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OPERATIONAL ECOLOGICAL STUDY IN THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER JANUARY THROUGH DECEMBER 1981

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SUMMARY

The 1981 operational monitoring data collected near Duane Arnold Energy Center (DAEC) corresponded with the results of prior operational and preoperational investigations of the Cedar River. The monitoring of the Cedar River revealed minimal variations in water quality immediately downstream from the station discharge and no apparent alterations in the biological communities. The principal factors influencing the chemical, physical and biological parameters of the Cedar River near DAEC were the natural hydrologic and seasonal variations which occurred during 1981.

The operation of DAEC had a minimal effect on the water quality of the Cedar River as indicated by chemical and physical measurements. Temperature, total dissolved solids, total solids, hardness, orthophosphate, sulfate, phosphorus, tannins and lignins and total alkalinity were the only water quality parameters in the river affected by station operation. Effects on these parameters appeared localized near the discharge as little or no effects were observed one-half mile further downstream. Little variation was found in the levels of general water quality parameters (other than those affected by station operation) and nutrients among river locations for a given sampling event or between annual mean values for each river location. This provided further indication of minimal effect of station effluent on river water quality.

Diatoms were the most abundant component of the phytoplankton community in the Cedar River and in the discharge canal during most of 1981. Phytoplankton densities were highest in late August and late September with lowest densities occurring during January, February and early August. Differences in the phytoplankton community among locations and over time were attributed to natural spatial and seasonal variability and not to the operation of DAEC.

Diatoms composed more than 70% of the periphyton assemblage at both upstream and downstream locations during all sampling periods. Differences in the relative abundance of periphytic taxa between sampling sites were attributed to natural factors (i.e., grazing of substrates by macroinvertebrates). Periphyton biomass production and assemblage composition differences between upstream and downstream locations were not reflective of any perturbation as a result of station operation.

The dominant benthic macroinvertebrates collected from the natural substrate samples in the Cedar River were rhabdocoels (near _Macrostomum_ sp.) and midge fly larvae (Chironomidae). The benthic community was generally sparse and contained relatively few taxa at all locations during 1981. Aquatic Oligochaeta and the insect orders Ephemeroptera, Plecoptera, Trichoptera and Diptera were the dominant organisms that colonized the artificial substrate samplers in the Cedar River. The diversity and density of the organisms colonizing artificial substrate samplers were generally greater than the fauna collected from natural substrates. This difference was attributed to the favorable stable substrate of the Hester-Dendy samplers as opposed to the unstable sand of the river bottom. The diversity values at the natural substrate locations increased when the silt fraction increased in the sediments. The fingernail clams (_Sphaerium transversum_) collected downstream from the

DAEC discharge in Nover er may have originated from the discharge canal; however, there were no con'stent differences in the macroinvertebrate communities sampled from natural and artificial substrates during 1981 which could be at ted to the operation of DAEC.

The predominant fish species collected by electrofishing were river carpsucker and carp while spotfin shiners were the dominant species collected by seining. Game species were collected in low numbers with all sampling methods. Greater numbers of fish were collected by electro-shocking downstream from the station than upstream. No pronounced differences were noted in the food habits of fishes upstream or downstream from DAEC. All fish collected upstream and downstream from the station had low levels of chlorinated insecticides and PCB's. The caged fish study revealed no evidence that the effluent from the discharge canal would adversely affect fish in the Cedar River. The results of this study did not provide evidence that the operation of the DAEC adversely impacted the fish community of the Cedar River.

Only 322 fish were impinged at the DAEC during 1981. Over 82 percent of the impingement occurred from January through early April. Spotfin shiner and sand shiner were the predominant fish in the impingement collections. Based on these low numbers, impingement by the station had no appreciable impact on the fish populations in the Cedar River during 1981.

Diatoms were the most abundant phytoplankton components in the 1981 entrainment samples. Phytoplankton biomass in terms of chlorophyll a content ranged from 11.973 to 140.428 mg/m^3, and was greatest on the May sampling date. Zooplankton densities for entrainment sampling ranged from 301 to 52,670 organisms/m^3 and were generally lower than during 1980. Rotifers dominated the zooplankton community on each sampling date. Ichthyoplankton entrainment samples collected during 1981 were void of fish larvae and eggs. The small percentage of the total river flow entering the station indicated that the impact of DAEC on the phytoplankton, zooplankton and ichthyoplankton communities as a result of entrainment was minimal in 1981.

The 1981 Corbicula survey near DAEC revealed several potential habitats for colonization and survival of C. fluminea; however, there was no evidence of the species ever occurring in this specific area.

The terrestrial vegetation monitoring during May through September 1981 revealed no evidence of salt damage resulting from the operation of the station cooling towers.

Chapter 1

Introduction

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1.0 INTRODUCTION

An ecological monitoring program was conducted for the Iowa Electric Light and Power Company in the vicinity of Duane Arnold Energy Center (DAEC) near Palo, Iowa, from January through December 1981. Physical, chemical, and biological studies were conducted in the Cedar River, and terrestrial studies were carried out near the station to meet the requirements of Section 4.0, "Environmental Surveillance and Special Studies," of the Nuclear Regulatory Commission's Technical Specifications. Data collected as part of this monitoring program were utilized to evaluate the operational impact of the DAEC generating facility on the ecology of the Cedar River and the nearby terrestrial vegetation during 1981.

Studies to determine the baseline physical, chemical, and biological characteristics of the Cedar River near Duane Arnold Energy Center were instituted in April 1971 prior to station start-up. Data from these studies served as a basis for the development of the operational monitoring program which was implemented in January 1974 and has continued to date.

1.1 OBJECTIVES OF THE STUDY

The operational studies were designed to identify and evaluate any substantial effects of chemical or thermal discharges from the generating station on the Cedar River aquatic ecosystem as well as to determine the magnitude of impingement on intake screens and entrainment in the condenser make-up water.

The specific objectives of the operational study were threefold:

1. To continue routine water quality and biological determinations in the Cedar River upstream from the discharge canal in order to identify ambient conditions and to describe natural variations in water quality and biological communities;

2. To conduct physical, chemical and biological studies in and downstream from the discharge canal to define possible water quality changes occurring as the result of chemical additions or condenser passage and to identify the potential impact of the station effluent on aquatic communities of the Cedar River;

3. To identify and quantify organisms impinged on the intake screens and entrained in the intake water in order to estimate the magnitude and effects of impingement and entrainment; and

4. To monitor the terrestrial vegetation near the DAEC cooling towers for evidence of salt injury.

1.2 DESCRIPTION OF THE STUDY SITE

The Duane Arnold Energy Center is a nuclear-fueled electrical generating plant operated by the Iowa Electric Light and Power Company. The facility is located on the western shore of the Cedar River, about 2.5 mi

north-northeast of Palo, Iowa, in Linn County. A boiling water nuclear power reactor is used to produce about 550 MWe of power at full capacity. Circulating condenser water from the turbine cycle is cooled by means of two closed loop induced draft cooling towers, which require a maximum of 11,000 gpm of water from the Cedar River. A maximum of 7,000 gpm may be lost through evaporation, while 4,000 gpm is returned to the river as blowdown water.

Sampling sites for the operational monitoring program have been established in the discharge canal and at four locations in the Cedar River (Figure 1-1): Location 1 is upstream of the station at the Lewis Access Bridge; Location 2 is immediately upstream from the station intake; Location 3 is approximately 140 ft downstream of the station discharge; and Location 4 is adjacent to Comp Farm about 0.5 mi downstream from the station. Samples also were collected from Location 5 in the discharge canal. Impingement and entrainment samples were collected in or near the station intake. Terrestrial vegetation inspections were conducted at three sites near the cooling towers.

1.3 MONITORING FREQUENCY

The monitoring frequency for each aspect of the program is presented in Table 1-1. Samples for general chemical and plankton analysis were collected semi-monthly, whereas samples for seasonal chemical analysis, periphyton, benthos, and fishery studies were collected three times per year. Impingement/entrainment studies were conducted quarterly and were representative of the four seasons. Five vegetation inspections were made from May through September 1981. Thermal plume mapping was not conducted during 1981 because the river flow continuously exceeded the minimum specified for plume mapping.

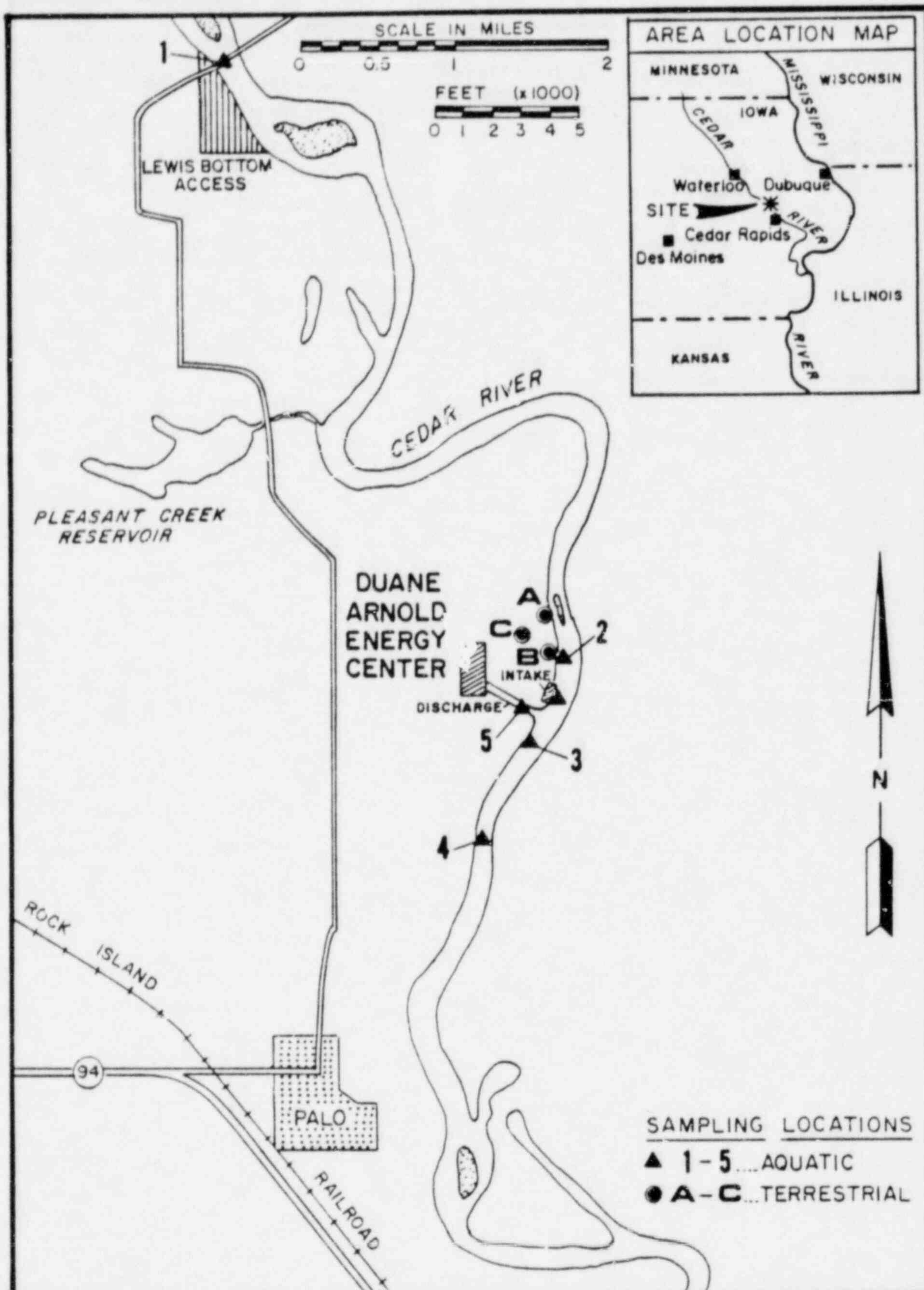

Figure 1-1. Sampling locations for the Cedar River operational monitoring study near Duane Arnold Energy Center, January - December 1981

TABLE 1-1 MONITORING FREQUENCY FOR THE DUANE ARNOLD ENERGY CENTER ECOLOGICAL STUDY, JANUARY - DECEMBER 1981

Program Aspect	Month of Collection											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
General Water Quality Analyses	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
Seasonal Water Quality Analyses					X			X			X	
Phytoplankton	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
Periphyton					X			X			X	
Benthic Macroinvertebrates												
Natural Substrates					X			X			X	
Artificial Substrates					X			X			X	
Fisheries					X	X		X			X	
Fish Basket Study								X				
Impingement		X			X			X			X	
Entrainment		X			X			X			X	
Radiological												
Periphyton		X			X			X			X	
Fish						X					X	
Bottom Sediments					X						X	
Corbicula Survey					X						X	
Terrestrial					X	X	X	X	X			

Chapter 2

Water Quality

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2.0 WATER QUALITY

2.1 INTRODUCTION

A comprehensive water quality investigation was conducted for the Iowa Electric Light and Power Company in the Cedar River in the vicinity of the Duane Arnold Energy Center (DAEC). The study was carried out from January through December 1981.

The overall objective of this study was to determine the effects of chemical and thermal discharges from the generating station on the water quality of the river. The specific objectives were:

1. To determine ambient water quality in the Cedar River upstream from the discharge canal;

2. To determine water quality in the station discharge and in the river downstream from the discharge canal; and

3. To compare upstream and downstream data in order to assess the effects of station discharge on the water quality of the river.

2.2 HISTORICAL REVIEW

Preoperational and operational water quality studies have been conducted in the Cedar River near the Duane Arnold Energy Center from 1971 through 1980. Preoperational studies were carried out from 1971 through 1973 (McDonald 1972, 1974a, 1974b) and operational studies were conducted from 1974 through 1980 (McDonald 1975, 1976, 1977, 1978, and 1979; Putkey 1980; Kranz 1981).

The preoperational studies indicated that the major factors affecting water quality of the Cedar River were runoff from agricultural lands and the hydrological characteristics of the river. During both the preoperational and operational studies, maximum values for the levels of turbidity, suspended solids, phosphate, nitrate, and ammonia were found to have coincided frequently with periods of high runoff, while low values for these parameters occurred during low-flow periods.

The operational studies indicated that the only water quality parameters affected by station operation were temperature, solids, hardness, sulfate, orthophophate and total coliform bacteria, and that, in general, effects were observable only at downstream Location 3 situated in the mixing zone of the station discharge. During station shutdown in 1978, no consistent differences were noted in the water quality parameters among the river locations.

2.3 FIELD AND ANALYTICAL PROCEDURES

2.3.1 Field Collections

Single water samples were collected semimonthly from depths of one meter at each of the five monitoring locations (Figure 1-1, Chapter 1) with a 6-liter polyvinyl chloride Kemmerer sampler or by direct filling of sample bottles below the surface. Samples were collected as far from the

shore as possible. Individual bottles appropriate for parameters to be measured from the sample were filled from the spigot on the sampler. Samples were preserved as appropriate, placed in insulated coolers, packed in ice, and shipped to the laboratory for analysis.

Water temperature was measured in situ, and measurements for dissolved oxygen, pH, and alkalinity were made in the field as soon as possible after sample collection. In addition, diurnal measurements of dissolved oxygen, pH, and alkalinity were taken every four hours during a 24-hr period in the spring (May), summer (August), and fall (November).

2.3.2 Analytical Procedures

Water samples were analyzed on a semimonthly basis for the water quality parameters listed in Table 2-1. In addition, samples were analyzed on a seasonal basis (in May, August and November) for the supplementary parameters also listed in Table 2-1.

General water quality parameters were measured in order to define the general chemical quality of the water. Aquatic nutrients were measured since they are necessary for the growth of aquatic plants and are useful in identifying chemicals from agricultural run-off and sanitary waste discharges. The indicators of contamination were measured to provide an assessment of contamination from sanitary and industrial wastes. Analyses for trace metals were carried out because these substances can be potentially toxic to aquatic biota and can accumulate in the organisms at the top of the food chain.

All samples were analyzed by EA's Analytical Chemistry Laboratory located in Sparks, Maryland. The methods used for laboratory and field analysis of water samples are presented in Table 2-2. Analytical methods used were taken from Standard Methods for the Examination of Water and Wastewater (APHA et al., 1976) or Methods for Chemical Analysis of Water and Wastes (USEPA 1979a).

The quality assurance program employed in the chemical laboratory followed the Ecological Analysts, Inc. Quality Assurance Program Manual and the Environmental Analytical Chemistry Quality Control Manual. The Quality Control Manual is based on the Handbook for Analytical Quality Control in Water and Wastewater Laboratories (USEPA 1979b) and in general complies with requisites described in Minimal Requirements for a Water Quality Assurance Program (USEPA 1975); including the calibration of sampling equipment and field instruments; sample collection and preservation techniques; laboratory analysis; data recording, storage and retrieval; and chain-of-custody.

Descriptive statistics were calculated for water quality data on an annual basis for each parameter at each location and for the combined river locations. The descriptive statistics included the number of measurements, mean, minimum, and maximum values. This technique provided an overview of the water quality conditions existing within the system.

TABLE 2-1 WATER QUALITY PARAMETERS MEASURED SEMIMONTHLY AND SEASONALLY IN THE CEDAR RIVER AND DISCHARGE CANAL, DUANE ARNOLD ENERGY CENTER, JANUARY - DECEMBER 1981

General Water Quality

Semimonthly

Alkalinity, carbonate
Alkalinity, total
Carbon dioxide
Color
Hardness, calcium
Hardness, total
(calcium and magnesium)
Iron, total
Oxygen, dissolved
pH
Residue, filtrable
(total dissolved solids)
Residue, nonfiltrable
(total suspended solids)
Residue, total
(total solids)
Temperature
Turbidity

Seasonally[a]

Chloride
Manganese, total
Sulfate

Aquatic Nutrients

Semimonthly

Ammonia
Nitrate
Orthophosphate, soluble
Phosphorus, total

Seasonally

Nitrite

Indicators of Contamination

Semimonthly

Biochemical oxygen demand
(5-day)
Chemical oxygen demand
Odor
Tannins and lignins

Trace Metals

Seasonally

Chromium, hexavalent
Copper, total
Lead, total
Mercury, total
Zinc, total

(a) Measured in addition to semimonthly parameters.

TABLE 2-2 METHODS FOR THE MEASUREMENT OF WATER QUALITY PARAMETERS

Parameter	Method
Alkalinity	Potentiometric, titrimetric
Ammonia	Autoanalyzer Phenate method
Biochemical oxygen demand (5-day)	Membrane electrode
Calcium	Atomic absorption
Calcium hardness	Calculated from calcium
Carbonate alkalinity	Potentiometric, titrimetric
Carbon dioxide	Calculated
Chemical oxygen demand	Low level method
Chloride	Autoanalyzer Ferricyanide or titrimetric
Chromium, hexavalent	Atomic absorption
Color	Platinum-cobalt
Copper	Atomic absorption
Hardness, total (calcium and magnesium)	Calculated from calcium and magnesium
Iron	Atomic absorption
Lead	Atomic absorption
Magnesium	Atomic absorption
Manganese	Atomic absorption
Mercury	Flameless atomic absorption
Nitrate	Autoanalyzer Cadmium reduction
Nitrite	Diazotization method
Odor	Dilution and Panel

TABLE 2-2 (CONT.)

Parameter	Method
Orthophosphate, soluble	Filtration, Autoanalyzer
Oxygen, dissolved	Oxygen analyzer, membrane electrode or Azide Modified Winkler titration
pH	Potentiometric
Phosphorus, total	Digestion, Autoanalyzer
Residue, filtrable (total dissolved solids)	Filtration, then gravimetry at 103-105C
Residue, total nonfiltrable (total suspended solids)	Filtration, then gravimetry at 103-105C, or by difference
Residue, total (total solids)	Gravimetry at 103-105C
Sulfate	Autoanalyzer, Methyl thymol blue method or titrimetric
Tannins and Lignins	Carbonate-Tartrate
Temperature	Hydrolab Surveyor or Whitney Thermometer
Turbidity	Hach Turbidimeter, nephelometric
Zinc	Atomic absorption

2.4 RESULTS AND DISCUSSION

The water quality data obtained for the Cedar River and the Duane Arnold Energy Center discharge canal from January through December 1981 are presented in Tables A-1 through A-31 of Appendix A. These data are summarized for each sampling location and the combined river locations (referred to as river values) in Table 2-3. The following discussion provides an overview of water quality in the river and discharge canal and an indication of the effects of the station effluent on water quality of the river. Water quality of the river is also discussed relative to hydrological conditions.

2.4.1 Hydrology

Based on data from the U.S. Geological Survey gauging station at Cedar Rapids, the mean annual flow in the Cedar River during water year 1981 (3,610 cfs) was slightly above the historical average of 3,301 cfs. Mean daily flows during 1981 ranged from 760 cfs on 13 February to 14,900 cfs on 29 June (Figure 2-1). The seasonal distribution of flows was unusual in that peak daily and monthly flows occurred during June (monthly mean of 5,914 cfs) and July (monthly mean of 6,640 cfs) rather than during the spring as is usually the case. This is very similar to the pattern observed during 1980 (Kranz 1981).

2.4.2 General Water Quality Parameters

Water Temperatures

Water temperatures in the Cedar River followed normal seasonal trends during 1981, ranging from 0 C on various dates in January, February, and December to 28.0 C on 8 July (Tables 2-3 and A-1). The annual mean river temperature was 13.0 C (Table 2-3).

Temperatures in the discharge canal ranged from 9.2 C on 8 January to 32.2 C on 8 July, and averaged 20.0 C for the year (Table 2-3). Station ΔT's (i.e., Location 2 vs Location 5) ranged from 0 to 22 C, with an average of 7.4 C (Table A-1). Delta-T's were highest during the winter, typically ranging from 18-22 C. River temperatures at Location 3 were noticeably influenced by the discharge in January through March, and again in November and December. These were the periods when ΔT's were greatest and flows were lowest. For the year, temperatures at Location 3 averaged 1.5 degrees higher than at Location 2. During the same months that Location 3 was affected by the effluent, slightly elevated temperatures (0.5-1.1 C) were also observed at Location 4.

Dissolved Oxygen

Dissolved oxygen concentrations in the river in January through April and September through December were typically between 10 and 15 mg/l; whereas, with the exception of one date in May, DO concentrations for the period May through August were typically between 6 and 10 mg/l (Tables 2-3 and A-3). Extremes for the year ranged from 6.5 on 5 August to 18.4 on 21 May. The annual average for the river was 11.6 mg/l. Although DO concentrations in the river generally followed normal seasonal trends,

TABLE 2-3 SUMMARY OF WATER QUALITY DATA FOR THE CEDAR RIVER AND THE DISCHARGE CANAL AT THE DUANE ARNOLD ENERGY CENTER FROM JANUARY THROUGH DECEMBER 1981

		Location					
		1	2	3	4	1-4[a]	5
General Water Quality							
Temperature (C)	Mean	12.5	12.6	14.1	12.9	13.0	20.0
	Min-Max	0.0-26.9	0.0-26.8	3.2-28.0	0.0-27.3	0.0-28.0	9.2-32.2
	N[b]	24	24	24	24	96	24
Carbon Dioxide (mg/l)	Mean	6.6	6.6	5.8	6.0	6.3	6.0
	Min-Max	1.8-22.0	1.9-19.0	1.7-13.0	1.8-14.0	1.7-22.0	2.2-11.0
	N	24	24	24	24	96	24
Dissolved Oxygen (mg/l)	Mean	11.8	11.7	11.2	11.6	11.6	8.8
	Min-Max	6.9-18.4	6.5-16.6	6.7-14.7	6.7-15.4	6.5-18.4	6.8-11.3
	N	24	24	24	24	96	24
pH (units)	Mean	7.9	7.9	7.9	7.9	7.9	7.7
	Min-Max	7.2-8.4	7.3-8.4	7.3-8.4	7.2-8.4	7.2-8.4	6.7-8.2
	N	24	24	24	24	96	24
Alkalinity, total (mg/l-$CaCO_3$)	Mean	197	194	184	192	192	138
	Min-Max	113-258	110-239	112-225	109-240	109-258	37-224
	N	24	24	24	24	96	24
Alkalinity, carbonate (mg/l-$CaCO_3$)	Mean	0.4	0.6	0.5	0.5	0.5	0.0
	Min-Max	0.0-10.0	0.0-14.0	0.0-12.0	0.0-12.0	0.0-14.0	0.0
	N	24	24	24	24	96	24
Chloride (mg/l)	Mean	24.9	24.4	25.5	26.5	25.3	31.4
	Min-Max	16.6-31.0	16.6-30.0	16.7-30.5	20.2-32.0	16.6-32.0	26.5-38.2
	N	3	3	3	3	12	3
Hardness, calcium (mg/l-$CaCO_3$)	Mean	191	193	207	205	199	281
	Min-Max	132-290	98-362	117-310	133-388	98-388	136-567
	N	22	22	21	22	87	22
Hardness, total (mg/l, $CaCO_3$)	Mean	280	292	320	302	299	451
	Min-Max	198-443	190-512	170-508	191-547	170-547	205-873
	N	22	22	21	22	87	22
Sulfate (mg/l)	Mean	36.2	34.2	63.1	41.1	43.7	211.3
	Min-Max	33.1-38.8	27.2-38.9	36.2-104.4	30.2-54.9	27.2-104.4	35.8-299.2
	N	3	3	3	3	12	3
Turbidity (NTU)	Mean	34	39	39	41	38	50
	Min-Max	1.1-139	1.3-165	1.2-160	1.6-156	1.1-165	1.9-192
	N	23	23	23	22	91	23
Residue, filtrable	Mean	406	390	426	432	414	733
	Min-Max	303-724	256-696	273-596	247-816	247-816	292-2027
	N	23	23	23	23	92	23

TABLE 2-3 (CONT.)

