oil and Grease			<5	mg/L	<5	mg/L
Antimony	<0.05	mg/Kg	<1	ug/L	1	ug/L
Arsenic	5.0	mg/Kg	8	ug/L	38	ug/L
Barium	260	mg/Kg	60	ug/L	150	ug/L
Beryllium	1.2	mg/Kg	<1	ug/L	<1	ug/L
Cadmium	<0.1	mg/Kg	<0.1	ug/L	<0.1	ug/L
Chromium	240	mg/Kg	6	ug/L	26	ug/L
Copper	880	mg/Kg	<10	ug/L	<10	ug/L
Iron	32000	mg/Kg	210	ug/L	150	ug/L
Lead	28	mg/Kg	<1	ug/L	2	ug/L
Magnesium	17000	mg/Kg	86	mg/L	79	mg/L
Manganese	4200	mg/Kg	19	ug/L	3500	ug/L
Mercury	<0.10	mg/Kg	<0.2	ug/L	<0.2	ug/L
Selenium	0.27	mg/Kg	1	ug/L	<1	ug/L
Zinc	1300	mg/Kg	<10	ug/L	<10	ug/L
Nickel	550	mg/Kg	6	ug/L	16	ug/L
Aluminum	34000	mg/Kg	170	ug/L	70	ug/L
Calcium	71000	mg/Kg	87	mg/L	78	mg/L
Sodium	1400	mg/Kg	300	mg/L	270	mg/L
Potassium	6400	mg/Kg	43	mg/L	46	mg/L
Silver	<1	mg/Kg	<10	ug/L	<10	ug/L
Simazine (Princep)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Metribuzin (Lexone)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Atrazine (Aatrex)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Aldrin	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
alpha-BHC	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
beta-BHC	25	ug/Kg	<0.01	ug/L	<0.01	ug/L
gamma-BHC (Lindane)	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Mirex	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Chlordane	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
P'P"DDD	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
P'P"DDE	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
P'P"DDT	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Dieldrin	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Endosulfan I	<10	ug/Kg	<0.01	ug/L	<0.01	ug/L
Propachlor (Ramrod)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Metolachlor (Dual)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Alachlor (Lasso)	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
Diazinon	<10	ug/Kg	<0.1	ug/L	<0.1	ug/L
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