		Location					
		1	2	3	4	1-4[a]	5
Residue, nonfiltrable	Mean	115	124	108	136	121	125
	Min-Max	1-808	1-864	1-474	1-860	1-864	3-472
	N	23	23	23	23	92	23
Residue, total	Mean	521	513	534	567	534	858
	Min-Max	313-1532	353-1560	390-860	309-1676	309-1676	345-2229
	N	23	23	23	23	92	23
Color (units)	Mean	87	84	87	98	89	106
	Min-Max	0.6-455	0.1-514	0.6-469	0.1-560	0.1-560	1.7-450.9
	N	23	23	23	23	92	23
Iron, total (mg/l)	Mean	1.97	2.44	1.70	2.19	2.08	2.70
	Min-Max	0.1-14	0.1-16.2	<0.04-10.9	<0.04-14.1	<0.04-16.2	<0.3-10.9
	N	24	24	23	24	95	24
Manganese, total (mg/l)	Mean	0.10	0.13	0.12	0.12	0.12	0.16
	Min-Max	0.06-0.15	0.05-0.20	0.06-0.17	0.06-0.17	0.05-0.20	0.13-0.21
	N	3	3	3	3	12	3
Aquatic Nutrients							
Ammonia (mg/l-N)	Mean	0.25	0.28	0.15	0.27	0.24	0.24
	Min-Max	<0.01-1.499	<0.008-2.080	<0.008-1.001	<0.008-2.059	<0.008-2.080	0.014-2.724
	N	24	24	24	24	96	24
Nitrate (mg/l-N)	Mean	6.00	5.81	6.11	5.68	5.90	8.09
	Min-Max	2.32-10.9	2.08-8.19	2.09-9.54	2.07-8.35	2.07-10.9	3.36-14.97
	N	24	24	24	24	96	24
Nitrite (mg/l-N)	Mean	0.023	0.025	0.019	0.022	0.022	0.021
	Min-Max	0.012-0.04	0.016-0.04	0.011-0.03	0.016-0.03	0.011-0.04	0.016-0.03
	N	3	3	3	3	12	3
Orthophosphate, soluble (mg/l-P)	Mean	0.41	0.41	0.50	0.40	0.43	0.97
	Min-Max	0.009-0.960	0.009-1.026	0.029-1.454	0.021-1.077	0.009-1.454	0.054-2.444
	N	23	23	23	23	92	23
Phosphorus, total (mg/l-P)	Mean	0.77	0.79	0.91	0.76	0.81	1.77
	Min-Max	<0.2-3.11	<0.2-3.28	0.22-3.63	0.22-3.92	<0.2-3.92	0.22-4.81
	N	22	23	23	23	91	23
Indicators of Contamination							
Biochemical Oxygen Demand (5 day) (mg/l)	Mean	6.5	6.4	6.4	6.1	6.4	6.9
	Min-Max	1.5-17.7	1.6-18.6	1.6-16.8	1.2-16.8	1.2-18.6	1.8-18.9
	N	23	23	23	22	91	23
Chemical Oxygen Demand (mg/l)	Mean	38.0	52.9	52.2	46.2	47.3	48.4
	Min-Max	4.9-146.8	5.6-360.8	3.9-432.8	7.3-168.1	3.9-432.8	10.1-126.1
	N	23	23	23	22	91	23

TABLE 2-3 (CONT.)

		Location					
		1	2	3	4	1-4[a]	5
Odor, threshold (units)	Mean	1	2	2	2	2	2
	Min-Max	0-3	0-4	0-4	0-4	0-4	0-4
	N	23	23	23	23	92	23
Tannins and Lignins (mg/l)	Mean	0.75	0.73	0.84	0.70	0.76	1.16
	Min-Max	0.07-7.5	0.05-7.2	0.13-9.3	0.08-6.3	0.05-9.3	0.11-11.1
	N	24	24	24	24	96	24
Trace Metals							
Chromium, hexavalent (μg/l)	Mean	7.1	11.4	11.6	2.5	8.2	1.7
	Min-Max	1.1-18.9	1.8-28.7	1.5-31.2	1.7-3.3	1.1-31.2	0.2-<5.0
	N	3	3	3	3	12	3
Copper, total (μg/l)	Mean	13.9	6.2	6.2	56.3	20.7	18.8
	Min-Max	6.7-22.7	4.6-7.7	5.1-7.0	4.2-153.3	4.2-153.3	12.0-28.6
	N	3	[illegible]	3	3	12	3
Lead, total (μg/l)	Mean	5.5	4.7	4.0	3.9	4.5	4.8
	Min-Max	1.4-11.4	3.0-7.3	1.6-5.9	1.8-6.5	3.9-5.5	1.2-6.6
	N	3	3	3	3	12	3
Mercury, total (μg/l)	Mean	0.19	0.10	0.09	0.11	0.12	0.15
	Min-Max	<0.03-0.49	<0.03-0.23	<0.03-0.20	<0.03-0.25	<0.03-0.49	<0.03-0.38
	N	3	3	3	3	12	3
Zinc, total (mg/l)	Mean	0.03	0.02	0.03	0.04	0.03	0.06
	Min-Max	0.02-0.05	0.02-0.03	0.01-0.05	0.03-0.05	0.01-0.05	0.03-0.10
	N	3	3	3	3	12	3

[a]Pooled river data for Locations 1 through 4
[b]Number of determinations

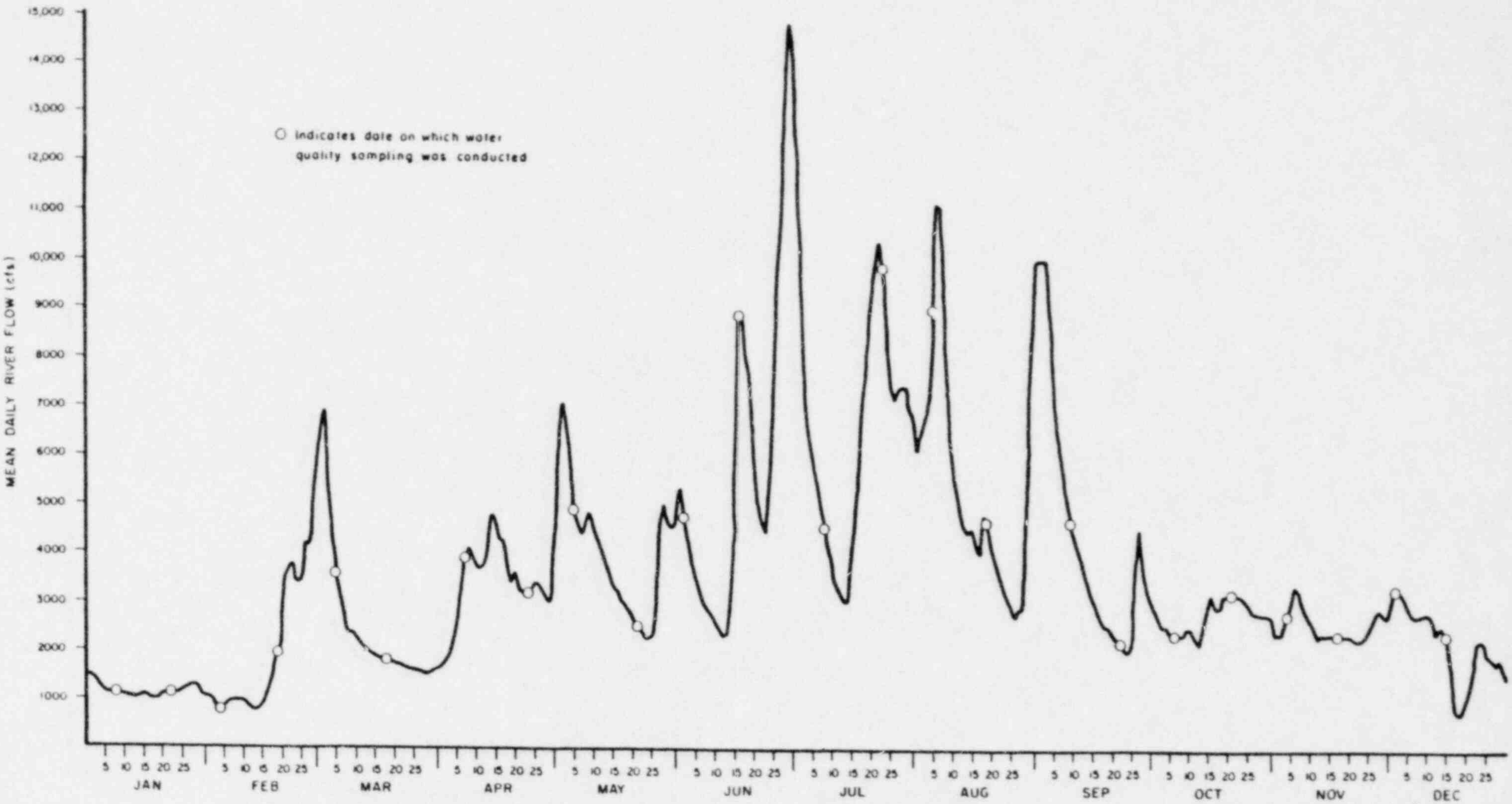

Figure 2-1 River flows of the Cedar River at Cedar Rapids, Iowa, January through December 1981.

they also were strongly affected by phytoplankton abundance. Several examples illustrate this relationship. On 5 May, phytoplankton numbers were low (3,000 units/ml) (Chapter 3, Figure 3-1) and DO levels were slightly below saturation (Tables 2-3 and A-3). Two weeks later on 21 May, a diatom-dominated bloom occurred with total numbers reaching 65,000 units/ml. DO values on this date reached their maximum concentration for the year, 18.4 mg/l. A comparison of DO concentrations and phytoplankton abundance on 9 and 22 September revealed a similar pattern. On 9 September phytoplankton numbers were at normal season levels (20,000 units/ml) and DO values were near saturation. On 22 September maximum phytoplankton numbers (200,000 units/ml) for the year occurred and DO values reached 16.9 mg/l, 178% saturation.

Supersaturated conditions occurred in the river primarily during late March and April (104 to 116 percent at Location 1) and during late August through November (109 to 178 percent at Location 1). On 21 May, DO levels at Location 1 were 200% of saturation, the maximum for the year. Except during June and July, DO values in the discharge canal were consistently lower than those recorded upstream of the plant. During June and July, DO values in the discharge and at Locations 1 and 2 were comparable. DO values in the discharge canal and the river were, however, always well above the minimum values needed to support the indigenous aquatic community inhabiting the Cedar River.

pH

pH values for all sampling locations including the discharge canal were quite consistent both for a given sampling date and for the year as a whole; values in the river averaged 7.9 with a range of 7.2 to 8.4, and values in the discharge averaged 7.7 with a range of 6.7 to 8.2 (Table 2-3). No correlations between pH and the other parameters measured during this study were apparent.

Alkalinity (Total and Carbonate) and Carbon Dioxide

Total alkalinity in the river ranged from 109 to 258 mg/l, with an annual mean of 192 mg/l (Table 2-3). No seasonal pattern was apparent. By definition, carbonate alkalinity exists only when pH values exceed 8.3. This occurred only on 18 March when pH values at all four river locations were 8.4. On this date carbonate values in the river ranged from 10 to 14 mg/l, with a mean of 12 mg/l.

Carbon dioxide values in the river ranged from 1.7 to 22.0 mg/l, with an annual mean of 6.3 mg/l (Table 2-3). High carbon dioxide values were associated with the colder months and/or when pH values were below 7.6; whereas, low carbon dioxide values typically occurred when phytoplankton counts (and presumably photosynthetic activity) were high (e.g., 21 May and 19 August).

Total alkalinity values in the discharge were noticeably lower than in the river. Values in the discharge ranged from 37 to 224 mg/l, with an annual mean of 138 mg/l (Table 2-3). Mean carbon dioxide values in the discharge (6.0 mg/l) were slightly lower than the mean for the four river locations (6.3 mg/l). Presumably as a result of inputs from the

discharge, annual mean carbon dioxide values at Locations 3 and 4 downstream of the plant were slightly (5.8-6.0 mg/l vs. 6.6 mg/l) lower than at Locations 1 and 2 upstream of the plant.

Filtrable Residue

Concentrations of filtrable residue (total dissolved solids or TDS) in the river ranged from 247 to 816 mg/l, with an annual mean of 414 mg/l (Table 2-3). Values in the river were generally between 300 and 500 mg/l regardless of location or sampling date. Values at Locations 3 and 4, however, averaged 20 to 40 mg/l higher than at Locations 1 and 2, reflecting the influence of the discharge. The annual mean value in the discharge (733 mg/l) was almost double that for the two upstream locations (390-406 mg/l). Values in the discharge were considerably more variable than any of the river locations, ranging from 292 to 2,027 mg/l (Table 2-3).

Turbidity

Turbidity at the river locations ranged from 1.1 to 165 NTU, with an annual mean of 38 NTU (Table 2-3). As expected, turbidity was correlated with river flow. When flows were low (January, February, November, and December), turbidity was also low. Conversely, high flows such as those that occurred on 7 April, 5 May, and 5 August resulted in high turbidity values.

Turbidity values in the discharge canal were generally higher than those at the river locations. The difference, however, was small; the mean annual value in the discharge was 50 NTU, with a range of 1.9 to 192 NTU (Table 2-3).

Non-filtrable Residue

The concentration of non-filtrable residue (total suspended solids or TSS) in the river ranged from 1 to 864 mg/l, with an annual mean of 121 mg/l (Table 2-3). Concentrations in the discharge were comparable to those in the river averaging 125 mg/l for the year. The seasonal pattern for TSS was similar to that observed for turbidity. That is, when flows were low TSS values were low, and in general, when flows were high TSS values were high.

Total Residue

Total residue (total solids or TS) in the river ranged from 309 to 1,676 mg/l, with an annual mean of 534 mg/l (Table 2-3). Concentrations in the discharge were 1.6 times those in the river, averaging 858 mg/l for the year and ranging from 345 to 2,229 mg/l. Apparently as a result of the high concentrations in the discharge, average concentrations at Locations 3 and 4 exceeded those at Locations 1 and 2 by 20 to 50 mg/l.

Cations and Anions

Cations monitored during 1981 included iron (semimonthly) and manganese (seasonally). Total iron concentrations in the river ranged from <0.04

to 16.2 mg/l, with an annual mean of 2.08 mg/l (Table 2-3). Annual mean concentrations in the river above the station (1.97 to 2.44 mg/l) were comparable to those below (1.70 to 2.19 mg/l). The mean annual concentration in the discharge (2.70 mg/l) was noticeably higher compared to any of the river locations. Iron concentrations were correlated with river flow. The highest iron concentrations occurred on the sampling dates when river flow was highest (e.g., 16 June, 23 July, and 5 August).

Total manganese concentrations in the river ranged from 0.05 to 0.20 mg/l, with an annual mean of 0.12 (Table 2-3). Concentrations in the river above the station were comparable with those below. The average concentration in the discharge (0.16 mg/l) was slightly higher than the annual mean (0.12 mg/l) for the river locations.

Chlorides and sulfates were the anions monitored during 1981; both were measured seasonally (Table 2-3). Chloride concentrations at all four river locations were comparable (Table 2-3); the annual mean in the river was 25.3 mg/l. The annual mean concentration in the discharge (31.4 mg/l) was slightly higher than in the river.

Sulfate concentrations in the discharge (annual mean = 211.3 mg/l) were much higher than in the river (annual mean = 43.7 mg/l). Because of the high concentrations in the discharge, concentrations at Location 4, and especially Location 3 were higher than at Locations 1 and 2 (Table 2-3).

Hardness

Total hardness in the river ranged from 170 to 547 mg/l, with an annual mean of 299 mg/l (Table 2-3). Total hardness in the discharge was higher, with an annual mean of 451 mg/l and a range of 205 to 873 mg/l. Total hardness values at the two downstream river locations (Locations 3 and 4) were higher by 10 to 40 mg/l than at the two upstream locations (Table 2-3).

As expected, calcium hardness followed a pattern similar to total hardness, i.e., concentrations in the discharge were higher than in the river and concentrations at the downstream locations were higher than those at the upstream locations (Table 2-3).

Color

Color in the river ranged from 0.1 to 560 units, with an annual mean of 89 units (Table 2-3). Color in the discharge was slightly higher, with an annual mean of 106 units and a range of 1.7 to 450.9 units. In general, highest color values were associated with high flow periods (e.g., 16 June) and the lowest values were associated with low flow periods, particularly the period January through March.

2.4.3 Aquatic Nutrients

Ammonia

Ammonia concentrations seemed to vary inversely with temperature. When temperatures were below 5 C, ammonia concentrations typically exceede

0.1 mg/l; whereas, when temperatures were above 5 C, ammonia concentrations typically were less than 0.1 mg/l (Table 2-3). Mean ammonia concentrations were similar (0.24 to 0.28 mg/l) at Locations 1, 2, 4 and 5, but slightly lower at Location 3 (Table 2.3). During January, ammonia concentrations at all locations were much higher (generally >1 mg/l) than at any other time during the year.

Nitrate and Nitrite

Nitrate concentrations were similar at all four river locations. The annual mean for these locations was 5.90 mg/l, with a range of 2.07 to 10.9 mg/l (Table 2-3). No seasonal pattern was apparent. Nitrate concentrations in the discharge were consistently higher than at any of the river locations; the annual mean was 8.09 mg/l. No associations between nitrate concentrations and either river flow or phytoplankton abundance were apparent.

Nitrite concentrations, which were measured seasonally, were low (<0.04 mg/l) and comparable at all five sampling locations with annual means ranging only from 0.019 to 0.025 mg/l.

Soluble Orthophosphate

Orthophosphate concentrations in the river ranged from 0.009 to 1.454 mg/l, with an annual mean of 0.43 mg/l (Table 2-3). Mean concentrations at Locations 1, 2, and 4 were nearly identical (0.40 to 0.41 mg/l); whereas, the mean concentration at Location 3 (0.50 mg/l) was somewhat higher. The mean concentration in the discharge (0.97 mg/l) was more than double the mean value for the river locations (0.43 mg/l). The higher orthophosphate concentrations in the discharge may be attributable to concentration in the cooling tower or to the addition of phosphate compounds to prevent scale in the cooling towers. The highest river concentrations occurred during January when water temperatures and phytoplankton numbers were low; whereas, the lowest concentrations (0.009 to 0.029 mg/l) occurred during the late spring diatom bloom. Despite considerable variability between the various sampling dates, a general trend of decreasing orthophosphate concentrations over the year was apparent.

Total Phosphorus

As expected, total phosphorus concentrations exhibited the same patterns and trends as orthophosphate. For instance, total phosphorus, like orthophosphate, showed a fairly consistent decline over the course of the year. Mean total phosphorus concentrations were similar (0.76-0.79 mg/l) at Locations 1, 2, and 4, with the concentration at Location 3 (0.91 mg/l) being somewhat higher (Table 2-3). Concentrations at all locations were very high (>3 mg/l) on 16 June apparently in response to the high flows and TSS concentrations that occurred on that date. On the average, concentrations in the discharge were approximately double what they were in the river (Table 2-3).

2.4.4 Indicators of Contamination

Chemical Oxygen Demand (COD)

COD values were comparable (38 to 53 mg/l) among all five locations sampled (Table 2-3). The values obtained on 8 January were much higher than on any other sampling date (Table A-20). No pattern ascribable to date or sampling location was apparent. Mean values in 1981 were similar to those reported in 1980 (Kranz 1981).

Biochemical Oxygen Demand (BOD)

BOD concentrations in 1981 (6.1 to 6.9 mg/l) were about 1.5 times what they were in 1980 (3.9 to 4.7 mg/l). This increase was not, however, a result of station operation because BOD concentrations at all five sampling locations were comparable (Table 2-3). BOD concentrations were high (>10 mg/l) during spring runoff and during phytoplankton blooms (e.g., 21 May, 22 September) (Table A-19).

Odor

Odor values were uniformly low (range of 0-4) at all sampling locations on all dates.

Tannins and Lignins

Mean tannin and lignin values were low at all sampling locations. The values at Locations 1, 2, and 4 were comparable (0.70 to 0.75 mg/l). The values at Locations 5 and 3 were higher, 1.16 and 0.84 mg/l, respectively (Table 2-3). The values on 16 June were approximately an order of magnitude higher than on any other date. This apparently was a response to the high flow conditions present on that date.

2.4.5 Trace Metals

Hexavalent chromium and total copper, lead, mercury and zinc were measured seasonally. Concentrations of all five were low, with the exception of one high copper value. Lead concentrations were generally below 10 μg/l and were comparable at all five sampling locations (Table 2-3). Mercury concentrations were always <0.5 μg/l and were comparable among the five sampling locations (Table 2-3). Zinc concentrations were consistently low (<0.1 mg/l). The mean discharge concentration (0.06 mg/l) was twice the mean concentration in the river (Table 2-3). Concentrations of hexavalent chromium were very low (<4 μg/l) at all sampling locations during the May and August samplings (Table A-24). Higher (2.0-3.0 μg/l) ambient (river) values were measured during the November sampling. Discharge concentrations were below 5 μg/l for all sampling periods. With one exception, copper concentrations were low to moderate (6 to 29 μg/l) during each sampling period at all locations. Within a given sampling period, there was considerable variation in copper concentrations among the four river locations (Table A-25). A high concentration of copper (153.3 μg/l) was found at Location 4 on 17 November. Later rerunning of the sample and checking of the quality

control data confirmed the validity of this value. Additional analyses, conducted on samples collected at each location on 2 and 15 December and 14 January 1982, revealed that all values were between 1 and 28 μg/l. Therefore the reason(s) for the single high value in November were not clear.

2.4.6 Diel Studies

Water temperature, DO, pH, and total alkalinity were measured at approximately four hour intervals during three separate 24-hr periods. During each 24-hr period, substantial diel variations in temperature and DO were observed; whereas, pH and alkalinity were much less affected.

On 21 and 22 May, temperatures in the river ranged from 15.8 to 20.2 C and from 14.8 to 18.2 C in the discharge (Table 2-4); all locations were therefore considered to be comparable. Minimum temperatures and DOs typically occurred in the early morning (0700 hrs) with maximum values occurring in the mid to late afternoon (i.e., 1500 to 2000 hrs). The difference between maximum and minimum temperatures was 3-4 degrees regardless of location. The difference between maximum and minimum DO values in the river ranged from 3.4 to 8.3 mg/l depending on location. The difference between maximum and minimum DO values in the discharge was noticeably less; only 1.2 mg/l. DO saturation values also followed a diurnal cycle; typically being near 100% in the early morning, increasing to as much as 200% during mid-day (e.g., Location 1 at 1500 hr), and then gradually returning to near saturated levels late at night. The supersaturated conditions were no doubt caused by the photosynthetic activity from the concurrent phytoplankton bloom (Chapter 3). pH values did not follow a discernible trend, either among stations or diurnally (Table 2-4). Alkalinity values at all five locations were approximately 200 mg/l in the early morning and declined steadily to near 160 mg/l by the end of the monitoring period (Table 2-4).

On 19 and 20 August, diurnal fluctuations in DO and temperature were apparent, however, the magnitude of the temperature fluctuations was much lower compared to those observed during May. For river locations, the difference between maximum and minimum temperatures was only 2.1 to 2.5 C (Table 2-5). Discharge temperatures showed a maximum difference of 4.4 C. As in May, minimum temperatures occurred in early morning and maximum temperatures occurred during mid or late afternoon (Table 2-5). The river locations showed maximum to minimum DO fluctuations of 4.3 to 5.9 mg/l, roughly comparable to those observed during May. The highly supersaturated conditions that were observed in May did not occur in August; maximum DO saturation values in August were 121-125%. DO values in the discharge did not vary diurnally. None of the river locations showed any diel fluctuations in pH or alkalinity (Table 2-5). However, in the discharge, pH and alkalinity increased steadily throughout the monitoring period (Table 2-5).

On 17 and 18 November, DO and temperature values in the river fluctuated diurnally, but the magnitude of these fluctuations was small; generally less than 2 C for temperature and 2-3 mg/l for DO (Table 2-6). As opposed to the other two diel studies, temperatures at Location 3 were noticeably affected by the plume from the station during November. At the

TABLE 2-4 WATER TEMPERATURE, DISSOLVED OXYGEN, pH, AND ALKALINITY DATA COLLECTED IN THE CEDAR RIVER DIEL STUDY CONDUCTED AT DUANE ARNOLD ENERGY CENTER, 21 AND 22 MAY 1981

Date	Time (Hrs)	Temperature (C)	Dissolved Oxygen (mg/l)	pH (Units)	Alkalinity (mg/l-$CaCO_3$)
		Location 1			
21 May 1981	0700	16.8	10.1	8.0	199
21 May 1981	1040	17.6	11.7	8.2	194
21 May 1981	1500	20.0	18.4	8.1	166
21 May 1981	2000	19.8	16.2	8.2	163
21 May 1981	2315	19.2	13.4	8.0	160
22 May 1981	0220	18.5	11.4	7.9	163
		Location 2			
21 May 1981	0705	16.4	10.3	8.3	203
21 May 1981	1040	17.6	12.4	8.3	199
21 May 1981	1450	19.3	14.9	8.1	176
21 May 1981	1950	20.2	16.6	8.2	162
21 May 1981	2310	19.4	13.8	7.9	158
22 May 1981	0215	18.6	11.9	7.9	160
		Location 3			
21 May 1981	0707	15.8	10.4	8.3	204
21 May 1981	1030	17.4	11.0	8.3	201
21 May 1981	1500	19.0	13.8	8.1	182
21 May 1981	2000	19.4	13.8	8.2	169
21 May 1981	2320	18.8	12.1	7.9	163
22 May 1981	0220	18.0	11.2	8.0	165
		Location 4			
21 May 1981	0650	16.4	10.5	8.2	204
21 May 1981	1040	17.6	12.5	8.4	200
21 May 1981	1440	19.2	14.7	8.2	184
21 May 1981	1940	20.0	15.6	8.2	168
21 May 1981	2305	19.3	13.1	8.0	161
22 May 1981	0210	18.6	11.6	7.9	162
		Location 5			
21 May 1981	0710	14.8	9.9	8.3	206
21 May 1981	1030	17.5	10.4	8.3	207
21 May 1981	1520	18.2	10.8	8.2	193
21 May 1981	2005	18.2	9.8	8.1	179
21 May 1981	2325	18.0	9.6	8.0	175
22 May 1981	0230	17.4	9.7	8.0	173

TABLE 2-5 WATER TEMPERATURE DISSOLVED, OXYGEN, pH, AND ALKALINITY DATA COLLECTED IN THE CEDAR RIVER DIEL STUDY CONDUCTED AT DUANE ARNOLD ENERGY CENTER, 19 AND 20 AUGUST 1981

Date	Time (Hrs)	Temperature (°C)	Dissolved Oxygen (mg/l)	pH (Units)	Alkalinity (mg/l-$CaCO_3$)
		Location 1			
19 August 1981	0755	21.2	6.7	8.1	205
19 August 1981	1245	22.3	9.5	8.0	212
19 August 1981	1615	23.3	10.6	8.0	211
19 August 1981	1955	23.0	11.0	8.1	202
19 August 1981	2310	22.3	9.5	8.1	203
20 August 1981	0325	21.7	8.6	8.0	194
		Location 2			
19 August 1981	0710	21.2	5.2	8.1	214
19 August 1981	1150	22.0	9.2	8.1	213
19 August 1981	1545	23.4	11.0	8.2	200
19 August 1981	1925	23.4	11.0	8.1	202
19 August 1981	2352	22.6	7.5	8.1	212
20 August 1981	0400	21.6	4.5	8.0	203
		Location 3			
19 August 1981	0705	21.1	5.5	8.1	199
19 August 1981	1140	22.1	9.2	8.1	201
19 August 1981	1540	23.6	10.3	8.2	187
19 August 1981	1920	23.5	10.4	8.1	201
19 August 1981	2350	22.6	7.3	8.1	208
20 August 1981	0355	21.6	6.2	8.0	199
		Location 4			
19 August 1981	0700	21.2	5.2	8.1	198
19 August 1981	1130	22.1	9.2	8.1	203
19 August 1981	1525	23.4	10.7	8.2	211
19 August 1981	1915	23.5	10.8	8.0	202
19 August 1981	2345	22.6	8.1	8.1	208
20 August 1981	0350	21.7	4.9	8.0	203
		Location 5			
19 August 1981	0720	20.6	8.2	7.2	75
19 August 1981	1200	24.3	8.2	7.4	83
19 August 1981	1555	25.0	7.7	7.5	85
19 August 1981	1930	23.4	8.3	8.1	210
19 August 1981	2410	22.4	8.2	8.0	211
20 August 1981	0410	21.6	7.9	8.0	213

TABLE 2-6 WATER TEMPERATURE, DISSOLVED OXYGEN, pH, AND ALKALINITY DATA COLLECTED IN THE CEDAR RIVER DIEL STUDY CONDUCTED AT DUANE ARNOLD ENERGY CENTER, 17 AND 18 NOVEMBER 1981

Date	Time (Hrs)	Temperature (C)	Dissolved Oxygen (mg/l)	pH (Units)	Alkalinity (mg/l-$CaCO_3$)
		Location 1			
17 November 1981	0650	6.4	11.7	8.1	227
17 November 1981	0955	6.7	12.8	8.1	228
17 November 1981	1400	7.8	14.8	8.0	221
17 November 1981	1745	7.6	14.9	8.2	221
17 November 1981	2200	7.0	13.5	8.2	221
18 November 1981	0150	6.8	12.8	8.1	219
		Location 2			
17 November 1981	0623	6.5	11.7	8.1	224
17 November 1981	1040	6.9	13.3	8.2	228
17 November 1981	1440	7.8	15.1	8.2	222
17 November 1981	1818	7.7	14.6	8.2	222
17 November 1981	2240	7.2	13.5	8.2	222
18 November 1981	0222	6.7	12.5	8.1	218
		Location 3			
17 November 1981	0619	10.2	11.0	8.0	183
17 November 1981	1035	11.6	12.8	8.1	212
17 November 1981	1435	11.4	13.6	8.2	187
17 November 1981	1815	11.3	14.4	8.2	220
17 November 1981	2235	7.2	12.9	8.2	221
18 November 1981	0220	6.8	12.3	8.1	218
		Location 4			
17 November 1981	0615	7.4	11.4	8.0	212
17 November 1981	1030	8.0	13.1	8.2	217
17 November 1981	1430	8.6	14.8	8.3	216
17 November 1981	1810	8.8	14.1	8.2	212
17 November 1981	2230	7.2	13.1	8.2	221
18 November 1981	0215	6.8	12.2	8.1	218
		Location 5			
17 November 1981	0627	17.5	9.0	7.4	84
17 November 1981	1045	23.6	8.2	7.3	89
17 November 1981	1445	21.0	8.3	7.1	71
17 November 1981	1823	20.3	9.5	7.3	93
17 November 1981	2245	7.3	12.1	8.2	220
18 November 1981	0225	6.9	11.9	8.1	219

river locations, supersaturated (123 to 131%) conditions occurred only during mid or late afternoon, while DO levels in the discharge remained near saturation throughout the study period. The discharge did not exhibit any diel DO fluctuations; however, both pH and alkalinity did fluctuate diurnally; both increasing during the study period. The change in pH and alkalinity appeared, however, to be an artifact associated with the station apparently going off line near the end of the study period, and not related to diel fluctuations.

2.5 SUMMARY AND CONCLUSIONS

1. River flows in the Cedar River as measured at the Cedar Rapids gauging station of the U.S. Geological Survey were slightly above average. Peak flows occurred in June and July rather than the more normal period of March and April.

2. Water temperature, total dissolved solids, total solids, sulfates, hardness, orthophosphate, total phosphorus, tannins and lignins, and total alkalinity levels in the river appeared to be affected by station operation. These effects were generally localized at Location 3. Sulfates, total dissolved solids, total solids, and hardness, however, showed slightly elevated levels 0.5 mi downstream of the station at Location 4.

3. Concentrations of general water quality parameters and nutrients not affected by station operation showed considerable uniformity among locations for a given sampling event and for annual means.

4. Concentrations of some constituents (TSS, turbidity, and iron) appeared to be related to hydrological conditions; however, the relationships were not pronounced.

5. Supersaturation of river water with dissolved oxygen occurred in spring and in late summer and fall both upstream and downstream from the station. The supersaturated conditions were attributed primarily to high photosynthetic rates for phytoplankton.

6. Total phosphorus and related orthophosphate were the only constituents to exhibit trends over the year. These values, although fluctuating widely, generally decreased throughout the year.

7. DO concentration and saturation exhibited marked diel fluctuations in the river in May. All river values at this time were extremely high due to high rates of photosynthesis. pH and alkalinity showed little or no diurnal fluctuation.

8. Operation of the Duane Arnold Energy Center had minimal effect on the water quality of the Cedar River. Observed effects were generally localized to Location 3 immediately downstream of the discharge. These effects were most apparent during low flow periods of the year.

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Chapter 3

Phycology

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3.0 PHYCOLOGY

3.1 INTRODUCTION

The algal community of the Cedar River was sampled during 1981 as part of a continuing environmental monitoring program to determine the operational impact of the Duane Arnold Energy Center (DAEC) on aquatic biota of the river. The specific objectives of the study were:

1. to estimate the phytoplankton species composition and abundance at five sampling locations; and

2. to estimate the periphytic algal species composition, and biomass at locations upstream and downstream of the station.

3.2 HISTORICAL REVIEW

3.2.1 Phytoplankton

Phytoplankton samples have been collected at the DAEC twice per month since April 1971, prior to station operation (McDonald 1972, 1974a and b, 1975, 1976, 1977, 1978, 1979; Alberico and Altstaetter 1980; Dvorak 1981). Sampling locations have varied over the monitoring period, with the present five locations remaining the same from 1974, when station operation began.

Greatest phytoplankton densities were recorded in September during several of the previous years of sampling. Maximum densities were also reported in May, June, July and October. Smallest phytoplankton densities were consistently recorded in December, January, and February during all years of sampling. Diatoms, especially *Skeletonema*, *Cyclotella*, *Nitzschia*, and *Melosira*, were the most abundant genera each year when phytoplankton densities were greatest.

No sampling location consistently had the highest or lowest phytoplankton densities, but rather the highest or lowest density shifted among locations from one sampling date to the next (McDonald 1974a, 1974b, 1975, 1976, 1977, 1978, and 1979; Alberico and Altstaetter 1980; Dvorak 1981).

3.2.2 Periphyton

Periphytic algae have been sampled for species composition and biomass determinations two or three times per year since 1975 at Locations 2 and 3 (upstream and downstream of the site, respectively).

The initial periphyton survey in 1975 consisted only of a listing of the genera found at each location. In 1976 through 1979 qualitative analyses were conducted and the relative abundance of each taxa was reported. Commencing in 1980 quantitative analyses were conducted to describe the periphytic community. During each sampling period of each year, *Navicula* was abundant. Other genera that were abundant during the samplings were *Nitzschia*, *Gomphonema*, *Cyclotella* and *Lyngbya* (McDonald 1977, 1978, and

1979; Alberico and Altstaetter 1980; Dvorak 1981). No consistent differences in the periphyton populations were observed between the collection locations.

Periphyton biomass (ash-free dry weight), analyzed for each collection period, yielded no considerable differences between the two sampling locations (McDonald 1976, 1977, 1978, and 1979; Alberico and Altstaetter 1980; Dvorak 1981).

3.3 FIELD AND ANALYTICAL PROCEDURES

3.3.1 Field Procedures

Phytoplankton

Single samples to determine phytoplankton species composition and abundance were collected from Locations 1 through 5 (Figure 1-1, Chapter 1) on a semimonthly basis from January through December 1981. The samples were collected using a 6-liter Kemmerer water sampler. Samples were transferred to labeled 0.25 liter polyethylene bottles, and preserved and stained at the time of collection with 1% Lugol's solution.

Periphyton

Samples of periphytic algae were collected from glass microscope slides held in floating artificial substrates at Locations 2 and 3 on 20 May, 18 August, and 16 November 1981. The May collections for Locations 2 and 3 were made after an incubation period of 14 and 26 days, respectively. August substrates were collected after 13 days, whereas, the November collection was made after an incubation period of approximately 26 days. Slides for species identification and relative abundance were placed into labeled vials and preserved and stained at the time of collection with Lugol's solution. Four replicate slides per location for biomass determination were also placed into labeled vials, but were transported to the laboratory on ice, unpreserved, and kept frozen until analysis.

3.3.2 Laboratory Procedures

Phytoplankton

Each phytoplankton sample was thoroughly shaken, and an appropriate aliquot of the sample was settled in a Zeiss settling chamber. The bottom plate of the chamber was placed on a Zeiss Standard UPL inverted microscope, and analyses were conducted at either 400X or 1000X magnification (Lund et al. 1958, Weber 1973). Subsamples were of sufficient size to yield an approximate count of 500 reporting units.

Phytoplankton density was reported in units per milliliter. Filamentous algal forms were counted in 100 μm lengths and colonial forms in four cell units, except for Aphanocapsa, Aphanothece, and Microcystis which were reported in 50 cell units. All other unicellular algae were reported as a single cell or diatom frustule unit. Identifications were made to genus or species utilizing current appropriate taxonomic keys.

Periphyton

Four slides for periphyton species composition and relative abundance determination from each location were scraped, and the resultant sample was divided into two portions, one for diatom analysis and the other for non-diatom analysis. The portion for diatom analysis was "cleaned" in a nitric acid and potassium dichromate mixture and prepared as Hyrax mounts (Hohn and Hellerman 1963). Diatom analyses were conducted at 1250X magnification utilizing a Zeiss Standard RA research microscope. Approximately 1000 valves (equivalent to 500 intact cells) were counted in each replicate.

The two remaining slides were used for replicate analysis of non-diatom taxa. Material from each slide was scraped into a blender and mixed for approximately 30 seconds. A semi-permanent wet mount was prepared and examined at 500X magnification. Non-diatoms were identified and counted in the following reporting units:

Algal Form	Reporting Unit
Unicellular	One cell
Colonial	Four cells
Filamentous	10 μm lengths

Approximately 200 reporting units were counted in each replicate. Abundance of periphytic algae was expressed as units/cm^2.

The four replicate slides for biomass determinations were processed in accordance with Section 602 of Standard Methods (A.P.H.A. et al. 1976).

3.4 RESULTS AND DISCUSSION

3.4.1 Phytoplankton

Densities of dominant (>5%) phytoplankton species and major divisions for each sampling date and location are presented in Tables 3-1 through 3-12. As in the previous year's study (Dvorak 1981), lowest phytoplankton abundance generally occurred in winter months, whereas maximum densities occurred late August and September. Numbers of phytoplankton ranged from 1009 units/ml in early August to approximately 275,000 units/ml in September.

Diatoms (Bacillariophyta) dominated the phytoplankton assemblage for most sampling dates, composing from 18 to 98% of the total community. The dominant winter and spring diatoms were *Stephanodiscus invisitatus* and *S. tenuis*. These were succeeded in abundance by species of *Nitzschia* and *Skeletonema potamos*. *Skeletonema potamos* remained dominant from July through early October. Other diatoms which were common during much of 1981 included *Gomphonema*, *Navicula*, *Cyclotella* and *Melosira*.

As in the previous year's study (Dvorak 1981), densities of green algae (Chlorophyta) increased in May due primarily to greater numbers of *Scenedesmus*. Abundance peaked, however, in September when total phytoplankton was greatest. At Location 5, Chlorophyta reached densities

TABLE 3-1 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, JANUARY 1981

	Location 1		Location 2		Location 3		Location 4		Location 5	
Taxa	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
January 8, 1981										
Asterionella formosa	67	4.00	90	5.46	75	4.71	71	4.32	80	4.78
Cyclotella meneghiniana	84	5.00	65	3.98	60	3.76	75	4.54	73	4.33
Nitzschia linearis	97	5.77	108	6.59	93	5.88	92	5.57	88	5.22
Stephanodiscus invisitatus	1116	66.30	1086	66.11	1057	66.47	1126	68.37	1070	63.52
Stephanodiscus tenuis	80	4.78	97	5.92	64	4.00	82	5.00	135	7.99
Total Bacillariophyta	1601	95.06	1565	95.23	1475	92.83	1589	96.54	1582	93.95
Total Chlorophyta	28	1.67	38	2.33	59	3.74	27	1.65	47	2.80
Total Chrysophyta	36	2.11	26	1.59	32	2.00	19	1.14	30	1.78
Total Cyanophyta	7	0.39	4	0.27	4	0.26	0	0.00	12	0.68
Total Euglenophyta	2	0.11	2	0.11	6	0.35	0	0.00	4	0.22
Total Cryptophyta	11	0.66	7	0.46	13	0.82	11	0.68	9	0.56
Total Phytoplankton	1684		1644		1589		1647		1684	
January 22, 1981										
Asterionella formosa	144	10.13	151	9.63	140	9.05	135	8.[illegible]	131	8.70
Cyclotella meneghiniana	95	6.70	120	7.61	79	5.07	105	6.66	90	5.97
Nitzschia linearis	99	6.97	108	6.90	127	8.21	114	7.25	114	7.58
Stephanodiscus invisitatus	718	50.51	692	44.02	770	49.74	737	46.86	727	48.37
Total Bacillariophyta	1247	87.73	1259	80.07	1322	85.36	1294	82.31	1245	82.82
Coelastrum cambricum	15	1.05	90	5.71	31	2.02	60	3.81	30	1.99
Total Chlorophyta	30	2.14	96	6.13	48	3.11	77	4.91	49	3.23
Synura uvella	84	5.92	112	7.13	95	6.16	120	7.61	103	6.83
Total Chrysophyta	144	10.13	208	13.21	166	10.75	196	12.49	204	13.55
Total Cyanophyta	0	0.00	0	0.00	7	0.42	3	0.18	6	0.40
Total Euglenophyta	0	0.00	9	0.59	6	0.36	2	0.12	0	0.00
Total Phytoplankton	1422		1572		1549		1572		1504	

TABLE 3-2 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, FEBRUARY 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
February 4, 1981										
Gomphonema parvulum	0	0.00	77	4.98	91	5.38	108	6.37	127	6.55
Nitzschia linearis	85	5.32	102	6.64	99	5.89	122	7.21	162	8.29
Nitzschia palea	99	6.21	88	5.72	108	6.39	91	5.36	145	7.42
Stephanodiscus invisitatus	1100	68.79	1072	69.69	1092	64.77	1111	65.71	1145	58.76
Total Bacillariophyta	1562	97.70	1500	97.53	1622	96.23	1656	97.90	2001	98.62
Total Chlorophyta	26	1.60	23	1.47	22	1.30	13	0.80	18	0.95
Total Chrysophyta	9	0.53	9	0.55	23	1.35	0	0.00	6	0.29
Total Euglenophyta	0	0.00	0	0.00	11	0.67	6	0.34	3	0.15
Total Cyanophyta	0	0.00	7	0.44	5	0.29	11	0.64	0	0.00
Total Cryptophyta	3	0.18	0	0.00	3	0.17	6	0.34	0	0.00
Total Phytoplankton	1599		1538		1685		1691		1949	
February 19, 1981										
Gomphonema parvulum	1219	11.65	2708	22.04	1318	11.79	1163	10.38	1021	9.58
Nitzschia linearis	2254	21.53	2481	20.19	2438	21.81	2339	20.89	2623	24.62
Stephanodiscus invisitatus	4934	47.12	4990	40.61	5047	45.13	5557	49.62	5316	49.90
Total Bacillariophyta	9924	94.78	12036	97.95	10831	96.87	10817	96.58	10477	89.34
Total Chlorophyta	489	4.67	209	1.70	294	2.63	326	2.91	177	1.66
Total Euglenophyta	0	0.00	0	0.00	0	0.00	14	0.13	0	0.00
Total Pyrrhophyta	57	0.54	43	0.35	57	0.51	43	0.38	0	0.00
Total Phytoplankton	10470		12288		11182		11200		10654	

TABLE 3-3 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, MARCH 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
March 5, 1981										
Nitzschia acicularis	6994	13.85	8265	14.46	7517	13.55	6283	12.94	7480	12.95
Stephanodiscus invisitatus	34034	67.42	38148	66.73	36727	66.20	31079	64.03	41215	71.35
Total Bacillariophyta	45964	91.06	52846	92.44	49256	88.78	42935	88.46	53183	92.07
Chlamydomonas spp.	2543	5.04	2693	4.71	3104	5.60	2506	5.16	2693	4.66
Total Chlorophyta	2702	5.35	2898	5.07	4413	7.95	3441	7.09	3001	5.20
Total Chrysophyta	1627	3.22	1346	2.36	1384	2.49	1561	3.22	1346	2.33
Total Cyanophyta	0	0.00	0	0.00	127	0.23	303	0.62	82	0.14
Total Euglenophyta	112	0.22	0	0.00	150	0.27	112	0.23	75	0.13
Total Cryptophyta	75	0.15	75	0.13	150	0.27	187	0.39	75	0.13
Total Phytoplankton	50481		57166		55479		48539		57762	
March 18, 1981										
Gomphonema parvulum	468	7.49	549	7.56	374	6.33	337	5.23	0	0.00
Nitzschia acicularis	1060	16.97	1134	15.64	947	16.03	947	14.71	829	14.18
Nitzschia linearis	1496	23.96	1278	17.62	1421	24.05	1446	22.45	1359	23.24
Nitzschia palea	386	6.19	443	6.10	249	4.22	268	4.16	193	3.31
Stephanodiscus invisitatus	2188	35.04	2506	34.55	2144	36.28	2300	35.71	2313	39.55
Total Bacillariophyta	5897	94.44	4195	89.56	5504	93.14	5872	91.17	5311	90.84
Total Chlorophyta	78	1.25	212	2.92	167	2.82	176	2.73	229	3.92
Total Chrysophyta	249	3.99	499	6.88	218	3.69	362	5.61	281	4.80
Total Cyanophyta	7	0.12	16	0.21	8	0.14	0	0.00	14	0.23
Total Euglenophyta	0	0.00	0	0.00	0	0.00	6	0.10	0	0.00
Total Cryptophyta	12	0.20	31	0.43	12	0.21	25	0.39	12	0.21
Total Phytoplankton	6244		7252		5910		6441		5847	

TABLE 3-4 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, APRIL 1981

Taxa	Location 1 Units/ml	Location 1 %	Location 2 Units/ml	Location 2 %	Location 3 Units/ml	Location 3 %	Location 4 Units/ml	Location 4 %	Location 5 Units/ml	Location 5 %
April 7, 1981										
Stephanodiscus invisitatus	15012	49.3	14544	52.5	15635	51.3	13402	46.9	14285	53.2
Stephanodiscus tenuis	4935	16.2	4259	15.4	3221	10.6	4519	15.8	4156	15.5
Total Bacillariophyta	27426	90.0	24621	88.9	26907	88.3	24842	86.9	23375	87.0
Total Chlorophyta	623	2.0	948	3.4	2182	7.2	1623	5.7	1610	6.0
Total Cyanophyta	192	0.6	0	0.0	390	1.3	234	0.8	0	0.0
Total Euglenophyta	104	0.3	104	0.4	0	0.0	52	0.2	52	0.2
Cryptomonas ovata	2130	7.0	1818	6.6	779	2.6	1714	6.0	1662	6.2
Total Cryptophyta	2130	7.0	2026	7.3	987	3.2	1818	6.4	1818	6.8
Total Phytoplankton	30475		27699		30465		28569		26855	
April 23, 1981										
Gomphonema parvulum	402	1.2	563	1.6	966	2.4	2817	6.8	1207	3.2
Nitzschia acicularis	1851	5.3	2575	7.3	2253	5.7	0	0.0	2495	6.5
Stephanodiscus invisitatus	20198	57.8	13921	39.5	16255	40.9	17784	42.6	15370	40.2
Stephanodiscus tenuis	8449	24.2	12553	35.6	14565	36.7	15450	37.0	14485	37.9
Total Bacillariophyta	33396	95.5	32993	93.6	37741	95.0	39028	93.5	36212	94.8
Total Chlorophyta	1328	3.8	2112	6.0	1750	4.4	2676	6.4	1529	4.0
Total Cyanophyta	161	0.5	0	0.0	241	0.6	0	0.0	322	0.8
Total Cryptophyta	81	0.2	161	0.5	0	0.0	0	0.0	161	0.4
Total Phytoplankton	34964		35266		39732		41704		38224	

TABLE 3-5 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, MAY 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
May 5, 1981										
Diatoma vulgare	44	1.5	75	2.5	44	1.4	112	3.7	143	5.0
Gomphonema parvulum	231	7.7	100	3.4	262	8.3	143	4.7	168	5.8
Navicula tripunctata	168	5.6	137	4.6	162	5.1	193	6.3	224	7.8
Nitzschia acicularis	93	3.1	137	4.6	131	4.1	218	7.1	37	1.3
Nitzschia linearis	112	3.7	137	4.6	243	7.7	162	5.3	299	10.4
Stephanodiscus invisitatus	573	19.1	742	25.1	723	22.9	555	18.1	430	14.9
Stephanodiscus tenuis	941	31.4	817	27.7	779	24.7	630	20.5	679	23.6
Total Bacillariophyta	2680	89.3	2630	89.2	2761	87.4	2662	86.7	2631	91.4
Total Chlorophyta	295	9.8	307	10.4	341	10.8	366	11.9	206	7.1
Total Euglenophyta	13	0.4	0	0.0	25	0.8	12	0.4	6	0.2
Total Cryptophyta	13	0.4	13	0.4	31	1.0	31	1.0	37	1.3
Total Phytoplankton	3000		2950		3159		3071		2880	
May 21, 1981										
Nitzschia acicularis	4768	7.4	3927	7.2	3086	5.0	2431	4.1	2712	4.9
Stephanodiscus invisitatus	35436	55.3	20850	38.1	21972	35.3	24964	41.7	20009	36.4
Stephanodiscus tenuis	6264	9.8	7760	14.2	6358	10.2	10752	18.0	4955	9.0
Total Bacillariophyta	49087	76.5	36839	67.3	37119	59.6	43477	72.8	32070	58.2
Micractinium pusillum	1823	2.8	2852	5.2	2922	4.7	4254	7.1	3787	6.9
Pediastrum duplex v. *reticulatum*	0	0.0	2992	5.5	0	0.0	0	0.0	2992	5.4
Scenedesmus abundans	701	1.1	608	1.1	7714	12.4	210	0.4	327	0.6
Scenedesmus acuminatus	3202	5.0	3880	7.1	4067	6.5	2478	4.1	4418	8.0
Total Chlorophyta	12576	19.6	16292	29.8	23492	37.8	14703	24.6	20920	38.0
Total Cyanophyta	2085	3.3	1421	2.6	1328	2.1	1150	1.9	1851	3.4
Total Euglenophyta	187	0.3	94	0.2	187	0.3	374	0.6	94	0.2
Total Cryptophyta	187	0.3	94	0.2	93	0.2	93	0.2	94	0.2
Total Phytoplankton	64122		54739		62219		59797		55029	

TABLE 3-6 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, JUNE 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
June 2, 1981										
Gomphonema parvulum	84	3.9	37	1.9	9	0.5	112	5.1	56	2.5
Navicula lanceolata	112	5.2	140	7.2	103	5.2	140	6.4	140	6.3
Navicula tripunctata	159	7.4	178	9.2	215	10.8	0	0.0	140	6.3
Navicula acicularis	458	21.3	365	18.8	411	20.7	580	26.6	393	17.6
Nitzschia linearis	150	6.9	234	12.1	196	9.9	168	7.7	196	8.8
Nitzschia palea	159	7.4	112	5.8	178	8.9	122	5.6	224	10.1
Nitzschia spp.	65	3.0	47	2.4	47	2.4	47	2.1	112	5.0
Stephanodiscus invisitatus	84	3.9	103	5.3	84	4.2	131	6.0	140	6.3
Total Bacillariophyta	1702	79.0	1533	79.3	1599	80.6	1730	79.3	1842	82.5
Ankistrodesmus falcatus	112	5.2	84	4.3	75	3.8	112	5.1	56	2.5
Total Chlorophyta	388	18.0	262	13.5	267	13.4	337	15.4	262	11.7
Total Cyanophyta	36	1.7	56	2.9	64	3.2	40	1.8	82	3.7
Total Euglenophyta	9	0.4	19	1.0	19	0.9	37	1.7	28	1.3
Total Cryptophyta	19	0.9	65	3.4	37	1.9	37	1.7	19	0.8
Total Phytoplankton	2153		1935		1985		2181		2233	
June 16, 1981										
Gomphonema parvulum	112	4.8	75	3.0	150	5.1	75	3.8	0	0.0
Meridion circulare	0	0.0	0	0.0	0	0.0	131	6.6	19	0.7
Navicula lanceolata	112	4.8	131	5.2	75	2.6	75	3.8	112	4.2
Navicula tripunctata	93	4.0	112	4.5	243	8.3	131	6.6	206	7.7
Navicula spp.	93	4.0	168	6.7	131	4.5	131	6.6	75	2.8
Nitzschia acicularis	56	2.4	56	2.2	37	1.3	112	5.7	0	0.0
Nitzschia linearis	131	5.6	112	4.5	168	5.7	206	10.4	112	4.2
Nitzschia palea	879	37.8	785	31.5	991	33.8	393	19.8	729	27.3
Nitzschia spp.	0	0.0	94	3.7	131	4.5	19	0.9	187	7.0
Stephanodiscus invisitatus	187	8.0	56	2.2	94	3.2	37	1.9	187	7.0
Total Bacillariophyta	2001	86.1	2001	80.2	2525	86.1	1720	86.9	2132	79.9
Scenedesmus opoliensis	117	5.0	89	3.6	80	2.7	61	3.1	98	3.7
Total Chlorophyta	215	9.2	332	13.3	229	7.8	196	9.9	379	14.2
Total Cyanophyta	92	3.9	123	4.9	178	6.1	43	2.2	120	4.5
Total Euglenophyta	0	0.0	37	1.5	0	0.0	19	0.9	19	0.7
Total Cryptophyta	19	0.8	0	0.0	0	0.0	0	0.0	19	0.7
Total Phytoplankton	2326		2494		2931		1978		2668	

TABLE 3-7 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, JULY 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
July 8, 1981										
Cyclotella meneghiniana	263	6.69	187	5.09	187	6.03	272	7.52	110	3.07
Melosira granulata	195	4.96	204	5.56	127	4.11	263	7.29	68	1.89
Nitzschia acicularis	204	5.18	144	3.94	178	5.76	119	3.29	85	2.36
Nitzschia palea	246	6.26	212	5.79	289	9.32	246	6.82	178	4.96
Skeletonema potamos	399	10.14	433	11.81	408	13.16	493	13.63	578	16.07
Stephanodiscus invisitatus	280	7.12	374	10.19	357	11.51	323	8.93	272	7.56
Total Bacillariophyta	3213	48.99	1717	46.76	1853	59.75	2023	55.94	1538	42.77
Ankistrodesmus falcatus	178	4.53	195	5.32	136	4.39	238	6.58	68	1.89
Pediastrum boryanum	68	1.73	272	7.41	0	0.00	0	0.00	136	3.78
Total Chlorophyta	631	16.02	844	22.97	436	14.05	565	15.63	572	15.89
Anabaena flos-aquae	66	1.68	45	1.23	94	3.04	104	2.87	191	5.32
Aphanizomenon flos-aquae	526	13.36	507	13.82	581	18.72	427	11.80	420	11.67
Coelosphaerium naegelianum	529	13.43	219	5.96	0	0.00	212	5.88	429	11.93
Merismopedia tenuissima	0	0.00	221	6.02	0	0.00	104	2.88	153	4.25
Total Cyanophyta	1276	32.40	1018	27.72	711	22.91	909	25.14	1325	36.84
Total Euglenophyta	0	0.00	8	0.23	25	0.82	8	0.24	0	0.00
Total Pyrrhophyta	0	0.00	8	0.23	0	0.00	0	0.00	0	0.00
Total Cryptophyta	102	2.59	76	2.08	76	2.47	110	3.06	161	4.49
Total Phytoplankton	3939		3672		3101		3616		3597	
July 22, 1981										
Melosira granulata	425	5.91	544	7.34	323	4.54	408	5.53	0	0.00
Nitzschia palea	527	7.33	255	3.44	408	5.74	493	6.69	442	6.43
Total Bacillariophyta	2312	32.16	1632	22.02	1564	22.00	1921	26.06	1258	18.29
Total Chlorophyta	497	6.92	591	7.97	739	10.40	718	9.74	646	9.39
Anabaena flos-aquae	467	6.50	753	10.16	558	7.84	488	6.62	479	6.97
Aphanizomenon flos-aquae	3771	52.44	3890	52.48	3609	50.77	3745	50.80	4128	60.02
Total Cyanophyta	4381	60.93	5018	67.71	4754	66.88	4512	61.20	4904	71.32
Total Euglenophyta	0	0.00	68	0.92	0	0.00	51	0.69	0	0.00
Total Cryptophyta	0	0.00	102	1.38	51	0.72	170	2.31	68	0.99
Total Phytoplankton	7190		7411		7108		7372		6876	

TABLE 3-8 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, AUGUST 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
August 5, 1981										
Cyclotella meneghiniana	37	3.71	61	5.23	56	4.78	33	2.76	70	4.82
Nitzschia acicularis	56	5.56	70	6.04	65	5.58	75	6.31	42	2.89
Nitzschia palea	75	7.41	126	10.87	103	8.77	103	8.68	70	4.82
Melosira ambigua	84	8.34	103	8.85	65	5.58	79	6.70	84	5.78
Melosira granulata	98	9.73	140	12.07	150	12.75	117	9.86	140	9.64
Skeletonema potamos	159	15.75	210	18.11	248	21.12	262	22.08	290	19.92
Total Bacillariophyta	608	60.23	851	73.24	832	70.94	804	67.82	888	61.05
Total Chlorophyta	127	12.62	98	8.45	133	11.36	164	13.80	250	17.19
Aphanizomenon flos-aquae	242	23.95	190	16.38	181	15.46	189	15.93	231	15.91
Total Cyanophyta	265	26.22	208	17.91	194	16.50	213	17.98	274	18.86
Total Euglenophyta	0	0.00	0	0.00	5	0.40	0	0.00	28	1.93
Total Pyrrhopyta	5	0.46	0	0.00	0	0.00	0	0.00	5	0.32
Total Cryptophyta	5	0.46	5	0.40	9	0.80	5	0.39	9	0.64
Total Phytoplankton	1009		1162		1173		1186		1455	
August 19, 1981										
Skeletonema potamos	78056	82.53	82408	78.72	84633	77.73	91597	82.31	81344	78.79
Total Bacillariophyta	87825	92.86	92371	88.24	96626	88.74	101366	91.09	93821	90.87
Total Chlorophyta	3917	4.14	4425	4.23	5441	5.00	2587	2.32	3675	3.56
Total Cyanophyta	2641	2.79	7399	7.07	6234	5.73	6751	6.07	5267	5.10
Total Euglenophyta	0	0.00	290	0.28	290	0.27	387	0.35	484	0.47
Total Pyrrhophyta	0	0.00	0	0.00	0	0.00	97	0.09	0	0.00
Total Cryptophyta	193	0.20	193	0.18	290	0.27	97	0.09	0	0.00
Total Phytoplankton	94576		104679		108881		111285		103247	

TABLE 3-9 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, SEPTEMBER 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
September 9, 1981										
Melosira granulata	1589	6.92	841	3.55	608	2.82	1356	7.21	888	3.97
Skeletonema potamos	3927	17.09	4909	20.72	5423	25.19	4394	23.38	3693	16.51
Stephanodiscus invisitatus	3226	14.04	3833	16.18	4441	20.63	2898	15.42	4722	21.11
Total Bacillariophyta	11547	50.24	11500	48.55	12435	57.76	10425	55.47	12108	54.13
Dictyosphaerium pulchellum	374	1.63	561	2.37	748	3.47	888	4.73	1449	6.48
Gloeoactinium limneticum	0	0.00	1496	6.32	280	1.30	0	0.00	0	0.00
Total Chlorophyta	3436	14.95	3974	16.78	3635	16.88	4301	22.89	4406	19.70
Total Chrysophyta	93	0.41	93	0.39	93	0.43	0	0.00	0	0.00
Aphanizomenon flos-aquae	1828	7.95	1557	6.57	617	2.87	388	2.06	430	1.92
Coelosphaerium naegelianum	1636	7.12	1169	4.93	1636	7.60	1169	6.22	2805	12.54
Merismopedia tenuissima	1543	6.71	1776	7.50	1028	4.78	935	4.98	701	3.14
Oscillatoria tenuis	2174	9.46	1080	4.56	388	1.80	196	1.04	248	1.11
Total Cyanophyta	7438	32.36	6063	25.60	4245	19.72	3366	17.91	5058	22.61
Total Euglenophyta	0	0.00	47	0.20	140	0.65	93	0.50	234	1.05
Total Pyrrhopyta	47	0.20	0	0.00	93	0.43	47	0.25	0	0.00
Total Cryptophyta	421	1.83	514	2.17	608	2.82	561	2.99	561	2.51
Total Phytoplankton	22982		23688		21530		18793		22367	
September 22, 1981										
Cyclotella meneghiniana	7792	4.67	10597	4.15	16207	5.91	13402	4.94	7168	3.12
Nitzschia acicularis	2805	1.68	4052	1.59	5922	2.16	8103	2.99	12155	5.29
Skeletonema potamos	63579	38.10	107212	42.01	90071	32.84	83837	30.90	68878	29.98
Stephanodiscus invisitatus	23998	14.38	48931	19.17	53606	19.55	63891	23.55	56723	24.69
Total Bacillariophyta	104719	62.75	181076	70.94	182946	66.71	183258	67.55	161130	70.13
Total Chlorophyta	27193	16.29	[illegible]	9.49	30153	10.99	35530	13.10	38335	16.68
Coelosphaerium naegelianum	23375	14.01	38958	15.26	44256	16.14	31166	11.49	17141	7.46
Total Cyanophyta	32164	19.27	48993	19.20	61148	22.30	52515	19.36	29359	12.78
Total Euglenophyta	623	0.37	312	0.12	0	0.00	0	0.00	935	0.41
Total Pyrrhophyta	312	0.19	0	0.00	0	0.00	0	0.00	0	0.00
Total Cryptophyta	1870	1.12	623	0.24	0	0.00	0	0.00	0	0.00
Total Phytoplankton	166880		255237		274243		271303		229758	

TABLE 3-10 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, OCTOBER 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
October 6, 1981										
Nitzschia acicularis	3054	7.87	2867	7.68	3678	8.72	1496	4.91	1995	6.16
Skeletonema potamos	8851	22.80	11781	31.57	10223	24.24	7418	24.34	7854	24.27
Stephanodiscus invisitatus	2369	6.10	4239	11.36	3989	9.46	2119	6.95	2867	8.86
Stephanodiscus tenuis	7667	19.75	7293	19.54	5735	13.60	8914	29.24	6046	18.68
Total Bacillariophyta	25806	66.48	28922	77.50	26990	64.00	20819	68.30	21941	67.79
Total Chlorophyta	5376	13.85	5205	13.95	5548	13.15	2743	9.00	2945	9.10
Total Chrysophyta	436	1.12	0	0.00	0	0.00	187	0.61	0	0.00
Coelosphaerium naegelianum	4893	12.61	0	0.00	6233	14.78	3896	12.78	4675	14.44
Total Cyanophyta	7075	18.23	374	1.00	9512	22.55	6607	21.68	7231	22.34
Total Euglenophyta	0	0.00	0	0.00	0	0.00	0	0.00	62	0.19
Total Cryptophyta	125	0.32	436	1.17	125	0.30	125	0.41	187	0.58
Total Phytoplankton	38818		37319		42174		30481		32366	
October 21, 1981										
Nitzschia acicularis	1122	4.25	1015	3.91	1336	4.77	1977	7.17	962	3.76
Stephanodiscus invisitatus	3313	12.54	6732	25.95	4541	16.22	3580	12.99	4167	16.30
Stephanodiscus tenuis	9777	37.02	9083	35.01	9564	34.16	10846	39.36	10258	40.12
Total Bacillariophyta	17792	67.37	19822	76.41	19715	70.42	20410	74.07	19127	74.81
Total Chlorophyta	2698	10.22	2150	8.29	2778	9.92	2524	9.16	2925	11.44
Total Chrysophyta	0	0.00	321	1.24	267	0.95	1015	3.68		0.00
Coelosphaerium naegelianum	2030	7.69	1336	5.15	1710	6.11	855	3.10	2030	7.94
Oscillatoria tenuis	1988	7.53	1667	6.43	2153	7.69	1950	7.08	1207	4.72
Total Cyanophyta	5813	22.01	3489	13.45	5022	17.94	3446	12.51	3462	13.54
Total Euglenophyta	0	0.00	107	0.41	107	0.38	53	0.19	0	0.00
Total Cryptophyta	107	0.40	53	0.21	107	0.38	107	0.39	53	0.21
Total Phytoplankton	26409		25942		27996		27555		25568	

TABLE 3-11 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, NOVEMBER 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
November 4, 1981										
Nitzschia acicularis	1700	8.48	1360	7.18	1054	5.92	1326	6.83	1496	7.94
Nitzschia linearis	816	4.07	612	3.23	510	2.86	578	2.98	952	5.05
Stephanodiscus invisitatus	8568	42.73	6664	35.20	7140	40.09	7752	39.95	6052	32.11
Stephanodiscus tenuis	4488	22.38	5746	30.35	3740	21.00	5236	26.98	3162	16.77
Total Bacillariophyta	17680	88.17	16286	86.03	14960	84.00	17068	87.96	14552	77.20
Dictyosphaerium pulchellum	459	2.29	765	4.04	272	1.53	816	4.21	1207	6.40
Total Chlorophyta	1623	8.10	2142	11.31	2533	14.22	1768	9.11	3417	18.13
Total Cyanophyta	680	3.39	367	1.94	78	0.44	500	2.58	779	4.13
Total Euglenophyta	34	0.17	0	0.00	102	0.57	0	0.00	0	0.00
Total Cryptophyta	34	0.17	136	0.72	136	0.76	68	0.35	102	0.54
Total Phytoplankton	20051		18931		17809		19404		18849	
November 17, 1981										
Stephanodiscus invisitatus	20694	54.83	18388	50.30	21442	50.93	19697	58.40	19198	50.88
Stephanodiscus tenuis	7168	18.99	7667	20.97	8789	20.88	5548	16.45	6981	18.50
Total Bacillariophyta	33473	88.68	31291	85.59	35717	84.84	30418	90.20	32600	86.40
Total Chlorophyta	3350	8.88	4254	11.64	4831	11.47	2415	7.16	4223	11.19
Total Cyanophyta	798	2.11	826	2.26	1178	2.80	704	2.09	785	2.08
Total Euglenophyta	125	0.33	62	0.17	125	0.30	187	0.55	0	0.00
Total Cryptophyta	0	0.00	125	0.34	249	0.59	0	0.00	125	0.33
Total Phytoplankton	37746		36558		42100		33725		33733	

TABLE 3-12 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, DECEMBER 1981

Taxa	Location 1		Location 2		Location 3		Location 4		Location 5	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
December 2, 1981										
Stephanodiscus invisitatus	14623	66.68	13202	73.05	12155	74.07	13838	69.47	12791	72.30
Stephanodiscus tenuis	1571	7.16	1047	5.79	823	5.01	1459	7.32	1122	6.34
Total Bacillariophyta	19448	88.68	16792	92.91	15334	93.45	18027	90.50	16418	92.81
Total Chlorophyta	2235	10.19	1206	6.67	1075	6.55	1720	8.64	1178	6.66
Total Chrysophyta	112	0.51	75	0.41	0	0.00	75	0.38	37	0.21
Total Cyanophyta	135	0.61	0	0.00	0	0.00	97	0.49	56	0.32
Total Phytoplankton	21929		18073		16409		19919		17690	
December 15, 1981										
Stephanodiscus invisitatus	6208	80.68	5890	78.85	6377	76.12	6825	75.80	6508	77.90
Stephanodiscus tenuis	337	4.37	187	2.50	337	4.02	467	5.19	262	3.13
Total Bacillariophyta	7405	96.23	7125	95.37	7891	94.20	8546	94.91	7854	94.02
Total Chlorophyta	243	3.16	346	4.63	402	4.80	458	5.09	421	5.04
Total Cyanophyta	28	0.36	0	0.00	47	0.56	0	0.00	41	0.49
Total Cryptophyta	19	0.24	0	0.00	37	0.45	0	0.00	37	0.45
Total Phytoplankton	7695		7471		8378		9004		8353	

over 38,000 units/ml and composed nearly 17% of the total community. Species of Scenedesmus, Ankistrodesmus and Pediastrum constituted the majority of the Chlorophyta.

Cyanophytes (blue-green algae) were most abundant in September and October, however, they composed up to 71% of the total phytoplankton in July when densities of Aphanizomenon flos-aquae peaked. The greatest abundances in September and October were attributable to increased densities of Coelosphaerium naegelianum (over 44,000 units/ml at Location 3 on September 22). This common species is often associated with late summer blooms (Prescott 1951).

Densities of chrysophytes (golden brown algae) were highest in March (1600 units/ml) although percent occurrence was greatest in late January. Synura uvella composed the majority of the golden brown algae in January. During most of the year, chrysophytes were rare or absent in samples.

No consistent differences in the composition or densities of phytoplankton could be detected between the sampling locations (Figure 3-1). The slight differences that were observed were attributable to natural spatial and seasonal variability and not to any effects of station operation.

3.4.2 Periphyton

Density and percent occurrence of dominant periphyton taxa and divisions collected in the Cedar River are presented in Table 3-13. A total of 12 species collected from artificial substrates occurred as dominant (>5%) taxa. As found in the phytoplankton samples, diatoms were the dominant algal form, composing at least 72% of the total community. Maximum numbers in May at Location 3 (3,166,000 units/ml) were attributable to many diatoms attaining peak densities. In August, densities decreased by at least one half at both locations, then increased in November. During all sampling periods, total periphyton densities were greater at Location 3 than Location 2.

Artificial substrates collected in May were dominated by species of Gomphonema and Navicula. Diatoms reached peak abundance for all sampling periods at Location 3, composing over 97% of the total periphyton. Chlorophyta and Cryptophyta also reached maximum densities in May.

The algal community in August was also dominated by Gomphonema and Navicula. Lyngbya diguetti, a blue-green alga, increased dramatically in August to over 270,000 units/cm^2, composing 23% of the total periphyton at Location 3.

Periphyton collected in November was again dominated by diatom taxa. Diatoma vulgare and Gomphonema olivaceum, typical winter diatoms (Blum 1957, Hynes 1972), composed the majority of the periphyton. Diatoma vulgare composed over 61% of the total periphyton at the upstream location (Location 2). Data from 1980 (Dvorak 1981) followed the same dominance pattern. High numbers of blue-greens are attributable to increased densities of Oscillatoria.

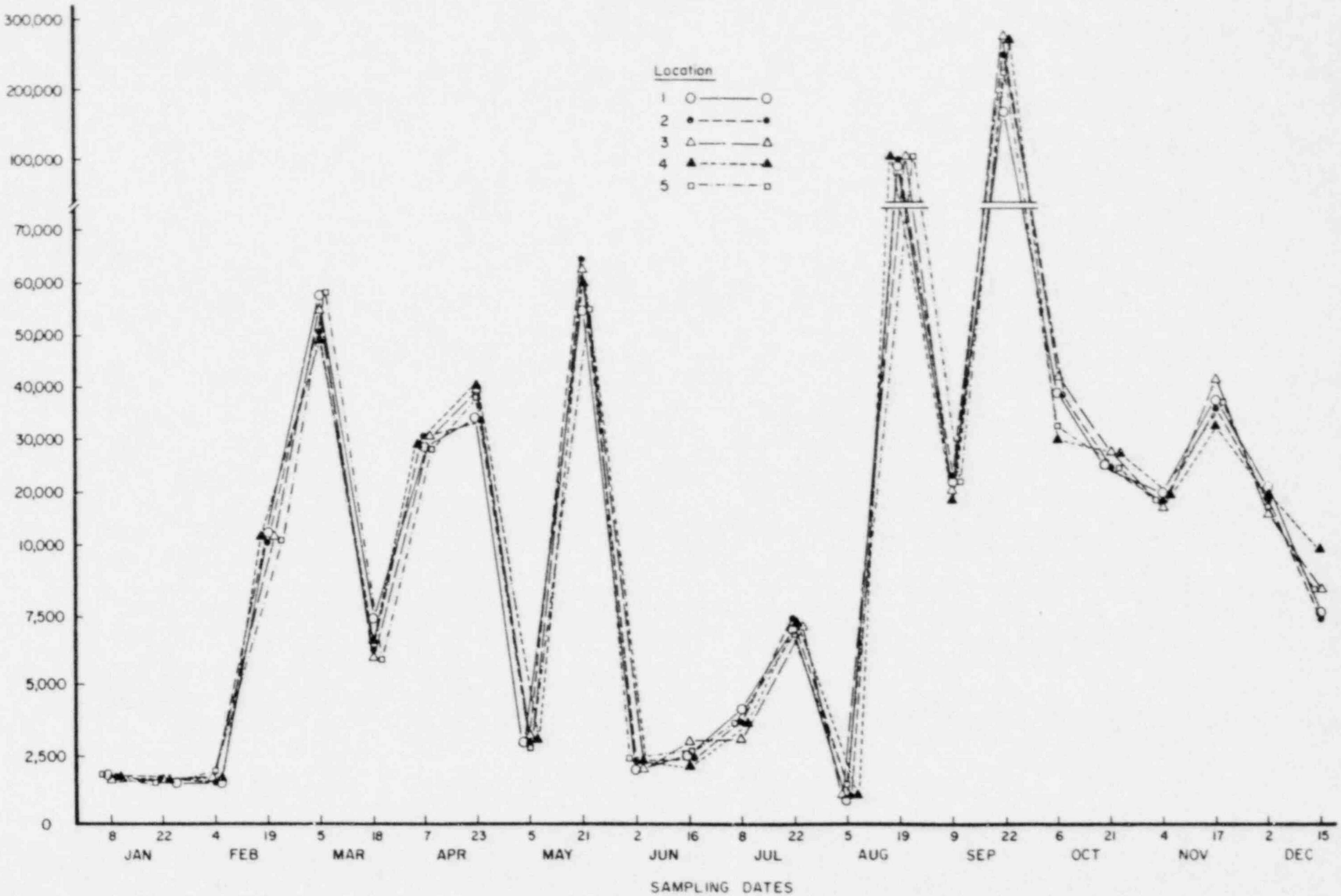

Figure 3-1 Mean density (units/m.) of phytoplankton collected in the Cedar River near the Duane Arnold Energy Center, January - December 1981.

TABLE 3-13 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PERIPHYTON COLLECTED FROM AR˜IFICIAL SUBSTRATES IN THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST, AND NOVEMBER 1981

	20 May 1981				18 August 1981				16 November 1981			
	Location 2		Location 3		Location 2		Location 3		Location 2		Location 3	
Taxa	Units/cm²	%	Units/cm²	%	Units/cm²	%	Units/cm²	%	Units/cm²	%	Units/cm²	%
BACILLARIOPHYTA												
Cyclotella spp.	72,166	6.45	147,755	4.67	1,439	0.30	2,938	0.25	7,835	0.48	60,445	2.65
Diatoma vulgare	9,573	0.86	10,746	0.34	0	0.00	0	0.00	1,010,777	61.53	592,698	25.97
Gomphonema olivaceum	399,125	35.66	239,094	7.55	480	0.10	2,519	0.21	221,632	13.49	478,524	20.96
Gomphonema parvulum	8,100	0.72	495,650	15.65	135,762	28.57	115,014	9.73	0	0.00	1,679	0.07
Navicula pelliculosa	27,983	2.50	362,671	11.45	68,121	14.34	419,758	35.50	2,239	0.14	0	0.00
Navicula tripunctata	60,384	5.39	157,157	4.96	1,199	0.25	2,099	0.18	3,358	0.20	13,432	0.59
Nitzschia dissipata	27,247	2.43	298,196	9.42	480	0.10	3,778	0.32	14,552	0.89	130,964	5.74
Nitzschia lauenbergiana	11,782	1.05	0	0.00	480	0.10	0	0.00	5,597	0.34	120,890	5.30
Nitzschia palea	30,928	2.76	304,912	9.63	59,006	12.42	107,878	9.12	7,835	0.48	58,766	2.57
Skeletonema potamos	0	0.00	0	0.00	70,519	14.84	54,569	4.62	7,835	0.48	11,753	0.51
Stephanodiscus astraea v. minutula	94,995	8.49	132,979	4.20	4,797	1.01	5,459	0.46	13,432	0.82	62,124	2.72
Total Bacillariophyta	1,050,830	93.89	3,097,468	97.82	423,597	89.15	853,801	72.21	1,529,034	93.08	2,135,724	93.57
CHLOROPHYTA	20,449	1.83	39,657	1.25	14,419	3.03	8,456	0.72	4,234	0.26	12,685	0.56
CYANOPHYTA												
Lyngbya diguetti	13,087	1.17	3,791	0.12	801	0.17	273,016	23.09	0	0.00	0	0.00
Total Cyanophyta	44,713	3.99	27,702	0.87	36,050	7.59	320,129	27.07	108,687	6.62	132,234	5.79
EUGLENOPHYTA	1,909	0.17	292	0.01	534	0.11	0	0.00	353	0.02	1,585	0.07
CRYPTOPHYTA	1,363	0.12	1,458	0.05	534	0.11	0	0.00	353	0.02	317	0.01
TOTAL PERIPHYTON	1,119,264		3,166,577		475,134		1,182,386		1,642,661		2,282,545	

Mean periphyton biomass values ranged from 2.70 mg/dm^2/day in August (Location 2) to 9.50 mg/dm^2/day in May (Location 3) (Table 3-14). Biomass was slightly higher upstream in November, whereas in May and August downstream values were higher. The higher values reported in May from Location 3 may have been attributable to colonization by macroinvertebrates as evidenced by numerous insect cases on the slides.

Differences in periphyton community composition and biomass values between upstream and downstream locations were probably not related to station operation. These differences between locations during each sampling period were probably attributable to natural factors rather than effects of station operation.

3.5 SUMMARY AND CONCLUSIONS

1. Phytoplankton densities were highest in late September with a secondary peak in late August. Lowest densities occurred during January, February, and early August.

2. Diatoms, composed primarily of _Stephanodiscus_ _invisitatus_ and _S. tenuis_ were the most abundant phytoplankton group throughout most of the sampling year.

3. Differences in the phytoplankton community among locations and over time were attributed to natural spatial and seasonal variability and not to any effects of station operation.

4. Diatoms dominated the periphyton at both upstream and downstream locations throughout all the sampling periods.

5. Species of _Gomphonema_, _Navicula_, and _Nitzschia_ were the most abundant periphyton taxa present during the study.

6. Differences in periphyton biomass production and assemblage composition between upstream and downstream locations were not attributable to any adverse conditions resulting from station operation.

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TABLE 3-14 PERIPHYTON BIOMASS PRODUCTION ($mg/dm^2/day$) FROM SAMPLES COLLECTED IN THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST, AND NOVEMBER 1981

Location	Rep	20 May	18 August	16 November
2	A	6.98	4.03	4.31
	B	5.32	3.29	4.08
	C	3.63	1.69	2.82
	D	(a)	1.77	3.49
	Mean	5.31	2.70	3.68
3	A	9.38	3.43	3.78
	B	9.43	3.37	2.29
	C	9.69	3.74	4.41
	D	(a)	3.43	2.54
	Mean	9.50	3.49	3.26

[a] Missing replicate.

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Chapter 4

Benthic Macroinvertebrates

CONTENTS

LIST OF TABLES

4.0 BENTHIC MACROINVERTEBRATES

4.1 INTRODUCTION

Macroinvertebrates are a major component in the energy transfer between primary producers and consumers at higher trophic levels. Because macroinvertebrates are a vital component in energy flow and the aquatic food chain, changes in the macroinvertebrate community may induce changes in the populations at higher trophic levels. Aquatic macroinvertebrates are also valuable indicators of water quality. Therefore, the aquatic macroinvertebrate investigations in the Cedar River are extremely significant in the environmental monitoring program for Duane Arnold Energy Center (DAEC).

Results of the present study were based on data gathered from April through November 1981. The principal objectives of the study were:

1. To describe the benthic macroinvertebrate community colonizing natural and artificial substrates in the Cedar River near DAEC;

2. To discuss the spatial and temporal variations in macroinvertebrate composition, density, relative abundance and diversity;

3. To compare the results of this study with previous studies and to determine if major community changes have occurred from previous years; and

4. To report any alterations present in the aquatic fauna which could be attributed to the operation of DAEC.

4.2 HISTORICAL REVIEW

The benthic macroinvertebrate community of the Cedar River near DAEC was documented for three years prior to station operation (McDonald 1972, 1974a and b) and during seven years of operation (McDonald 1975, 1976, 1977, 1978, 1979; Lewis 1980, 1981). Aquatic organisms were collected by various techniques including a Ponar grab sampler, hand picking and artificial substrate samplers.

The bottom substrate of the Cedar River has been characterized as primarily shifting sand that supports few macroinvertebrates. From 1972 through 1978 most Ponar grab samples were void of biota although specimens of Tubificidae (sludge worms) and Chironomidae (midge-fly larvae) were occasionally present. Increased densities in the benthic fauna (primarily tubificids and chironomids) were noted whenever the sediment contained a greater percentage of silt and clay. In November 1978, an effort was made to collect Ponar grab samples from silty substrates. The resulting samples yielded a macroinvertebrate fauna with a greater diversity and density than the benthic community in the predominantly sand substrates. Grab samples collected in 1979 and 1980 (Lewis 1980 and 1981, respectively) yielded numerous rhabdocoels (near *Macrostomum* sp.) and chironomids from the shifting sand of the Cedar River.

Qualitative sampling yielded numerous organisms at Locations 1 and 2 in 1972. Net-spinning caddisflies (Hydropsychidae) and mayflies (Stenonema sp.) were the predominant macroinvertebrates hand-picked from rocks along the shoreline. No other qualitative sampling has been conducted near DAEC.

A variety of organisms were also collected from the artificial substrate samplers at Location 3 during 1977. Chironomid midges and hydropsychid caddisflies were the dominant macroinvertebrates colonizing the Hester-Dendy samplers in the Cedar River. In the 1979 and 1980 artificial substrate samples, aquatic oligochaetes (Naididae), mayflies (Baetidae and Heptageniidae), stoneflies (Perlodidae), net-spinning caddisflies (Hydropsychidae), blackflies (Simuliidae), and midge flies (Chironomidae) were the predominant organisms.

Monitoring of DAEC from 1974 through 1980 revealed no alterations in the macroinvertebrate community of the Cedar River which could be related to station operation. The sparse benthic macroinvertebrate fauna collected in the Ponar grab samples upstream and downstream from the station during 1974-1978 was similar to the benthic community reported near the station in the preoperational studies. The 1979 and 1980 samplings revealed a more abundant and diverse community than the data from 1974-1978. The apparent community changes observed in 1979 and 1980 were attributed to improved sorting and identification techniques and probably did not reflect actual faunal changes. These differences were noted both upstream and downstream from the station and could not be related to the operation of DAEC.

4.3 FIELD AND ANALYTICAL PROCEDURES

4.3.1 Sampling Procedures

4.3.1.1 Natural Substrates

The benthic macroinvertebrate community of the Cedar River was sampled at four locations, two upstream and two downstream from DAEC in 1981 (Figure 1-1, Chapter 1). Control sampling sites were established immediately upstream from the station intake (Location 2) and near Lewis Access (Location 1). Downstream sampling sites were situated approximately 140 ft and 0.5 mi downstream from the station (Locations 3 and 4 respectively). Samples were collected from habitats near the west shoreline. A single Ponar grab sample (area sampled = 530 sq cm) was collected at each location in the spring (20 May), summer (18 August) and fall (18 November) during 1981. The samples were preserved in 10% formalin containing Rose Bengal stain to aid sorting. Visual characterizations were made of the sediments at each sampling location as the grab samples were collected.

4.3.1.2 Artificial Substrates

Artificial substrate samplers were also utilized to monitor the aquatic macroinvertebrate community of the Cedar River in 1981. The artificial substrate sampling locations were the same as described for the natural substrate samples (see Section 4.3.1.1).

A single modified Hester-Dendy sampler was suspended from a float approximately 30 cm below the water surface at each sampling location. Each substrate was uniformly constructed of nine 6.3 cm diameter tempered hardboard plates (0.3 cm thick) mounted on an eyebolt and separated by circular spacers. The spacers between plates varied in thickness from 0.3 to 1.3 cm which allowed for colonization by various sized organisms. Each sampler exposed a surface area of 512 sq cm.

The Hester-Dendy samplers were placed in the Cedar River for approximately six-week colonization periods during the spring, summer and fall. Samplers were collected on 20 May, 17 August, and 28 November 1981. Each sampler was retrieved with a dipnet and placed in a labeled jar containing a 10% formalin and Rose Bengal stain solution.

4.3.2 Analytical Procedures

4.3.2.1 Natural Substrates

The Ponar grab samples were washed on a U.S. Standard No. 30 mesh screen and the retained material was stored in 10% formalin. The organisms were sorted from the sample material and enumerated under a stereozoom dissecting microscope. Identification of the organisms, except chironomids and oligochaetes, was made during the sorting procedure. Chironomids and oligochaetes were individually mounted and cleared in CMC-10 nonresinous mounting media prior to examination under a binocular compound microscope at magnifications of 10-1000X. All organisms were identified to the lowest positive taxon (usually genus or species). Densities of bottom fauna were expressed as number of organisms per square meter (no./m^2). Taxonomic keys and literature that were consulted as identification aids included Brinkhurst (1964, 1965), Brinkhurst & Jamieson 1971), Burks (1953), Edmondson (1959), Edmunds, Jensen and Berner (1976), Hamilton and Saether (1970), Herrington (1962), Hilsenhoff (1975), Hiltunen (1973), Hiltunen and Klemm (1980), Lewis (1974), Pennak (1953), Ross (1944), Saether (1977), Schuster and Etnier (1978), Sperber (1950), Usinger (1956) and Wiggins (1977). A species diversity index was calculated for each sample on each collection date using Shannon's diversity formula to log base e (Shannon 1948).

4.3.2.2 Artificial Substrates

The Hester-Dendy samplers were returned to the laboratory, rinsed on a U.S. Standard No. 30 mesh screen, brushed clean of attached material, and the material stored in 10% formalin. The retained material was then sorted and the organisms identified in the same manner as described for the Ponar samples (see Section 4.3.2.1).

4.4 RESULTS AND DISCUSSION

4.4.1 Natural Substrates

A total of 28 taxa representing six phyla were collected from the natural substrates of the Cedar River near DAEC in 1981 (Table 4-1). Rhabdocoela

TABLE 4-1 TAXONOMIC LIST OF BENTHIC MACROINVERTEBRATES COLLECTED FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER, APRIL - NOVEMBER 1981

Taxon	Source of Collection Natural Substrate	Artificial Substrate
Platyhelminthes		
Turbellaria		
Tricladida		
Planariidae		
Unidentified Planariidae		X[a]
Rhabdocoela		
Unidentified Rhabdocoela		X
Macrostomidae		
near _Macrostomum_ sp. Schmidt	X	
Nematoda		
Unidentified Nematoda	X	
Ectoprocta		
Plumatellidae		
Unidentified Plumatellidae		X
Entoprocta		
Urnatellidae		
Urnatella gracilis Leidy	X	X
Annelida		
Oligochaeta		
Plesiopora		
Aeolosomatidae		
Unidentified Aeolosomatidae	X	
Enchytraeidae		
Unidentified Enchytraeidae		X
Naididae		
Nais behningi (Michaelsen)		X
N. bretscheri (Michaelsen)		X
N. elinguis Muller		X
N. variabilis Piguet		X
Piguetiella michiganensis Hiltunen	X	
Wapsa mobilis Liang	X	
Tubificidae		
Branchiura sowerbyi Beddard	X	
Limnodrilus hoffmeisteri Claparede	X	
L. udekemianus Claparede	X	
Hirudinea		
Immature Hirudinea	X	
Arthropoda		
Arachnida		
Acarina		
Unidentified Hydracarina		X

TABLE 4-1 (CONT.)

Taxon	Source of Collection: Natural Substrates	Source of Collection: Artificial Substrate
Insecta		
Ephemeroptera		
Ephemeridae		
Ephoron sp. Williamson	X	X
Caenidae		
Caenis sp. Stephens		X
Tricorythodes sp. Ulmer		X
Heptageniidae		
Heptagenia diabasia Burks		X
H. flavescens (Walsh)		X
Stenonema sp. Traver		X
S. exiguum Traver		X
S. integrum (McDunnough)		X
S. terminatum (Walsh)		X
Baetidae		
Baetis sp. Leach		X
Isonychia sp. Eaton		X
Ametropidae		
Pseudiron centralis McDunnough	X	
Odonta		
Gomphidae		
Immature Gomphidae	X	
Megaloptera		
Corydalidae		
Corydalus cornutus Linnaeus		X
Plecoptera		
Perlidae		
Perlesta placida (Hagen)		X
Perlodidae		
Isoperla sp. Banks		X
Taeniopterygidae		
Taeniopteryx sp. Pictet		X
Trichoptera		
Hydropsychidae		
Cheumatopsyche sp. Wallengren		X
Hydropsyche orris Ross	X	X
H. simulans Ross		X
H. valanis Ross		X
Potamyia flava Hagen		X
Coleoptera		
Elmidae		
Stenelmis sp. Dufour		X

Taxon	Source of Collection: Natural Substrates	Source of Collection: Artificial Substrate
Diptera		
Simuliidae		
Simulium sp. Latreille		X
Chironomidae		
Chironominae		
Chernovskiia orbicus (Townes)	X	
Harnischia sp. Kieffer	X	
Paratanytarsus sp. Kieffer		X
Paratendipes sp. Kieffer	X	
P. near *connectens* Lipina	X	
Polypedilum convictum type		X
P. fallax group	X	
P. scalaenum type	X	
P. simulans type	X	
Rheotanytarsus sp. (Bause)		X
Robackia claviger (Townes)	X	
Stenochironomus sp. Kieffer		X
Stictochironomus sp. Kieffer	X	
Tanytarsus sp. van der Wulp		X
Tanypodinae		
Procladius sp. Skuse	X	
Thienemannimyia series sensu Fittkau		X
Orthocladiinae		
Brillia sp. Kieffer		X
near *Corynoneura* sp. (Winnertz)	X	
Cricotopus bicinctus (Meigen)		X
C. tibialis (Meigen)		X
C. tremulus group sensu Hirvenoja		X
Eukiefferiella sp. Thienemann		X
Nanocladius sp. Kieffer		X
Orthocladius sp. (van der Wulp)		X
Parakiefferiella sp. (Thienemann)		X
Rheocricotopus sp. Thienemann and Harnisch		X
Thienemanniella sp. Kieffer		X
Empididae		
Unidentified Empididae		X
Mollusca		
Gastropoda		
Basomatophora		
Physidae		
Physa sp. Draparnaud	X	X

TABLE 4-1 (CONT.)

Taxon	Source of Collection Natural Substrates	Artificial Substrate
Lymnaeidae		
Lymnaea sp. Lamarck	X	
Pelecypoda		
Heterodonta		
Sphaeriidae		
Sphaerium transversum (Say)	X	
Total Taxa	28	50

(a) "X" indicates taxon was present.

and Chironomidae were the predominant organisms in the Ponar grab samples throughout 1981 (Appendix C, Tables C-1 through C-3).

Ponar samples from the Cedar River in 1981 revealed a sparse community of benthic organisms tolerant to the rigorous environment in the shifting sand substrates. This community was characterized by generally low densities and few taxa. Soft shifting sand is a difficult substrate for benthic animals and is poor in foodstuffs for larger organisms (Hynes 1972). Although there were variations in population densities between locations, community composition was similar at most locations. The greatest degree of variability was attributed to differences in the proportion of silt in the sediment.

The rhabdocoel, near Macrostomum sp., was the predominant organism at Locations 1, 2 and 3 in May; whereas, the chironomid Polypedilum simulans type was the predominant organism at Location 4 (Table 4-2). Near Macrostomum sp. was also the predominant organism near DAEC in May of 1979 and 1980 (Lewis 1980, 1981), and apparently can tolerate the harsh environment of shifting sand substrates. Chironomids were also commonly collected at Location 1 (primarily near Corynoneura sp.) and Locations 2 and 3 (Robackia claviger). Larvae of R. claviger have also been reported from sandy substrates of the Mississippi and Missouri rivers (Saether 1977). The larger numbers of P. simulans type at Location 4 in comparison to the other sampling locations was attributed to the larger amounts of silt present in the substrate at this downstream location (Table 4-3).

Rhabdocoels and chironomids also dominated the benthic samples collected on 18 August 1981 (Table 4-2). Robackia claviger was the most abundant organism at Locations 1 and 2, and was the dominant chironomid at Location 3. The most commonly collected organism at Location 3 was the rhabdocoel near Macrostomum sp. The chironomid Harnischia sp. dominated the sparse benthic community at Location 4. As was noted in May, the differences in the macroinvertebrate assemblages between Location 4 and the other locations was probably related to the greater silt and fine sand fractions at Location 4 (Table 4-3).

In November the benthic macroinvertebrate communities at Locations 1, 2 and 4 were numerically dominated by the rhabdocoel near Macrostomum sp. and chironomids. The chironomid Robackia claviger was especially numerous (1,418 individuals/m^2) at Location 4. Fingernail clams (Sphaerium transversum) were the most abundant organisms at Location 3. Sphaerium transversum also dominated the benthos at this location in November 1980 (Lewis 1981). The individuals of S. transversum and also the snail, Physa sp., at Location 3 may have originated from the DAEC discharge canal. Sampling of the discharge canal in 1981 revealed numerous individuals of S. transversum and Physa sp. (see Chapter 7) which could easily be transported to Location 3 during normal station discharge operation. These organisms were rarely collected at any other sampling locations in previous studies of the Cedar River.

Species diversity values ranged from a low of 0.4903 at Location 4 in November to a high of 1.6675 at Location 4 in August (Table 4-4). The greatest diversity values occurred at the sampling locations where silt

TABLE 4-2 DENSITIES (no./m^2) AND PERCENT COMPOSITION OF THE DOMINANT[(a)] BENTHIC MACROINVERTEBRATES COLLECTED WITH A PONAR GRAB SAMPLER FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, MAY - NOVEMBER 1981

Collection Date	Taxon	Location 1		Location 2		Location 3		Location 4	
		no./m^2	%	no./m^2	%	no./m^2	%	no./m^2	%
20 May 1981	Rhabdocoela								
	near *Macrostomum* sp.	813	71.7	1153	75.3	1002	72.6	19	1.5
	Oligochaeta								
	Unid. immature w/o cap.	0		0		95	6.8	0	
	Diptera								
	Polypedilum simulans type	0		0		0		964	77.3
	Polypedilum pupa	0		0		0		57	4.5
	Robackia claviger	76	6.7	359	23.5	227	16.4	0	
	near *Corynoneura* sp.	208	18.3	0		0		0	
	Total Benthos	1134		1531		1380		1248	
18 August 1981	Rhabdocoela								
	near *Macrostomum* sp.	302	34.0	189	23.8	680	69.2	0	
	Nematoda	0		0		57	5.8	19	12.5
	Oligochaeta								
	Unid. immature w/o cap.	0		0		0		19	12.5
	Branchiura sowerbyi	0		0		0		19	12.5
	Diptera								
	Chernovskiia orbicus	0		0		57	5.8	19	12.5
	Harnischia sp.	0		0		0		57	37.5
	Robackia claviger	548	61.7	605	76.2	76	7.7	0	
	near *Corynoneura* sp.	38	4.3	0		19	1.9	19	12.5
	Total Benthos	888		793		983		151	
18 November 1981	Rhabdocoela								
	near *Macrostomum* sp.	38	28.6	132	70.0	57	14.3	57	3.5
	Unid. Hirudinea	0		0		38	9.5	0	
	Trichoptera								
	Hydropsyche orris	0		19	10.0	0		0	
	Diptera								
	Polypedilum simulans type	0		0		19	4.8	0	
	Robackia claviger	19	14.3	38	20.0	0		1418	88.2
	near *Corynoneura* sp.	76	57.1	0		0		76	4.7
	Gastropoda								
	Physa sp.	0		0		19	4.8	0	
	Pelecypoda								
	Sphaerium transversum	0		0		265	66.7	0	
	Total Benthos	132		189		397		1607	

(a) Taxa that compose ≥ 5% of the total benthos at any location on one sampling date.

TABLE 4-3 VISUAL CHARACTERIZATION (% COMPOSITION) OF THE SEDIMENTS AT THE BENTHIC MACROINVERTEBRATE SAMPLING LOCATIONS IN THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, 1981

Sampling Date and Location	Sediment Composition (%)					
	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Detritus
20 May 1981						
1	5	75		20		
2		50		50		
3		65		35		
4		65		30	5	
18 August 1981						
1			100			
2	5	60	35			
3			80		10	10
4				80	20	
18 November 1981						
1		50		50		
2			50	50		
3			60	30	10	
4			80	20		

TABLE 4-4 MACROINVERTEBRATE SPECIES DIVERSITY AND REDUNDANCY VALUES FROM NATURAL AND ARTIFICIAL SUBSTRATE SAMPLES COLLECTED IN THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, APRIL - NOVEMBER 1981

Sample Type and Sampling Date	Value	Location 1	2	3	4
Natural Substrates					
20 May 1981	Diversity	0.8668	0.6079	0.8702	1.0385
	Redundancy	0.5838	0.5081	0.5596	0.8372
18 August 1981	Diversity	0.7991	0.5489	1.2802	1.6675
	Redundancy	0.3353	0.2485	0.7627	1.0000
18 November 1981	Diversity	0.9557	0.8018	1.0622	0.4903
	Redundancy	0.4727	0.6458	0.6375	0.7499
Artificial Substrates					
7 April - 20 May 1981	Diversity	2.1606	2.0160	2.2194	2.0841
	Redundancy	0.3882	0.3940	0.3451	0.4566
8 July - 17 August 1981	Diversity	--(a)	2.2169	2.2337	2.4598
	Redundancy	--	0.3219	0.2287	0.1858
6 October - 18 November 1981	Diversity	2.4988	2.0401	2.0173	1.7680
	Redundancy	0.2491	0.3007	0.3131	0.3951

(a) Dash (--) indicates the sampler was lost because of high river flows.

was observed in the bottom sediments (Table 4-3). The presence of silt was indicative of the stable (non-eroding) substrate at these locations. Stable substrates in comparison to shifting, eroding substrates, typically result in a more diverse benthic community.

The 1981 study revealed no adverse effects because of the station operation on the benthic community. The November Ponar sample from Location 3 contained fingernail clams and snails which may have originated from the DAEC discharge canal; however, most population differences among locations and sampling dates were attributed to the variability of the macroinvertebrate community created by natural seasonal, hydrologic, and substrate differences.

4.4.2 Artificial Substrates

Hester-Dendy artificial substrate samplers collected from the Cedar River near DAEC during 1981 yielded 50 macroinvertebrate taxa (Table 4-1). The dominant organisms that colonized the artificial substrate samplers were the aquatic Oligochaeta and insects among the orders Ephemeroptera, Plecoptera, Trichoptera, and Diptera (Appendix C, Tables C-4 through C-6).

Aquatic oligochaetes (Naididae); mayfly nymphs (primarily Isonychia sp.), net-spinning caddisfly larvae and pupae (Hydropsychidae); and blackfly larvae and pupae (Simulium sp.) were the most abundant organisms collected in May (Table 4-5). Simulium sp. dominated the macroinvertebrate communities at Locations 1, 3 and 4. This taxon was also abundant in May of 1979 and 1980 (Lewis 1980 and 1981, respectively). The caddisfly Hydropsyche orris was the predominant species at Location 2 and was also commonly collected at the other sampling locations.

Hydropsychid caddisflies dominated the macroinvertebrate fauna in August (Table 4-5). These organisms were also abundant in the summers of 1979 and 1980. A diverse and relatively abundant mayfly (Ephemeroptera) assemblage was noted in the August samples. The number of organisms collected on the August artificial substrate samplers decreased at all locations from the densities observed in May. The sampler at Location 1 was lost because of the high river flow that occurred during the sample colonization period (Figure 2-1, Chapter 2).

The November samples revealed a macroinvertebrate community very similar to the community collected in November of 1979 and 1980. Hydropsychid caddisflies (primarly Hydropsyche orris and H. simulans) were dominant at all locations, and the mayflies Heptagenia flavescens and Stenonema sp., and the stonefly Isoperla sp. were also common (Table 4-5). In 1981 and in previous years artificial substrate samples from the Cedar River generally had the lowest densities and the fewest taxa in November.

The greatest number of taxa and organisms collected from the Cedar River in 1981 were noted in the spring sampling. As was reported in 1979 and 1980, hydropsychid caddisflies (especially H. orris) were commonly collected throughout 1981. Seasonal community changes were also similar to those observed in 1979 and 1980. Aquatic oligochaetes (Naididae) and blackflies (Simulium sp.) were most abundant in the spring and summer

TABLE 4-5 ABUNDANCE (no./sampler) AND PERCENT COMPOSITION OF THE DOMINANT[a] MACROINVERTEBRATES COLONIZING HESTER-DENDY ARTIFICIAL SUBSTRATE SAMPLERS FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, APRIL - NOVEMBER 1981

Collection Date	Taxon	Location 1 no.	Location 1 %	Location 2 no.	Location 2 %	Location 3 no.	Location 3 %	Location 4 no.	Location 4 %
7 April - 20 May 1981	Oligochaeta								
	Nais behningi	39	6.1	91	16.7	37	6.8	37	7.3
	N. bretscheri	16	2.5	6	1.1	88	16.3	14	2.8
	Ephemeroptera								
	Isonychia sp.	59	9.2	33	6.1	34	6.3	42	8.3
	Trichoptera								
	Hydropsyche orris	62	9.7	190	34.9	100	18.5	43	8.5
	H. simulans	19	3.0	47	8.6	27	5.0	42	8.3
	Diptera								
	Simulium sp.	358	55.9	117	21.5	194	35.9	263	51.9
	Total Benthos	640		544		541		507	
8 July - 17 August 1981	Ephemeroptera								
	Caenis sp.	--[b]		0		13	10.2	18	4.9
	Heptagenia flavescens	--		2	1.3	9	7.0	19	5.1
	Stenonema sp.	--		12	7.6	18	14.1	7	1.9
	S. integrum	--		0		17	13.3	21	5.7
	Baetis sp.	--		0		3	2.3	17	4.6
	Isonychia sp.	--		6	3.8	12	9.4	37	10.0
	Trichoptera								
	Imm. Hydropsychidae	--		13	8.2	15	11.7	28	7.6
	Hydropsyche orris	--		24	15.2	3	2.3	57	15.4
	H. simulans	--		57	36.1	30	23.4	73	19.7
	Diptera								
	Simulium sp.	--		6	3.8	2	0.8	55	14.9
	Polypedilum convictum type	--		10	6.3	0		4	1.1
	Stenochironomus sp.	--		13	8.2	0		12	3.2
	Total Benthos	--		158		128		370	
6 October - 18 November 1981	Ephemeroptera								
	Heptagenia flavescens	23	9.4	12	10.5	21	12.4	3	3.4
	Stenonema sp.	16	6.5	9	7.9	6	3.5	1	1.1
	Plecoptera								
	Isoperla sp.	16	6.5	8	7.0	36	21.2	1	1.1
	Trichoptera								
	Immature Hydropsychidae	35	14.3	14	12.3	8	4.7	15	16.9
	Hydropsyche orris	46	18.8	30	26.3	29	17.1	28	31.5
	H. simulans	34	13.9	28	24.6	48	28.2	28	31.5
	Potamyia flava	23	9.4	3	2.6	8	4.7	3	3.4
	Diptera								
	Simulium sp.	0		1	0.9	1	0.6	6	6.7
	Rheotanytarsus sp.	11	4.5	4	3.5	5	2.9	2	2.3
	Total Benthos	245		114		170		89	

(a) Taxa that compose ≥ 5% of the total benthos at any location on one sampling date.
(b) Dash (--) indicates the sampler was lost because of high river flows.

collections, whereas, the stonefly Isoperla sp. was only collected in the fall. The macroinvertebrate communities of the Cedar River were relatively homogeneous in each season, except for the variable population abundances and minor differences in species composition.

Species diversity values ranged from a low of 1.7680 at Location 4 in November to a high of 2.4988 at Location 1 in November (Table 4-4). In 1981, diversity values were always greater for the artificial substrate samples than for the natural substrate samples. This difference was attributed to the relatively heavy colonization of the stable Hester-Dendy substrate in comparison to the sparse community of the unstable shifting sand substrate of the Cedar River.

No consistent spatial or temporal differences were detected in the macroinvertebrate fauna of the artificial substrates in 1981 which could be attributed to the operation of DAEC. The macroinvertebrate communities colonizing the artificial substrate samplers generally had similar composition and densities during each sampling. The slight spatial and temporal differences observed in 1981 were attributed to natural hydrologic factors, habitat variability between locations and natural seasonal fluctuations.

4.5 SUMMARY AND CONCLUSIONS

4.5.1 Natural Substrates

1. A total of 28 benthic macroinvertebrate taxa were collected in Ponar samples from the Cedar River near DAEC during 1981.

2. The rhabdocoel near Macrostomum sp. and the Chironomidae, or midge flies, were the dominant organisms collected in the Ponar samples.

3. Species diversity values ranged from a low of 0.4903 at Location 4 in November to a high of 1.6675 at Location 4 in August. The highest diversity values were observed at the locations with a large percentage of silt in the substrate.

4. The generally low density and diversity of organisms in the Cedar River was attributed to the unstable shifting sand river bottom.

5. Community differences among locations were primarily related to natural variations in substrate and habitat at the sampling sites.

6. The fingernail clams collected at Location 3 in November may have originated from the abundant population colonizing the DAEC discharge canal.

7. The species composition of the Cedar River fauna in 1981 was similar to that reported in 1979 and 1980.

8. No adverse spatial or temporal population differences were detected among the 1981 Ponar grab samples which could be attributed to the operation of Duane Arnold Energy Center.

4.5.2 Artificial Substrates

1. The artificial substrate samplers collected from the Cedar River near DAEC during 1981 yielded 50 aquatic macroinvertebrate taxa.

2. Aquatic Oligochaeta and the insect orders Ephemeroptera, Plecoptera, Trichoptera and Diptera were the dominant organisms that colonized the Hester-Dendy samplers.

3. Net-spinning caddisflies (especially Hydropsyche orris) were commonly collected throughout 1981.

4. Aquatic oligochaetes were commonly collected in the spring sampling but not in the summer or fall. The blackfly Simulium sp. was prevalent only in the spring and summer collections, and the stonefly Isoperla sp. was observed only in the fall.

5. Species diversity values ranged from a low of 1.7680 at Location 4 in November to a high of 2.4988 at Location 1 in November.

6. The diversity and density of the organisms colonizing artificial substrate samples were generally greater than the fauna collected from natural substrates. This difference was attributed to the favorable stable subtrate of the Hester-Dendy samplers as opposed to the unstable sand bottom of the river.

7. There were no consistent differences in the macroinvertebrate community of the artificial substrate samplers during 1981 which could be attributed to the operation of DAEC.

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Chapter 5

Fisheries

CONTENTS

LIST OF TABLES

5.0 FISHERIES

5.1 INTRODUCTION

Fish populations in the Cedar River near Duane Arnold Energy Center (DAEC) were studied in spring (May-June), summer (August) and fall (November) of 1981. Studies were conducted as part of the on-going operational monitoring program to evaluate possible effects of DAEC operation on the fish community. Specific objectives of the study were:

1. To determine the species composition, relative abundance, and spatial and temporal distribution of fish within the study area;

2. To determine the age, size distribution and food habits of selected species;

3. To determine differences between sampling locations upstream and downstream from the power station relative to the aforementioned objectives;

4. To determine possible effects of blowdown discharge from the cooling towers on native fish;

5. To determine pesticide levels in fish within the study area; and

6. To assess the impact of station operation on the fish community in the study area.

5.2 HISTORICAL REVIEW

Environmental studies at DAEC have been undertaken since 1971. Initial studies conducted in 1971 through 1973 were baseline, preoperational surveys (McDonald 1972, 1974a, 1974b). Operational monitoring commenced in 1974 and has continued to the present study (McDonald 1975, 1976, 1977, 1978, 1979; Jovanovic 1980; Hamilton 1981). Preoperational monitoring of the fish community was conducted by means of electroshocking, seining and baited hoop nets. Impingement, ichthyoplankton entrainment and fish survival studies were added to the program during the operational phase initiated in 1974.

Several changes in gear selection, level of effort, scheduling and data reduction occurred during the 1971 through 1978 period and precluded any detailed, preoperational-operational comparisons of fish community structure. In general, however, the composition and relative abundance of predominant fish has remained similar throughout the years. There have been no indications of marked population shifts in abundance or changes in composition or major species.

Comparisons of upstream, control data versus downstream, experimental data have revealed no consistent differences related to station operation. The predominant species have been carp (*Cyprinus carpio*), carpsuckers (*Carpiodes* spp.), shiners (*Notropis* spp.) and channel catfish (*Ictalurus punctatus*) during preoperational and operational studies. Changes in the relative abundance of these predominant taxa has been

observed during the monitoring years but is attributable to annual differences in sampling efficiency and natural variability in fish abundance and distribution.

5.3 FIELD AND ANALYTICAL PROCEDURES

5.3.1 Sampling Locations

Fish were sampled at two locations in the Cedar River near the DAEC. One location was positioned immediately downstream from the station's discharge canal and the second was situated approximately 5 mi upstream from DAEC in the vicinity of Lewis Access (Figure 1-1, Chapter 1). In addition, fish survival studies (using channel catfish held in cages) were conducted in the discharge canal and immediately upstream and downstream from the station.

5.3.2 Sampling and Analytical Methods

Sampling was conducted during May, June, August and November 1981. Sampling was accomplished by electrofishing, seining and hoopnetting. Electrofishing was conducted in June, August and November using a boat-mounted boom shocker equipped with a 230 volt three-phase A.C. generator. The shoreline was sampled for 20 min at each location. Surface water temperatures were recorded prior to sampling.

Shoreline seining was conducted at each location in May, August and November. Two hauls were taken at each location using a 6 x 25 ft seine of 0.25-in bar mesh.

A hoop net, 3 ft in diameter with 1-in bar mesh netting, was deployed at each location for approximately 24 hrs. Each hoop net was baited with cheese, set overnight, and retrieved the following day.

The fish survival studies were conducted only in August. The channel catfish used as test specimens were Mississippi River fish that were obtained from a commercial fisherman. Prior to placement in the study area, the fish were acclimated overnight in the quiet water above the station to ensure that only the more vigorous individuals were used in the experiment. The following day, ten fish were placed in each of three cages that had been anchored immediately upstream from the station (Location 2), immediately downstream from the station's discharge (Location 3), and in the discharge canal (Location 5). The fish in each cage were observed at 6-hr intervals throughout the 48-hr period for evidence of stress and mortality. Surface water temperatures were recorded inside each cage every 6 hrs.

Fish for pesticide analysis were collected by electrofishing at the upstream and downstream locations during each sampling period. Large-sized specimens were taken whenever possible. The fish were wrapped in aluminum foil (pre-cleaned with hexane), refrigerated and shipped to the laboratory where they were kept frozen until analyzed. The samples were analyzed for chlorinated insecticides and polychlorinated biphenyls (PCBs) by the gas-chromatographic method specified by the Food and Drug Administration (FDA 1971).

Fish collected by electrofishing were identified, measured (total length in millimeters) and weighed (grams) in the field. Fish collected by seining were preserved in formalin, labeled, and returned to the laboratory for identification and length measurement. Taxonomic keys used in the identification of fish included Eddy (1957), Hubbs and Lagler (1958), and Pflieger (1975). Scientific and common names of all fishes collected follow Baily (1970).

Scales and spines were collected from selected species for age analysis. Scale impressions were made on plastic (cellulose acetate) slides and the age was determined with the aid of a microprojector. The pectoral spine of ictalurids (catfish) was cut in cross section near the base and polished. The age was determined with the aid of a dissecting microscope.

Stomachs from selected species were excised in the field, preserved in formalin, and returned to the laboratory for analysis. Food items found in the stomachs were identified to the lowest possible taxonomic level, enumerated and measured volumetrically by water displacement to the nearest 0.1 ml. Taxonomic keys used to identify food organisms included Burks (1953), Needham and Needham (1962), Pennak (1953), and Usinger (1971).

5.4 RESULTS AND DISCUSSION

5.4.1 General Findings

A combined total of 637 fish were collected by shocking, seining and hoop netting in spring, summer and fall, 1981. The collection included 27 species distributed among 6 families (Table 5-1). Cyprinids (minnows and carp) and catostomids (suckers) accounted for both the largest number of individuals and species. Three species, carp, spotfin shiner and river carpsucker accounted for nearly 80% of the total catch. Sport fish such as northern pike, channel catfish, sunfish and bass constituted only a small percentage of the catch.

Species composition of the fish assemblage in 1981 varied slightly from the 1980 catch. Four species, suckermouth minnow (*Phenacobius mirabilis*), northern hogsucker (*Hypentelium nigricans*), stonecat (*Noturus flavus*), bluegill (*Lepomis macrochirus*) and largemouth bass (*Micropterus salmoides*) were collected in 1981 but not in 1980. Conversely, five species recorded in 1980 were not encountered in 1981: brassy minnow (*Hybognathus hankinsoni*), common shiner (*Notropus cornutis*), bigmouth shiner (*N. dorsalis*), silver redhorse (*Moxostoma anisurum*) and golden redhorse (*M. erythrurum*). No endangered or threatened fish species of Iowa were collected in 1981.

5.4.2 Electrofishing

Electrofishing yielded 293 individuals representing 19 species in 1981. Carp and river carpsucker were the most abundant species and accounted for 71.3% of the annual electrofishing catch (Table 5-2). The total number and relative abundance of the major species in 1981 was notably similar to results of 1980. Hamilton (1981) reported a total of 360 fish

TABLE 5-1 SPECIES LIST, NUMBERS AND PERCENT ABUNDANCE OF FISHES COLLECTED NEAR THE DUANE ARNOLD ENERGY CENTER, 1981

Family and Scientific Name[a]	Common Name	Number	Percent Abundance
Clupeidae (herrings)			
Dorosoma cepedianum	Gizzard shad	1	0.2
Esocidae (pikes)			
Esox lucius	Northern pike	3	0.5
Cyprinidae (minnows and carps)	Unidentified	3	0.5
Cyprinus carpio	Carp	76	11.9
Notropis spilopterus	Spotfin shiner	284	44.6
N. stramineus	Sand shiner	14	2.2
N. whipplei	Steelcolor shiner	1	0.2
Phenacobius mirabilis	Suckermouth minnow	1	0.2
Pimephales notatus	Bluntnose minnow	5	0.8
P. promelas	Fathead minnow	1	0.2
P. vigilax	Bullhead minnow	11	1.7
Catostomidae (suckers)			
Carpiodes carpio	River carpsucker	145	22.8
C. cyprinus	Quillback	12	1.9
C. velifer	Highfin carpsucker	9	1.4
Hypentelium nigricans	Northern hogsucker	1	0.2
Ictiobus cyprinellus	Bigmouth buffalo	11	1.7
Moxostoma macrolepidotum	Shorthead redhorse	8	1.3
Ictaluridae (freshwater catfishes)			
Ictalurus punctatus	Channel catfish	22	3.5
Noturus flavus	Stonecat	1	0.2
Polydictis olivaris	Flathead catfish	1	0.2
Centrarchidae (sunfishes)			
Lepomis cyanellus	Green sunfish	1	0.2
L. humilis	Orangespotted sunfish	5	0.8
L. macrochirus	Bluegill	2	0.3
Micropterus dolomieui	Smallmouth bass	5	0.8
M. salmoides	Largemouth bass	2	0.3
Pomoxis annularis	White crappie	5	0.8
P. nigromaculatus	Black crappie	7	1.1
Total		637	

(a) Scientific and common names follow Bailey (1970).

TABLE 5-2 SPECIES COMPOSITION, NUMBERS AND PERCENT ABUNDANCE OF FISHES COLLECTED BY ELECTROFISHING AT UPSTREAM AND DOWNSTREAM LOCATIONS NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST, AND NOVEMBER 1981

Species	Above DAEC		Below DAEC		Total	Percent
	Number	Percent	Number	Percent	Number	Abundance
Gizzard shad	1	1.0	0	0.0	1	0.3
Northern pike	3	2.9	0	0.0	3	1.0
Carp	21	20.0	52	27.7	73	24.9
Spotfin shiner	6	5.7	2	1.1	8	2.7
Bluntnose minnow	0	0.0	2	1.1	2	0.7
River carpsucker	45	42.9	91	48.4	136	46.4
Quillback	1	1.0	9	4.8	10	3.4
Highfin carpsucker	1	1.0	8	4.3	9	3.1
Bigmouth buffalo	10	9.5	1	0.5	11	3.8
Shorthead redhorse	1	1.0	7	3.7	8	2.7
Channel catfish	1	1.0	7	3.7	8	2.7
Flathead catfish	0	0.0	1	0.5	1	0.3
Green sunfish	0	0.0	1	0.5	1	0.3
Orangespotted sunfish	3	2.9	2	1.1	5	1.7
Bluegill	2	1.9	0	0.0	2	0.7
Smallmouth bass	0	0.0	5	2.7	5	1.7
Largemouth bass	2	1.9	0	0.0	2	0.7
White crappie	3	2.9	0	0.0	3	1.0
Black crappie	5	4.8	0	0.0	5	1.7
Number of Individuals	105		188		293	
Number of Species	15		13		19	
Percent of Total Catch	35.8		64.2			

collected by electroshocking in 1980 compared to 293 in the present study. Furthermore, carp and river carpsucker accounted for 71.7% of the 1980 catch compared to 71.3% in 1981 as noted previously. On an annual basis, slightly greater numbers of fish were collected below DAEC (188 individuals) than above DAEC (105 individuals). A similar pattern was also noted in 1980 (Hamilton 1981) when 270 fish were collected below DAEC compared to 90 above DAEC.

The number of fish collected by electrofishing increased through the year at both locations (Table 5-3). A total of only 32 fish were collected by electrofishing in June compared to 160 in November. Seasonal collections consistently yielded greater numbers of fish downstream of DAEC than upstream (Table 5-3). Carp and river carpsucker were the most abundant fish collected during each sampling. Sport fish constituted only a small fraction of the fish collected by electrofishing.

5.4.3 Seining

A total of 330 fish representing 14 species were collected by seining during 1981. Cyprinids predominated the catch, representing 10 of the 14 taxa and over 94% of the individuals collected. Spotfin shiners, alone, constituted nearly 84% of the catch (Table 5-4). Channel catfish and white crappie were the only sport fish collected and both occurred in only small numbers.

On an annual basis, numbers of fish collected were slightly larger upstream of DAEC than downstream. Species composition, however, was quite comparable between the two locations. No consistent differences in abundance or composition were observed between the upstream and downstream locations through the year.

The seine catch of 1981 was much smaller than was reported in 1980 when 1,141 individuals were collected (Hamilton 1981). Differences in the number of individuals collected during the two years was likely related to differences in water level between the two field years. The largest number of fish seined in 1980 occurred in May with markedly smaller numbers collected in summer and fall. In contrast, during the present study, only small numbers of fish were collected in May and August and large numbers were encountered in November (Table 5-5).

5.4.4 Hoop Netting

Hoop netting yielded only five species of fish totaling 14 individuals during the 1981 study (Table 5-6). The number of fish collected was insufficient to allow determination of any upstream-downstream differences in fish populations. Similarly sparse numbers of fish were collected in 1979 and 1980 (Jovanovic 1980; Hamilton 1981).

5.4.5 Age Analysis

Scales and spines from 25 fish representing 7 species of sportfish were analyzed for age determination (Table 5-7). Inasmuch as the sample size for each species was quite small, detailed analysis of age and growth was not possible. However, several general observations based upon

TABLE 5-3 NUMBER AND PERCENT ABUNDANCE OF FISHES COLLECTED PER 20 MINUTES OF ELECTROFISHING AT EACH SAMPLING LOCATION NEAR THE DUANE ARNOLD ENERGY CENTER, JUNE, AUGUST, AND NOVEMBER 1981

	2 June				19 August				17 November			
	Above DAEC		Below DAEC		Above DAEC		Below DAEC		Above DAEC		Below DAEC	
Species	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Gizzard shad	0	0.0	0	0.0	1	2.6	0	0.0	0	0.0	0	0.0
Northern pike	0	0.0	0	0.0	1	2.6	0	0.0	2	3.5	0	0.0
Carp	3	33.3	1	4.3	4	10.3	17	27.4	14	24.6	34	33.0
Spotfin shiner	0	0.0	2	8.7	6	15.4	0	0.0	0	0.0	0	0.0
Bluntnose minnow	0	0.0	2	8.7	0	0.0	0	0.0	0	0.0	0	0.0
River carpsucker	6	66.7	13	56.5	18	46.2	33	53.2	21	36.8	45	43.7
Quillback	0	0.0	0	0.0	1	2.6	0	0.0	0	0.0	9	8.7
Highfin carpsucker	0	0.0	0	0.0	0	0.0	0	0.0	1	1.8	8	7.8
Bigmouth buffalo	0	0.0	0	0.0	1	2.6	0	0.0	9	15.8	1	1.0
Shorthead redhorse	0	0.0	0	0.0	1	2.6	7	11.3	0	0.0	0	0.0
Channel catfish	0	0.0	2	8.7	1	2.6	3	4.8	0	0.0	2	1.9
Flathead catfish	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	1.0
Green sunfish	0	0.0	1	4.3	0	0.0	0	0.0	0	0.0	0	0.0
Orangespotted sunfish	0	0.0	2	8.7	3	7.7	0	0.0	0	0.0	0	0.0
Bluegill	0	0.0	0	0.0	0	0.0	0	0.0	2	3.5	0	0.0
Smallmouth bass	0	0.0	0	0.0	0	0.0	2	3.2	0	0.0	3	2.9
Largemouth bass	0	0.0	0	0.0	1	2.6	0	0.0	1	1.8	0	0.0
White crappie	0	0.0	0	0.0	0	0.0	0	0.0	3	5.3	0	0.0
Black crappie	0	0.0	0	0.0	1	2.6	0	0.0	4	7.0	0	0.0
Number of Individuals	9		23		39		62		57		103	
Number of Species	2		7		12		5		9		8	

TABLE 5-4 SPECIES COMPOSITION, NUMBERS AND PERCENT ABUNDANCE OF FISHES COLLECTED BY SEINING AT UPSTREAM AND DOWNSTREAM LOCATIONS NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST, AND NOVEMBER 1981

Species	Above DAEC		Below DAEC		Total	Percent
	Number	Percent	Number	Percent	Number	Abundance
Cyprinidae	3	1.3	0	0.0	3	0.9
Carp	0	0.0	3	2.8	3	0.9
Spotfin shiner	189	84.8	87	81.3	276	83.6
Sand shiner	8	3.6	6	5.6	14	4.2
Steelcolor shiner	1	0.4	0	0.0	1	0.3
Suckermouth minnow	1	0.4	0	0.0	1	0.3
Bluntnose minnow	3	1.3	0	0.0	3	0.9
Fathead minnow	1	0.4	0	0.0	1	0.3
Bullhead minnow	4	1.8	7	6.5	11	3.3
River carpsucker	1	0.4	1	0.9	2	0.6
Northern hogsucker	1	0.4	0	0.0	1	0.3
Channel catfish	11	4.9	1	0.9	12	3.6
Stonecat	0	0.0	1	0.9	1	0.3
White crappie	0	0.0	1	0.9	1	0.3
Number of Individuals	223		107		330	
Number of Species	11		8		14	
Percent of Total Catch	67.6		32.4			

TABLE 5-5 NUMBER AND PERCENT ABUNDANCE OF FISHES COLLECTED BY SEINING AT EACH SAMPLING LOCATION NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST, AND NOVEMBER 1981

Species	20 May				18 August				16 November			
	Above DAEC		Below DAEC		Above DAEC		Below DAEC		Above DAEC		Below DAEC	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Cyprinidae	0	0.0	0	0.0	3	27.3	0	0.0	0	0.0	0	0.0
Carp	0	0.0	1	7.1	0	0.0	2	5.9	0	0.0	0	0.0
Spotfin shiner	33	86.8	8	57.1	6	54.5	20	58.8	150	86.2	59	100.0
Sand shiner	0	0.0	3	21.4	0	0.0	3	8.8	8	4.6	0	0.0
Steelcolor shiner	0	0.0	0	0.0	1	9.1	0	0.0	0	0.0	0	0.0
Suckermouth minnow	0	0.0	0	0.0	1	9.1	0	0.0	0	0.0	0	0.0
Bluntnose minnow	3	7.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Fathead minnow	0	0.0	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0
Bullhead minnow	0	0.0	0	0.0	0	0.0	7	20.6	4	2.3	0	0.0
River carpsucker	0	0.0	1	7.1	0	0.0	0	0.0	1	0.6	0	0.0
Northern hogsucker	0	0.0	0	0.0	0	0.0	0	0.0	1	0.6	0	0.0
Channel catfish	2	5.3	1	7.1	0	0.0	0	0.0	9	5.2	0	0.0
Stonecat	0	0.0	0	0.0	0	0.0	1	2.9	0	0.0	0	0.0
White crappie	0	0.0	0	0.0	0	0.0	1	2.9	0	0.0	0	0.0
Number of Individuals	38		14		11		34		174		59	
Number of Species	3		5		4		6		7		1	

TABLE 5-6 FISH SPECIES COLLECTED WITH BAITED HOOP NETS[a] AT EACH SAMPLING LOCATION NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST, AND NOVEMBER 1981

Species	21 May[b]		19 August		17 November	
	Above DAEC	Below DAEC	Above DAEC	Below DAEC	Above DAEC	Below DAEC
River carpsucker	2	1	4			
Quillback				1		1
Channel catfish	2					
White crappie				1		
Black crappie		1		1		
Number of Individuals	4	2	4	3	0	1
Number of Species	2	2	1	3	0	1

(a) Sample of approximately 24 hr duration.
(b) Indicates the date that the hoop net was lifted.

TABLE 5-7 AGE OF SELECTED FISH SPECIES COLLECTED NEAR THE DUANE ARNOLD ENERGY CENTER, MAY, AUGUST AND NOVEMBER 1981

Date Collected	Location	Species	Length (mm)	Weight (g)	Age Class
21 May	Downstream	Black crappie	200	105	III
19 August	Upstream	Northern pike	590	1000	III
		Channel catfish	205	65	III
		Largemouth bass	210	135	III
		Black crappie	134	31	II
	Downstream	Channel catfish	298	215	IV
		Channel catfish	366	385	V
		Smallmouth bass	402	950	IV
		Smallmouth bass	465	1250	V
		White crappie	173	60	II
		Black crappie	194	110	III
17 November	Upstream	Northern pike	726	2700	III
		Bluegill	100	20	II
		Bluegill	185	137	III
		Largemouth bass	387	920	III
		White crappie	141	28	II
		White crappie	158	40	II
		Black crappie	160	50	II
		Black crappie	157	37	II
		Black crappie	265	297	III
		Black crappie	250	190	III
	Downstream	Channel catfish	220	73	IV
		Smallmouth bass	180	76	II
		Smallmouth bass	303	345	III
		Smallmouth bass	398	850	IV

comparisons with published information on growth from other areas yielded some interesting observations. Growth of the top carnivore sport fish, northern pike, largemouth bass and smallmouth bass appeared to be quite good in comparison to published information from several areas in the Midwest (Carlander 1969, 1977). Growth was particularly good among the older year classes in each of these species. Growth of remaining sport species sampled, black crappie, white crappie, bluegill and channel catfish appeared to be in the average to below average range for the region. These general observations on growth are no reflection of DAEC operation; moreover, they reflect the characteristics of the Cedar River food chain. Apparent differences in the growth achieved by the various species likely reflects the availability of abundant forage for top consumers and competition for limited forage among the bluegill, crappies and channel catfish. The size distribution of all fish collected near DAEC in 1981 is summarized in Table 5-8.

5.4.6 Food Habit Studies

Stomach contents were examined from seven species of sport fish collected during 1981 (Tables 5-9 through 5-11). The northern pike, smallmouth bass and largemouth bass examined were frequently empty, but based upon individuals with food remains, appeared to be feeding primarily on forage fish, crayfish and occasionally frogs. Black crappie, white crappie, bluegill and channel catfish appeared to rely heavily upon macroinvertebrate forage, particularly aquatic insects. Results of these 1981 analyses were consistent with the known diet preferences for these species at the size ranges examined.

5.4.7 Fish Survival Studies

Effects of the discharge upon fish in the Cedar River was examined by holding fish in the discharge (Location 5) and at two locations in the river (Locations 2 and 3). Mortalities were minimal at all three locations with survival rates ranging from 80 to 90% among the three sets of test fish (Table 5-12). High survival rates (90%) at Location 5 suggested that a short-term (48 hr) exposure to the discharge would be of little threat to many fish species indigenous to the Cedar River.

5.4.8 Pesticide Analyses

Levels of chlorinated insecticides and PCB's were low in all samples (Table 5-13). Concentrations of PCB's were well below the tolerance level (2.0 ppm) specified by the Food and Drug Administration (FDA 1979) for edible fish.

5.5 SUMMARY AND CONCLUSIONS

1. Endangered or threatened fish species of Iowa were not collected during the present study.

2. Predominant species collected by electrofishing were the river carpsucker and carp, while the spotfin shiner composed the majority of the fish collected by seining. Game species were collected in low numbers with all sampling methods.

3. Slightly greater numbers of species and individuals were collected downstream of DAEC than upstream of the station.

TABLE 5-8 SPECIES COMPOSITION AND SIZE DISTRIBUTION OF FISHES COLLECTED BY ALL SAMPLING METHODS NEAR THE DUANE ARNOLD ENERGY CENTER, MAY - NOVEMBER 1981

Species	Number[(a)]	Length (mm) Mean	Length (mm) Range	Weight (g) Mean	Weight (g) Range
Gizzard shad	1	102	-	10.0	-
Northern pike	3	599	482-726	1440.0	620-2700
Cyprinidae	3	31	27-34	(b)	
Carp	76	383	52-535	809.0	2-1700
Spotfin shiner	117	65	30-78	1.7	0.5-4.5
Sand shiner	14	53	41-67	1.4	0.5-3.5
Steelcolor shiner	1	74	-	4.0	-
Suckermouth minnow	1	86	-	7.0	-
Bluntnose minnow	5	60	35-80	3.0	0.5-6.5
Fathead minnow	1	57	-	2.0	-
Bullhead minnow	11	51	41-68	1.5	1.0-3.5
River carpsucker	145	284	41-483	292.1	0.5-1010
Quillback	12	301	200-382	306.9	105-620
Highfin carpsucker	9	290	238-360	290.6	150-580
Northern hogsucker	1	256	-	165.0	-
Bigmouth buffalo	11	344	312-388	601.4	455-800
Shorthead redhorse	8	327	280-375	338.1	205-505
Stonecat	1	86	-	8.0	-
Channel catfish	22	137	35-445	81.5	0.5-745
Flathead catfish	1	72	-	3.0	-
Green sunfish	1	60	-	3.5	-
Orangespotted sunfish	5	50	40-65	1.6	0.5-4.0
Bluegill	2	143	100-185	78.5	28-137
Smallmouth bass	5	350	180-465	694.2	76-1250
Largemouth bass	2	299	210-387	527.5	135-920
White crappie	5	143	59-186	44.8	1-95
Black crappie	7	222	134-265	117.1	31-297

(a) Represents number of fish measured.
(b) Weights not taken.

TABLE 5-9 RELATIVE ABUNDANCE OF FOOD ITEMS FOUND IN THE STOMACHS OF SELECTED SPORT FISH NEAR THE DUANE ARNOLD ENERGY CENTER, 21 MAY 1981

Sampling Location and Species (length)	Food Item	Number	Volume (ml)	Percent Total Volume
Below DAEC				
Black crappie (200 mm)	Unid. minnow	1	0.9	69.2
	Heptageniidae	1	<0.1	
	Baetidae	1	<0.1	
	Hydropsychidae	1	<0.1	
	Hydropsyche orris	2	<0.1	
	Nematoda	1	<0.1	
	Chironomidae (adult)	1	<0.1	
	Plant seeds	5	<0.1	
	Unrecognizable	-[a]	0.4	30.8

(a) Uncountable items.

TABLE 5-10 RELATIVE ABUNDANCE OF FOOD ITEMS FOUND IN THE STOMACHS OF SELECTED SPORT FISH NEAR THE DUANE ARNOLD ENERGY CENTER, 19 AUGUST 1981

Sampling Location and Species (length)	Food Item	Number	Volume (ml)	Percent Total Volume
Above DAEC				
Northern pike (590 mm)	None[a]			
Channel catfish (205 mm)	Hydropsychidae	3	<0.1	
	Hydropsyche orris	1	<0.1	
	Potamyia flava	3	<0.1	
	Plant seeds	2	0.1	100.0
Largemouth bass (210 mm)	None			
Black crappie (134 mm)	Gerridae	10	0.1	50.0
	Corixidae	1	<0.1	
	Dicrotendipes sp. pupae	1	<0.1	
	Chironomidae pupae	1	<0.1	
	Gastropoda	1	<0.1	
	Fish remains	-[b]	0.1	50.0
Below DAEC				
Channel catfish (366 mm)	Baetidae	1	<0.1	
	Chironomidae (adult)	3	0.1	33.3
	Sphaerium sp.	1	0.1	33.3
	Pisidium sp.	1	<0.1	
	Plant fragments	-	0.1	33.3
Channel catfish (298 mm)	Plant fragments	-	3.8	100.0
Smallmouth bass (465 mm)	None			
Smallmouth bass (402 mm)	*Orconectes virilis*	1	14.5	74.4
	Cyprinus carpio	1	5.0	25.6
White crappie (173 mm)	Gastropoda	1	0.1	100.0

TABLE 5-10(CONT.)

Sampling Location and Species (length)	Food Item	Number	Volume (ml)	Percent Total Volume
Black crappie (194 mm)	Baetidae	1	<0.1	
	Unid. minnow	1	1.1	100.0

(a) Stomach was empty.
(b) Uncountable items.

TABLE 5-11 RELATIVE ABUNDANCE OF FOOD ITEMS FOUND IN THE STOMACHS OF SELECTED SPORT FISH NEAR THE DUANE ARNOLD ENERGY CENTER, 17 NOVEMBER 1981

Sampling Location and Species (length)	Food Item	Number	Volume (ml)	Percent Total Volume
Above DAEC				
Northern pike (726 mm)	*Carpiodes* sp.	1	200.0	100.0
Bluegill (100 mm)	Chironomidae	2	<0.1	100.0
Bluegill (185 mm)	Chironomidae	67	0.3	60.0
	Unrecognizable	-[a]	0.2	40.0
Largemouth bass (387 mm)	Frog	1	18.0	100.0
White crappie (141 mm)	*Chaoborus* sp.	1	<0.1	100.0
White crappie (158 mm)	None[b]			
Black crappie (160 mm)	None			
Black crappie (157 mm)	*Chaoborus* sp.	8	0.1	100.0
Black crappie (265 mm)	None			
Black crappie (250 mm)	*Chaoborus* sp.	3	<0.1	100.0
Below DAEC				
Channel catfish (200 mm)	Heptageniidae	1	<0.1	50.0
	Unrecognizable	-	<0.1	50.0
Channel catfish (220 mm)	None			
Smallmouth bass (180 mm)	Heptageniidae	18	0.5	100.0

TABLE 5-11 (CONT.)

Sampling Location and Species (length)	Food Item	Number	Volume (ml)	Percent Total Volume
Smallmouth bass (303 mm)	Heptageniidae	6	0.6	54.5
	Corixidae	1	<0.1	
	Unid. minnow	1	0.5	45.5
Smallmouth bass (398 mm)	Astacidae	1	2.5	32.1
	Green sunfish	1	1.0	12.8
	Fish remains	-	4.3	55.1

(a) Uncountable items.
(b) Stomach was empty.

TABLE 5-12 RESULTS OF 48-HR LIVE BASKET EXPERIMENTS ON CHANNEL CATFISH IN THE CEDAR RIVER AND DISCHARGE CANAL OF THE DUANE ARNOLD ENERGY CENTER, 18-20 AUGUST 1981

	Number of Live Organisms									Temperature °C								
	Time (hr)									Time (hr)								
Station	0	6	12	18	24	30	36	42	48	0	6	12	18	24	30	36	42	48
2[a]	10	10	10	10	10	9	8	8	8	21.8	23.5	22.2	21.1	22.0	23.4	22.6	21.6	22.8
3[b]	10	10	10	10	10	10	9	9	9	21.8	23.7	22.6	21.1	22.1	23.5	22.6	21.6	23.6
5[c]	10	10	10	10	10	9	9	9	9	22.1	24.3	23.9	20.6	24.3	23.4	22.4	21.6	26.4

(a) Immediately above the Duane Arnold Energy Center.
(b) Immediately below the Center's discharge.
(c) In the discharge canal.

TABLE 5-13 CONCENTRATIONS OF CHLORINATED PESTICIDES AND PCB's IN FISH COLLECTED FROM THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, 1981

Sampling Date and Location	Species (length)	Concentration (μg/kg)							
		Aldrin	Heptachlor	Lindane	Dieldrin	Endrin	Methoxychlor	Total DDTs	Total PCBs
2 June									
Upstream	River carpsucker (375 mm)	<0.07	0.19	0.31	6.0	<0.1	<0.7	15.8	46
	Carp (467 mm)	<0.07	0.21	0.20	2.2	<0.1	<0.7	37.7	56
Downstream	River carpsucker (335 mm)	<0.07	0.33	0.36	11.4	<0.1	<0.7	26.1	85
	River carpsucker (305 mm)	<0.07	0.55	0.60	17.4	<0.1	<0.7	32.8	78
19 August									
Upstream	Carp (390 mm)	<0.2	<0.2	<0.1	6.6	<0.5	<0.2	7	3
	River carpsucker (335 mm)	<0.2	<0.2	<0.1	13.1	<0.5	<0.2	13	11
	Northern pike (590 mm)	<0.2	<0.2	<0.1	2.7	<0.5	<0.2	15	13
Downstream	Carp (467 mm)	<0.2	<0.2	<0.1	13.3	<0.5	<0.2	9	9
	River carpsucker (330 mm)	<0.2	<0.2	<0.1	<0.3	<0.5	<0.2	5	51
	Smallmouth bass (402 mm)	<0.2	<0.2	<0.1	2.7	<0.5	<0.2	7	8
17 November									
Upstream	Carp (535 mm)	0.2	0.2	0.1	12.3	0.5	0.2	78	104
	Northern pike (726 mm)	0.2	0.2	0.1	3.6	0.5	0.2	13	25
	Largemouth bass (387 mm)	0.2	0.2	0.1	3.9	0.5	0.2	14	25
Downstream	Carp (472 mm)	0.2	0.2	0.1	25.9	0.5	0.2	49	119
	Channel catfish (220 mm)	0.2	0.2	0.1	36.5	0.5	0.2	21	54
	Smallmouth bass (398 mm)	0.2	0.2	0.1	14.9	0.5	0.2	17	29

4. Seasonally, the total catch of fish was highest in November and lowest in June.

5. Growth of top consumer sport fish appeared to be much better in the Cedar River near DAEC than in many areas in the Midwest.

6. Survival studies indicated that 48 hr exposure to discharge waters represents little threat to most species indigenous to the Cedar River near DAEC.

7. The levels of chlorinated insecticides and PCB's were low in all fish analyzed.

8. There was no evidence that operation of the power station was adversely affecting the fish community of the Cedar River.

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Chapter 6

Impingement/Entrainment

CONTENTS

LIST OF TABLES

6.0 IMPINGEMENT/ENTRAINMENT

6.1 INTRODUCTION

A fish impingement study was conducted at the Duane Arnold Energy Center (DAEC) from January to December 1981, as part of the operational environmental monitoring program that has been conducted continuously since 1974. In addition, phytoplankton, zooplankton and ichthyoplankton were sampled to determine the extent of entrainment of these organisms by the DAEC. The specific objectives of the study were:

1. to identify the occurrence and number of adult and juvenile fish impinged on the station's intake screens;
2. to assess the impingement rates of fish at the Duane Arnold Energy Center:
3. to estimate the phytoplankton, zooplankton, and ichthyoplankton species composition and abundance at the intake location;
4. to estimate the phytoplankton biomass in terms of milligrams of chlorophyll a per cubic meter of water at the intake location; and
5. to relate the above data to the volume of water entering the station.

6.2 HISTORICAL REVIEW

Impingement studies were initiated at DAEC in 1974. Only two trash basket counts were made the first year of sampling (McDonald 1975). From 1975 through 1980, impinged fish were counted daily, and on four dates each year impinged fish were identified and their lengths and weights recorded (McDonald 1976, 1977, 1978, 1979; Jovanovic and Alberico 1980; Dvorak and Hamilton 1981). Impingement during the 1975 through 1980 study period was low, ranging from 104 to 651 fish per year. The majority of fish identified on four sampling dates during each of those six years were young-of-the-year channel catfish.

Entrainment studies have been conducted at DAEC since 1974. Phytoplankton, zooplankton, and ichthyoplankton samples were collected at the intake structure on three dates each in 1974 and 1975, and on four dates each in 1976 through 1980 (McDonald 1975, 1976, 1977, 1978, 1979; Jovanovic and Alberico 1980; Dvorak and Hamilton 1981). Phytoplankton and zooplankton densities were reported in different units from year to year, therefore making comparisons among the years difficult.

Phytoplankton densities were lowest during the February or March sampling of each year, and were usually highest during the August or October sampling. The lowest phytoplankton densities were recorded during February 1979 (275 units/ml), and the highest densities (1,134,000 units/ml) occurred during October 1974. Diatoms were usually more

abundant than any of the other phytoplankton divisions (McDonald 1975, 1976, 1977, 1978, 1979; Jovanovic and Alberico 1980; Dvorak and Hamilton 1981).

There was no consistency among months in the highest and lowest zooplankton densities observed during 1974-1980. Mean yearly zooplankton densities were greatest in 1980 (23,685 organisms/m^3) and lowest in 1978 (318 organisms/m^3). Rotifers were usually more abundant than any other major zooplankton group (McDonald 1975, 1976, 1977, 1978, 1979; Jovanovic and Alberico 1980, Dvorak and Hamilton 1981).

Ichthyoplankton samples were void of organisms in 1974, 1975, 1977 and 1980. Only three fish eggs were collected in 1976 (May 11), and only cyprinid larvae were collected in 1978 (July 31) (McDonald 1975, 1976, 1977, 1978, 1979). A total of 12 fish larvae were collected in 1979; 11 catostomids in May and one carp (Cyprinus carpio) in August (Jovanovic and Alberico 1980).

The volume of water drawn into the station for condenser cooling is 24.5 cfs. This volume represents a variable percentage of the total river flow depending on the river discharge on any particular date. Historically, the percentage of river flow entering the station was highest during the February 1977 sampling date (6.0%). Because the percentage has always been small, phytoplankton, zooplankton, and ichthyoplankton entrainment was never considered to be a significant problem at the DAEC (McDonald 1975, 1976, 1977, 1978, 1979; Jovanovic and Alberico 1980; Dvorak and Hamilton 1981).

6.3 FIELD AND ANALYTICAL PROCEDURES

6.3.1 Impingement

Daily counts of fish collected in the trash baskets at the station's intake were made by station personnel from January through December 1981. Each daily count represented the number of fish impinged over a 24-hour period. On four sampling dates (20 February, 22 May, 18 August, and 18 November) 24-hour trash basket counts were made by EA personnel. The fish collected on those four dates were identified to the lowest possible taxonomic level and their individual lengths (millimeters) and weights (grams) were recorded.

6.3.2 Entrainment

6.3.2.1 Field Procedures

Single samples to determine the species composition and abundance of entrained phytoplankton, and chlorophyll a concentration were collected from the intake location (Figure 1-1, Chapter 1) on 19 February, 20 and 21 May, 19 August, and 17 and 18 November 1981 using a 6-liter Kemmerer water sampler. Samples for phytoplankton species composition and abundance were placed into 0.25 liter polyethylene bottles, preserved at the time of collection with 1.0% Lugol's solution and transported to the

laboratory for analysis. Samples for phytoplankton chlorophyll a analyses were placed into 3.8 liter cubitainers, iced, and transported to the laboratory unpreserved.

Single samples to determine the species composition and abundance of entrained zooplankton were collected from the intake location on 19 February, 21 May, 17 August and 18 November 1981 by placing a 30 cm diameter, No. 25 mesh (64 μm aperture), conical plankton net horizontally in the current of the river for a measured length of time. The river current was also measured in conjunction with the collection of the zooplankton sample. The zooplankton samples were placed in glass jars, and immediately anesthetized with menthol crystals which relax the body structure of the Rotifera thereby facilitating identification. Within a few hours of collection, the samples were preserved with 5% formalin, and transported to the laboratory for analysis.

Ichthyoplankton entrainment sampling was conducted quarterly (19 February, 21 May, 17 August and 18 November). Samples were collected in the river adjacent to the intake bar grill using a 0.5 m diameter conical plankton net with a mesh aperture of 571 μm (No. 0 mesh). The net was held stationary in a horizontal position and allowed to sample for 5-10 minutes.

Two ichthyoplankton samples were obtained for each sampling period; one collected within 1 m of the surface, and the other collected within 1 m of the bottom. A General Oceanics Model 2030 digital flow meter was mounted in the center of the net mouth to determine the volume of water filtered. In addition, a Marsh-McBirney Model 20 electromagnetic current meter was used to measure current velocity at the intake at the time of sampling. Surface water temperatures were recorded prior to sampling using a Whitney Model TC-5A thermistor. Samples were preserved in formalin and transported to the laboratory for analysis.

6.3.2.2 Laboratory Procedures

The samples used to determine entrained phytoplankton species composition and abundance were analyzed with the inverted microscope method as described in Chapter 3.

Three subsamples were withdrawn from each unpreserved phytoplankton sample and analyzed for chlorophyll a content. Each subsample was filtered through Whatman GF/C glass fiber filters on a thin layer of $MgCO_3$, eluted for at least 24 hours with 90% acetone, and subjected to ultrasonic disruption. The subsamples were then centrifuged and their fluorescence determined before and after the addition of 1 N HCl (Lorenzen 1966). The general equation of Strickland and Parsons (1972) was used to calculate the chlorophyll a concentration in milligrams per cubic meter of water (mg/m^3).

The samples for determining species composition and abundance of entrained zooplankton were analyzed using a subsampling and stratified counting technique. The samples were first concentrated or diluted so there was a suitable working density of organisms in a 1 to 5 ml subsample. A minimum of two subsamples, yielding at least 300 organisms,

were analyzed per sample. Subsamples were placed in a Bogorov counting chamber and examined with a Bausch and Lomb stereozoom dissection microscope at 10-70X magnification. Any organisms which were difficult to identify were removed from the counting chamber and mounted on glass slides for further examination using a Leitz SM Lux research microscope.

All Crustacea were identified to species with the exception of immature copepods which were categorized as nauplii, calanoid copepodites or cyclopoid copepodites. Unidentifiable immature forms of daphnids were identified to genus. All Rotifera were identified to genus with the exception of the rotifers of Class Bdelloidea, which when preserved with formalin are usually identifiable only to class. Identifications were made using current appropriate taxonomic keys.

Ichthyoplankton samples were placed in a white enamel pan and examined for fish eggs and larvae under a magnifying lens equipped with a fluorescent light. Specimens were not found in any of the samples; therefore, no other analytical procedures were necessary.

6.4 RESULTS AND DISCUSSION

6.4.1 Impingement

A total of 322 fish were impinged during 1981 at the Duane Arnold Energy Center (Table 6-1). The highest impingement rates occurred in the winter months, particularly February and March, when 71 and 127 fish were impinged, respectively. Few fish were impinged throughout the spring, summer and fall with monthly impingement ranging from zero to 14 fish.

On four scheduled dates, EA personnel performed the impingement sampling and analyzed the impinged fish. The fish collected on each date represented those impinged over a 24-hour period. Of the 29 impinged fish observed by EA personnel during this study, 27 were collected on 20 February. Of the fish collected on 20 February, there were eleven each of spotfin shiner and sand shiner, two each of river carpsucker and channel catfish, and one green sunfish (Table 6-2). One stonecat and one channel catfish were collected on May and November sampling dates, respectively. No fish were present in the August impingement sampling.

6.4.2 Entrainment

Densities of total phytoplankton increased from the seasonal minimum in February of 13,500 units/ml to the maximum in August (97,000 units/ml) (Table 6-3). The peak abundance reported in 1980 was 127,000 units/ml (Dvorak and Hamilton 1981). Diatoms dominated the community in all sampling months. The centric diatom, _Stephanodiscus invisitatus_, was abundant throughout most of the study period, and composed over 62% of the total phytoplankton in November. The dominant taxa from the August sampling was the diatom _Skeletonema potamos_, which constituted over 80% of the algal assemblage.

Phytoplankton chlorophyll _a_ concentrations ranged from 11.973 mg/m^3 in February to 140.428 mg/m^3 in May (Table 6-4). Maximum values in May could be attributable to an increase in algal abundance. Densities of

TABLE 6-1 DAILY NUMBERS OF FISH IMPINGED AT THE DUANE ARNOLD ENERGY CENTER, JANUARY - DECEMBER 1981

Day of the Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	2	1	5	0	0	0	0	0	0	0	0
2	0	3	0	1	0	0	0	0	0	1	0	0
3	0	1	0	2	0	0	0	0	0	0	0	0
4	3	0	0	3	0	0	0	0	0	0	0	0
5	1	2	10	1	0	0	0	0	0	0	0	0
6	0	5	2	2	0	0	0	0	0	0	0	0
7	0	2	4	0	0	0	0	0	0	0	0	0
8	0	2	2	0	0	0	0	0	1	0	0	0
9	0	0	3	2	0	1	0	0	0	0	1	1
10	0	0	4	2	0	0	0	0	0	0	0	0
11	0	0	5	0	0	0	0	0	0	0	0	0
12	0	0	2	0	0	0	0	0	0	0	2	0
13	0	2	4	0	0	0	0	0	0	0	0	0
14	0	0	5	3	0	0	0	0	0	0	0	0
15	2	1	9	0	0	0	0	0	0	0	4	0
16	0	0	3	0	0	0	0	0	0	0	1	1
17	1	1	12	0	0	0	0	0	0	0	0	0
18	0	1	4	0	0	0	0	0[a]	0	0	1[a]	0
19	0	6	6	0	0	0	0	0	0	0	0	0
20	3	27[a]	12	0	0	1	0	0	0	0	0	0
21	2	0	16	0	0	0	0	0	0	0	0	0
22	0	0	3	1	1[a]	0	0	0	0	2	0	0
23	18	0	2	0	0	0	0	0	0	0	0	3
24	0	1	7	1	0	0	0	0	0	0	3	0
25	0	3	2	2	0	0	0	0	0	0	0	0
26	0	8	4	0	0	0	0	0	0	0	0	0
27	1	2	0	0	0	0	0	0	0	0	1	0
28	3	2	0	1	0	0	0	0	0	1	0	0
29	3		0	1	0	0	0	0	0	10	4	3
30	2		5	1	0	0	0	0	0	0	2	0
31	9		0		0		0	0		0		2
Total	49	71	127	28	1	2	0	0	1	14	19	10

Annual Total 322

(a) Dates that impingement collections were made by EA personnel.

TABLE 6-2 SPECIES COMPOSITION AND SIZE DISTRIBUTION OF QUARTERLY FISH IMPINGEMENT COLLECTIONS AT DUANE ARNOLD ENERGY CENTER, 1981

Collection Date and Species	Number	Total Length (mm) Mean	Total Length (mm) Range	Weight (g) Mean	Weight (g) Range
20 February					
Spotfin shiner	11	59	47-74	2.0	1.0-4.0
Sand shiner	11	39	32-46	0.6	0.5-1.0
River carpsucker	2	42	40-43	1.0	-
Channel catfish	2	95	80-110	7.3	4.5-10.0
Green sunfish	1	70	-	3.0	-
22 May					
Stonecat	1	92	-	10.0	-
18 August					
No fish impinged					
18 November					
Channel catfish	1	122	-	14.5	-

TABLE 6-3 DENSITY AND PERCENT OCCURRENCE OF DOMINANT TAXA, MAJOR DIVISIONS AND TOTAL PHYTOPLANKTON COLLECTED QUARTERLY FROM THE CEDAR RIVER AT THE INTAKE LOCATION OF THE DUANE ARNOLD ENERGY CENTER, 1981

Taxa	19 February		21 May		19 August		17 November	
	Units/ml	%	Units/ml	%	Units/ml	%	Units/ml	%
Gomphonema parvulum	1673	12.35	0	0.00	193	0.20	0	0.00
Nitzschia acicularis	57	0.42	3833	6.72	774	0.80	1060	3.02
Nitzschia linearis	3430	25.33	0	0.00	193	0.20	499	1.42
Skeletonema potamos	0	0.00	0	0.00	78539	80.92	187	0.53
Stephanodiscus invisitatus	6096	45.01	26367	46.21	1838	1.89	21941	62.56
Stephanodiscus tenuis	0	0.00	6638	11.63	0	0.00	6109	17.42
Total Bacillariophyta	12759	94.21	41233	72.27	86954	89.59	32351	92.23
Micractinium pusillum	0	0.00	4441	7.78	0	0.00	0	0.00
Scenedesmus acuminatus	106	0.79	3717	6.51	242	0.25	592	1.69
Total Chlorophyta	712	5.26	14142	24.78	4885	5.03	2026	5.78
Total Cyanophyta	0	0.00	1403	2.46	4643	4.78	636	1.81
Total Euglenophyta	0	0.00	187	0.33	387	0.40	0	0.00
Total Pyrrhophyta	71	0.52	0	0.00	0	0.00	0	0.00
Total Cryptophyta	0	0.00	94	0.16	193	0.20	62	0.18
Total Phytoplankton	13542		57058		97062		35075	

TABLE 6-4 QUARTERLY CHLOROPHYLL a CONCENTRATIONS (mg/m^3) FROM SAMPLES COLLECTED IN THE CEDAR RIVER AT THE INTAKE OF THE DUANE ARNOLD ENERGY CENTER, 1981

Location	Rep	19 February	20 May	19 August	18 November
Intake	A	13.262	133.371	78.329	105.020
	B	13.127	141.840	99.499	102.327
	C	9.530	146.074	86.797	94.249
	Mean	11.973	140.428	88.208	100.532

phytoplankton at Location 2, immediately upstream from the intake, increased significantly from early to late May. Mean concentrations of chlorophyll *a* in 1980 varied from 7.367 mg/m^3 to 62.700 mg/m^3.

The highest observed zooplankton densities at the intake location occurred in February (52,000 organisms/m^3) when populations would normally be low in response to reduced water temperatures and other abiotic factors (Table 6-5). In August, when densities are typically high due to increased production, minimum values were observed. As in the previous year's study (Dvorak and Hamilton 1981) rotifers dominated the community in all months, composing from 77% to 98% of the total zooplankton. The densities in 1981 were lower than those reported in 1980. The most abundant rotifer taxa in 1981 were *Brachionus*, *Keratella*, *Polyarthra*, and *Synchaeta*. The only copepods encountered were immature forms. Cladocerans were absent to rare in samples collected.

No ichthyoplankton (fish eggs and larvae) were collected during the quarterly sampling program. The seasonal occurrence of ichthyoplankton in the drift, reported by Latvaitis (1976) for the Mississippi River and Bliss (1977) for the Missouri River, was from April through August with a peak density in June and July. Therefore, it is probably that only one or two sampling periods coincided with the reproduction and early life history periods of fish species inhabiting the Cedar River. Consequently, the data provided little insight into the seasonal occurrence and abundance of ichthyoplankton or possible entrainment effects on the fish community.

The percentage of the total river flow entering the station on each of the entrainment sampling dates of 1981 is presented in Table 6-6. The highest percentage recorded during 1981 was 1.26 in February. The relatively small portion of the river entering the station indicated there was little likelihood that entrainment at the Duane Arnold Energy Center affected the phytoplankton, zooplankton or ichthyoplankton populations of the river on the scheduled sampling dates.

6.5 SUMMARY AND CONCLUSIONS

1. Fish impingement rates at the Duane Arnold Energy Center were low throughout 1981. Only 322 fish were impinged during the year with most of the impingement occurring during the winter. Based on these low numbers, impingement by the station had no appreciable impact on fish populations in the river during 1981.

2. Phytoplankton densities at the intake location reached a maximum of 97,000 units/ml in August. Diatoms dominated the community in all sampling months.

3. Phytoplankton biomass in terms of chlorophyll *a* content ranged from 11.973 to 140.428 mg/m^3, and was particularly high on the May sampling date.

4. Zooplankton densities ranged from 301 to 52,000 organisms/m^3. These densities were lower than those reported in the 1980 study period. The zooplankton community was dominated by rotifers on every sampling date.

TABLE 6-5 MEAN ABUNDANCE AND PERCENT OCCURRENCE OF ZOOPLANKTON IDENTIFIED FROM ENTRAINMENT SAMPLES COLLECTED QUARTERLY IN THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER, 1981

Taxa	19 February		21 May		17 August		18 November	
	No./m^3	%	No./m^3	%	No./m^3	%	No./m^3	%
nauplii	871	1.65	375	3.64	48	15.95	161	10.28
calanoid copepodites	13	0.03	0	0	0	0	0	0
cyclopoid copepodites	54	0.10	33	0.32	13	4.32	4	0.25
TOTAL COPEPODA	938	1.78	408	3.96	61	20.27	166	10.52
Alona circumfimbriata	0	0	0	0	0	0	4	0.25
Bosmina longirostris	0	0	0	0	5	1.66	4	0.25
Chydorus sphaericus	0	0	0	0	0	0	0	0
Moina micrura	0	0	0	0	3	1.00	8	0.50
TOTAL CLADOCERA	0	0	0	0	8	2.66	16	1.00
Asplanchna spp.	502	0.95	0	0	0	0	0	0
Bdelloid Rotifera	167	0.32	103	1.00	17	5.65	55	3.51
Brachionus spp.	39,176	74.38	2,166	21.01	182	60.47	592	37.60
Cephalodella spp.	0	0	206	2.00	0	0	55	3.51
Colurella spp.	0	0	0	0	0	0	4	0.25
Conochilus spp.	1,674	3.18	0	0	0	0	0	0
Euchlanis spp.	1,339	2.54	0	0	0	0	24	1.51
Filinia spp.	167	0.32	0	0	0	0	4	0.25
Keratella spp.	502	0.95	6,292	61.03	21	6.98	79	5.01
Notholca spp.	3,851	7.31	0	0	4	1.33	63	4.01
Polyarthra spp.	3,348	6.36	103	1.00	0	0	268	17.04
Synchaeta spp.	335	0.64	1,031	10.00	0	0	197	12.53
Testudinella spp.	0	0	0	0	0	0	4	0.25
Unidentified Rotifera	670	1.27	0	0	8	2.66	47	3.01
TOTAL ROTIFERA	51,733	98.22	9,901	96.04	232	77.08	1,392	88.48
TOTAL ZOOPLANKTON	52,670		10,309		301		1,574	

TABLE 6-6 PERCENTAGE OF TOTAL CEDAR RIVER FLOW ENTERING THE DUANE ARNOLD ENERGY CENTER ON THE ENTRAINMENT SAMPLING DATES, 1981

Date	River Flow at Cedar Rapids (cfs) [a]	Percent Entering Plant
February 19	1940	1.26
May 20	2730	0.90
May 21	2490	0.98
August 17	4000	0.61
August 19	4780	0.51
November 17	2400	1.02
November 18	2380	1.03

(a) Data for the Cedar River at Cedar Rapids, Iowa obtained from U.S. Geological Survey, Iowa City, Iowa.

5. No fish eggs or larvae were collected during the 1981 entrainment sampling.

6. Phytoplankton and zooplankton populations in the Cedar River were probably not affected by entrainment at the Duane Arnold Energy Center.

7. The ichthyoplankton data obtained during the present study were insufficient to assess entrainment impact, however, based on the low percentage of river water utilized by the station for cooling purposes, the level of impact was probably minimal.

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Chapter 7

Corbicula Survey

CONTENTS

7. CORBICULA SURVEY

7.1 INTRODUCTION

The United States Nuclear Regulatory Commission (NRC) issued a bulletin (IE Bulletin 81-03) on 10 April 1981 describing blockage of service water flows through the containment cooling units (CCUs) of a nuclear facility (Arkansas Nuclear One, Unit 2) owned by Arkansas Power and Light Company. Inspection of the cooling system revealed extensive plugging of the CCUs by the Asiatic clam (*Corbicula* sp.). This discovery and the resultant inability of the safety systems to perform their intended safety functions, prompted the NRC to issue a directive to all licensees of nuclear facilities to determine if *Corbicula* sp. were present in their station's fire or safety systems or in the local environment.

In response to the NRC directive, Iowa Electric Light and Power Company initiated a sampling program at Duane Arnold Energy Center (DAEC) to determine the presence or absence of *Corbicula* sp. This report presents results of that study.

7.2 HISTORICAL REVIEW

Corbicula was introduced into the west coast of the United States in the 1930's and has since spread across the southern states of this country (Sinclair 1971). This exotic species has been reported as far east as the Potomac River system by Britton (1981); as far north as the Minnesota and St. Croix Rivers by Cummings and Jones (1978) and Fuller (1978), respectively; and from numerous locations in the Upper Mississippi River (Lewis 1981a).

The benthic macroinvertebrate community of the Cedar River near DAEC was documented for three years prior to station operation (McDonald 1972, 1974a, and 1974b) and during seven years of operation (McDonald 1975, 1976, 1977, 1978, and 1979; Lewis 1980 and 1981b). Aquatic organisms were collected by various techniques including a Ponar grab sampler, hand picking and artificial substrate samplers. *Corbicula* was not collected in any of these studies; however, in January 1979, this species was observed by Ecological Analysts, Inc. during preliminary sampling of the Cedar River upstream from DAEC at Lewis Access.

7.3 FIELD AND ANALYTICAL PROCEDURES

Sampling for *Corbicula fluminea* (Asiatic clam) at the Duane Arnold Energy Center was conducted on 6 May and 18 November 1981. Sampling was conducted in the intake structure, the cooling towers, the discharge canal and the discharge area in the Cedar River. Three Ponar grab samples were collected along a transect in each of the two intake bays. Samples were collected between the bar grates and the traveling screens. In May, three Ponar grab samples were also collected along a transect in the collection basins of each cooling tower. The transect in each cooling tower was located immediately before the return pipes. Since a major portion of the water had been removed from the collection basins, visual examination for

Corbicula in the substrates of the basins was also accomplished. Operation of the cooling towers resulted in inadequate substrate for grab sampling in November; however, visual observations were conducted.

In May and November, mussel rake collections were taken from two areas in the discharge canal. Each area covered approximately 20 meters of canal. The upstream area was situated 35m downstream of the discharge pipe. The second area was approximately 35m upstream of the dam. The Cedar River was also sampled utilizing a mussel rake. The shoreline area downstream of the diffuser pipe and the embayment below the discharge dam were sampled for Corbicula.

The Ponar samples were sieved on a US Standard No. 30 mesh sieve and the residue was examined for Corbicula in the laboratory with the aid of an illuminated cyclops magnifying lens.

7.4 RESULTS AND DISCUSSION

Although suitable substrate (stable silty sand) was present near Duane Arnold Energy Center, there was no evidence of Corbicula fluminea near the station. No live individuals or relic valves of the species were observed in the intake bay, cooling tower basins, discharge canal or the discharge area in the Cedar River near DAEC in 1981.

The unstable sand substrates of the intake bay yielded small densities of tubificid oligochaetes, midge-fly larvae and fingernail clams in May and was void of macroinvertebrates in November. Colonization of the intake bay sediments by Corbicula is unlikely because of this species' aversion to unstable substrates.

In the cooling tower basins leeches were abundant in the May sampling but in November no organisms were observed. The concrete floors of the cooling tower basins offer few areas where sediment can accumulate and will therefore be unfavorable for colonization by Corbicula.

The silty sand substrate and elevated temperature of the canal provide optimal conditions for potential colonization by Corbicula; however, neither live specimens nor relic valves were observed in the present study. Fingernail clams (Sphaerium transversum) were commonly collected from the discharge canal in May and December. Leeches and snails (Physa sp.) were also abundant in the May sampling of the discharge canal.

The relatively stable substrates and typically ice-free conditions of the discharge area also offers a potentially favorable environment for Corbicula. In the present study, no Corbicula were observed, and the only abundant species was the fingernail clam (S. transversum). This species was also collected in the Ponar grab samples from this site in 1981 (see Chapter 4).

7.5 SUMMARY AND CONCLUSIONS

The 1981 investigations near DAEC revealed several potential habitats for the colonization and survival of Corbicula fluminea; however, there was no evidence of the species ever occurring in the area. Although Corbicula

poses no present threat to the operation of DAEC, its presence in the Cedar River (confirmed by preliminary sampling in January 1979) indicates the need for continued monitoring for the potential spread of this nuisance species.

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Chapter 8

Terrestrial Vegetation

CONTENTS

8.0 TERRESTRIAL VEGETATION

8.1 INTRODUCTION

The terrestrial monitoring program for 1981 consisted of five visual inspections of vegetation in the vicinity of, and down-wind from, the cooling towers at the Duane Arnold Energy Center (DAEC). The purpose of the inspections was to document any evidence of vegetation injury resulting from salts in the cooling tower drift, as an indicator of potential impacts to the terrestrial ecosystem in the site vicinity. Vegetation was inspected for both salt injury, and for injury resulting from pathological problems, insects, and environmental stresses. Chemical analyses would have been conducted to confirm salt injury, had significant injury been suspected.

8.2 HISTORICAL REVIEW

Operational surveys to determine phytosociological changes in vegetation resulting from operation of the DAEC were reported by Konefes and McDonald (1978). They noted considerable change in vegetational communities over a five-year period that had resulted from climate, disease, human activity, and natural succession, but no evidence of changes resulting from operation of the DAEC were found.

No records of inspections for salt injury prior to 1979 were reviewed, but conversations with DAEC staff (Personal Communication George Kuehn, Jr., 26 August 1980) indicated that letters in DAEC files demonstrate no salt injury in years prior to 1979.

Surveys conducted in 1979 and 1980 found vegetation to be lush and healthy as a result of above-normal rainfall, and demonstrated no significant salt injury problem. Pathological and insect related problems were common in many species, and it was possible that salt accumulation or uptake from cooling tower drift contributed to the severity of these problems. Symptoms on cottonwood that appeared similar to SO_2 or oxidant leaf injury might have been caused by H_2SO_4 in cooling tower drift, or by contact herbicides or fungal diseases.

8.3 FIELD AND ANALYTICAL PROCEDURES

Field inspections of vegetation at the DAEC were conducted on the following dates in 1981: 28 May, 26 June, 24 July, 20 August, and 22 September. Tree, shrub, and herbaceous foliage were inspected at each of the following three areas on the DAEC site (Figure 1-1, Chapter 1):

a. Location A - along the west river shore approximately 0.25 miles upstream from water quality sampling Location 2 (northeast of the cooling towers),

b. Location B - along the west river shore adjacent to water quality sampling Location 2,

c. Location C - directly east of the cooling towers and immediately outside of the fenced area.

Examples of several species in each stratum were examined for symptoms of salt injury, and other problems. A record was made of the species inspected by location and stratum, of any abnormalities, and of the general condition and health of the vegetation. Any suspected injury was photographed for stress symptoms. Because significant salt injury was not suspected in the injury noted in 1981, analysis for total salts on unwashed samples of affected and unaffected foliage was not performed. A summary of results from each field trip was presented in the monthly progress reports. Visual symptomology followed descriptions and photographs presented by Jacobson and Hill (1970), Tibbetts and Olszyk (1975), and Applied Science Associates, Inc. (1976).

8.4 RESULTS AND DISCUSSION

The vegetation of the three sampling areas consisted of common successional and old field species; Location C was herbaceous old field whereas Locations A and B were shrubby edge along the river bank. Considerable large shrub and small sapling vegetation had been mechanically removed since the 1979 surveys, including all of the woody vegetation at Location C.

Vegetation of the sampling area was generally healthy and fully developed as a result of adequately distributed precipitation throughout the growing season. Numerous insect (leaf eating, gall, miners) and pathogenic fungi (rusts, leaf spots, powdery mildew) problems developed on most plant species present, in varying levels of severity.

Of the many injury symptoms noted on various species, only a few might be confused with, or partially attributed to, salt injury resulting from cooling tower drift. The Lewis Bottom Park, approximately 5 miles north of DAEC, had been used as a control location in 1980 for examination of species with suspected symptoms. Most symptoms were found to also occur in the control area, although sometimes at lower levels of severity, thus indicating that salt might be a secondary rather than a primary factor contributing to the injury symptoms observed at DAEC. Symptoms noted in 1981 are in all cases similar to those noted in 1980.

Green ash (Fraxinus pennsylvanica) exhibited the same bi-facial chlorotic/necrotic leaf spot that was present in 1979 and 1980. The symptom was common offsite and at the control location in 1980 so it was thus attributable to factors other than salt drift.

Hackberry (Celtis occidentalis) at Location A continued to decline and exhibited heavy gall insect infestation, chlorotic leaves, tip burn, and early leaf loss. Symptoms were limited to a few small individuals, and were similar but more severe than those found on hackberry at the control location in 1980. The problem appeared to be primarily a result of heavy leaf gall infestation, but salt drift could have been a contributing factor. Some tip and margin necrosis occurred on other tree species as leaves were beginning to mature in September, which also might be an indication of minor salt accumulation.

Cottonwood (Populus deltoides) at Location B exhibited extensive chlorosis and bifacial necrotic stipple on lower leaves of small trees as in 1980. The symptoms appeared very similar to SO_2 and oxidant injury, but can also be caused by contact herbicides, such as paraquat, and by leaf spot fungi, such as Cercospora populina. Similar symptoms noted adjacent to cooling towers at Palisades Nuclear Plant in Michigan were attributed to sulfate deposition resulting from the addition of H_2SO_4 to the station's cooling water (Rochow 1978). Sulfuric acid is added to cooling water at DAEC (personal communication, George Kuehn, Jr., 26 August 1980), and thus is a potential but unlikely causal agent. In September of 1981, sporangia fruiting bodies were found on the lower surfaces of affected cottonwood leaves, thus indicating leaf rust fungi as the probable causal agent. The problem did not occur on mature trees.

Of the shrub species, grape (Vitus sp.) was generally healthy throughout the season. Poison ivy (Rhus radicans) which was heavily infested with gall and other insects, exhibited considerable interveinal chlorosis that was similar to symptoms at DAEC and the control location in 1980. Chlorosis was probably a result of the insects, but salt could have compounded the problem by predisposing the plants to stress.

Herbaceous vegetation was generally healthy, lush, and free of problems other than leaf-eating insects. Salt and/or dust accumulation was noted on herbaceous leaves at Location C adjacent to the cooling tower, but no injury was present. Milkweed exhibited some chlorotic mottling with some interveinal and tip necrosis that might have been aggravated by salt uptake. The problem was not severe, as plants completed normal life cycles, and only occurred occasionally. Similar symptoms were noted in control locations along roadsides.

None of the various injuries noted at DAEC were indicative of a significant pathological problem resulting from salt deposition or other environmental stress. Vegetation was generally healthy, and most of the symptoms described above were relatively isolated or low in severity. Although cooling tower drift may incrementally decrease the resistance of local vegetation to other stress, no major problem was apparent at DAEC.

8.5 SUMMARY AND CONCLUSIONS

Vegetation downwind from the cooling towers at DAEC was examined monthly from May through September 1981 for symptoms of injury resulting from salt accumulation. The vegetation was generally healthy and fully developed, and there was no evidence of significant salt injury. Leaf injury to cottonwood possibly attributed in 1980 to H_2SO_4 in cooling tower drift was determined in 1981 to have probably been caused by leaf rust fungi. A variety of other insect and pathological problems affected the vegetation at the sampling locations. The severity of such problems might have been increased by salt stress, but salt from cooling tower drift was probably not the primary stressing agent in any case. Vegetation examined at an offsite control location in 1980 exhibited most of the injury symptoms present at DAEC, although in some cases, they were

less severe. The ecological impact of salt drift at DAEC is minimal and insignificant, if present at all.

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OPERATIONAL ECOLOGICAL STUDY
IN THE CEDAR RIVER
NEAR DUANE ARNOLD ENERGY CENTER
JANUARY THROUGH DECEMBER 1981

APPENDICES A THROUGH C

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Appendix A

Water Quality Data

TABLE A-29 NITRITE VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	0.012	0.019	0.016	0.011	0.019
AUG 19 81	0.016	0.016	0.016	0.017	0.016
NOV 17 81	0.04	0.04	0.03	0.03	0.03

TABLE A-30 SULFATE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	38.8	38.9	35.8	36.2	38.1
AUG 19 81	33.1	27.2	299.2	48.6	30.2
NOV 17 81	36.6	36.6	299.0	104.4	54.9

TABLE A-31 ZINC (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	0.02	0.02	0.03	0.05	0.05
AUG 19 81	0.05	0.03	0.10	0.03	0.04
NOV 17 81	0.02	0.02	0.04	0.01	0.03

Appendix B

Phycology Data

LIST OF TABLES

LIST OF TABLES (CONT.)

TABLE A-1 TEMPERATURE (C) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0.0	0.0	9.2	3.2	0.0
JAN 22 81	0.0	0.0	19.3	3.2	0.8
FEB 04 81	0.0	0.0	18.9	4.0	1.1
FEB 19 81	0.4	0.4	22.4	4.2	0.8
MAR 05 81	4.3	4.3	22.1	6.0	4.9
MAR 18 81	7.5	7.8	19.7	10.2	8.3
APR 07 81	11.8	12.0	13.8	12.5	11.9
APR 23 81	10.6	10.9	11.7	11.1	10.9
MAY 05 81	16.3	16.3	16.2	16.2	16.3
MAY 21 81	20.0	19.3	18.2	19.0	19.2
JUN 02 81	21.8	22.0	22.3	22.1	21.9
JUN 16 81	21.8	21.9	16.4	21.6	21.9
JUL 08 81	26.9	26.8	32.2	28.0	27.3
JUL 23 81	24.8	24.6	28.2	24.9	24.8
AUG 05 81	24.3	24.4	28.5	24.8	24.4
AUG 19 81	23.3	23.4	25.0	23.6	23.4
SEP 09 81	21.4	21.6	28.9	21.8	21.7
SEP 22 81	18.4	18.4	20.0	18.6	18.4
OCT 06 81	14.6	14.8	11.0	13.8	14.6
OCT 21 81	10.4	10.6	9.4	10.5	10.6
NOV 04 81	12.4	12.4	26.4	16.2	13.4
NOV 17 81	7.8	7.8	21.0	11.4	8.6
DEC 02 81	1.6	1.7	19.4	6.1	2.5
DEC 15 81	0.0	0.0	19.3	5.9	0.8

TABLE A-2 CARBON DIOXIDE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	22.0	19.	6.5	13.0	14.0
JAN 22 81	10.0	10.	4.3	9.0	9.0
FEB 04 81	8.0	10.0	4.0	8.0	8.0
FEB 19 81	8.5	8.5	8.5	7.0	8.0
MAR 05 81	6.5	6.5	2.4	8.0	6.5
MAR 18 81	1.8	1.9	2.2	1.7	1.8
APR 07 81	5.0	6.0	7.5	5.0	5.0
APR 23 81	2.3	2.3	3.6	2.2	2.3
MAY 05 81	9.5	9.5	9.5	9.5	9.0
MAY 21 81	2.4	2.7	2.2	2.7	2.2
JUN 02 81	9.7	9.7	5.9	7.5	7.5
JUN 16 81	10.4	10.4	3.5	10.5	10.3
JUL 08 81	6.5	7.0	2.4	5.5	5.5
JUL 23 81	7.0	7.0	6.0	7.1	6.9
AUG 05 81	9.0	8.5	10.6	6.5	8.0
AUG 19 81	3.6	2.2	4.5	2.1	2.4
SEP 09 81	3.4	5.5	11.0	4.0	4.5
SEP 22 81	5.0	5.0	6.5	4.5	4.0
OCT 06 81	2.0	2.0	6.0	2.1	2.1
OCT 21 81	3.0	3.0	6.5	4.0	3.0
NOV 04 81	4.2	4.2	11.0	5.0	4.3
NOV 17 81	5.0	3.4	7.0	2.4	3.0
DEC 02 81	6.0	6.0	6.5	5.5	6.5
DEC 15 81	8.5	8.5	6.0	6.0	9.5

TABLE A-3 DISSOLVED OXYGEN (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	12.9	12.8	9.2	12.2	12.8
JAN 22 81	13.0	13.0	9.2	12.4	12.8
FEB 04 81	12.5	12.9	7.4	12.7	13.1
FEB 19 81	13.0	12.3	7.6	11.6	13.2
MAR 05 81	12.5	12.7	7.9	12.4	12.6
MAR 18 81	13.9	14.1	11.2	13.4	13.4
APR 07 81	11.2	11.1	9.9	11.0	11.1
APR 23 81	12.6	12.9	10.7	12.3	12.7
MAY 05 81	9.3	9.3	9.2	9.2	9.3
MAY 21 81	18.4	14.9	10.8	13.8	14.7
JUN 02 81	7.7	7.7	8.5	8.0	7.8
JUN 16 81	7.3	7.4	9.7	7.4	7.3
JUL 08 81	7.2	7.2	6.8	7.3	7.3
JUL 23 81	7.0	7.0	7.5	7.1	7.0
AUG 05 81	6.9	6.5	6.9	6.7	6.7
AUG 19 81	10.6	11.0	7.7	10.3	10.7
SEP 09 81	9.7	9.9	7.0	9.7	9.9
SEP 22 81	16.9	16.6	8.7	14.7	15.4
OCT 06 81	14.3	14.6	11.0	14.6	14.5
OCT 21 81	13.5	13.4	11.3	13.2	13.7
NOV 04 81	10.4	10.6	7.5	9.8	10.5
NOV 17 81	14.8	15.1	8.3	13.6	14.8
DEC 02 81	13.5	13.7	8.7	12.5	13.3
DEC 15 81	14.6	14.5	9.0	12.8	14.0

TABLE A-4 UNITS OF pH FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	7.5	7.6	7.6	7.7	7.7
JAN 22 81	7.8	7.8	7.7	7.8	7.8
FEB 04 81	7.9	7.8	7.7	7.8	7.9
FEB 19 81	7.7	7.7	7.0	7.7	7.7
MAR 05 81	7.8	7.8	8.0	7.7	7.8
MAR 18 81	8.4	8.4	8.0	8.4	8.4
APR 07 81	7.9	7.8	7.7	7.9	7.9
APR 23 81	8.3	8.3	8.1	8.3	8.3
MAY 05 81	7.6	7.7	7.6	7.6	7.6
MAY 21 81	8.1	8.1	8.2	8.1	8.2
JUN 02 81	7.6	7.6	7.8	7.7	7.7
JUN 16 81	7.2	7.3	7.8	7.3	7.2
JUL 08 81	7.8	7.8	8.1	7.8	7.8
JUL 23 81	7.6	7.6	7.5	7.6	7.6
AUG 05 81	7.5	7.5	7.8	7.6	7.5
AUG 19 81	8.0	8.2	7.5	8.2	8.2
SEP 09 81	8.1	7.9	7.2	8.0	8.0
SEP 22 81	7.8	7.9	7.3	7.8	7.9
OCT 06 81	8.3	8.3	7.9	8.3	8.3
OCT 21 81	8.2	8.2	7.9	8.1	8.2
NOV 04 81	8.0	8.0	6.7	7.8	8.0
NOV 17 81	8.0	8.2	7.1	8.2	8.3
DEC 02 81	8.0	8.0	7.6	7.9	7.9
DEC 15 81	7.9	7.9	7.7	7.9	7.8

TABLE A-5 TOTAL ALKALINITY (mg/l-$CaCO_3$) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	238	239	115	220	240
JAN 22 81	217	216	119	203	208
FEB 04 81	226	219	112	193	214
FEB 19 81	144	147	48	136	141
MAR 05 81	158	157	132	154	156
MAR 18 81	210	209	136	199	206
APR 07 81	179	177	184	179	177
APR 23 81	199	198	204	201	201
MAY 05 81	181	178	184	179	174
MAY 21 81	166	176	193	182	184
JUN 02 81	172	168	169	167	165
JUN 16 81	113	110	139	112	109
JUL 08 81	214	213	205	214	213
JUL 23 81	159	158	118	156	154
AUG 05 81	159	151	122	151	152
AUG 19 81	211	200	85	187	211
SEP 09 81	258	237	126	224	230
SEP 22 81	193	187	73	156	175
OCT 06 81	216	213	221	218	216
OCT 21 81	227	225	224	225	224
NOV 04 81	230	226	37	175	220
NOV 17 81	221	222	71	187	216
DEC 02 81	213	211	132	191	207
DEC 15 81	232	229	159	206	222

TABLE A-6 CARBONATE (mg/l-$CaCO_3$) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0.0	0.0	0.0	0.0	0.0
JAN 22 81	0.0	0.0	0.0	0.0	0.0
FEB 04 81	0.0	0.0	0.0	0.0	0.0
FEB 19 81	0.0	0.0	0.0	0.0	0.0
MAR 05 81	0.0	0.0	0.0	0.0	0.0
MAR 18 81	10.0	14.0	0.0	12.0	12.0
APR 07 81	0.0	0.0	0.0	0.0	0.0
APR 23 81	0.0	0.0	0.0	0.0	0.0
MAY 05 81	0.0	0.0	0.0	0.0	0.0
MAY 21 81	0.0	0.0	0.0	0.0	0.0
JUN 02 81	0.0	0.0	0.0	0.0	0.0
JUN 16 81	0.0	0.0	0.0	0.0	0.0
JUL 08 81	0.0	0.0	0.0	0.0	0.0
JUL 23 81	0.0	0.0	0.0	0.0	0.0
AUG 05 81	0.0	0.0	0.0	0.0	0.0
AUG 19 81	0.0	0.0	0.0	0.0	0.0
SEP 09 81	0.0	0.0	0.0	0.0	0.0
SEP 22 81	0.0	0.0	0.0	0.0	0.0
OCT 06 81	0.0	0.0	0.0	0.0	0.0
OCT 21 81	0.0	0.0	0.0	0.0	0.0
NOV 04 81	0.0	0.0	0.0	0.0	0.0
NOV 17 81	0.0	0.0	0.0	0.0	0.0
DEC 02 81	0.0	0.0	0.0	0.0	0.0
DEC 15 81	0.0	0.0	0.0	0.0	0.0

TABLE A-7 CALCIUM HARDNESS (mg/l-$CaCO_3$) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	290	362	252	310	388
JAN 22 81	224	219	410	168	230
FEB 04 81	189	153	271	237	219
FEB 19 81	132	98	251	165	148
MAR 05 81	250	257	440	254	257
MAR 18 81*	830	700	1,245	820	725
APR 07 81*	640	640	650	700	640
APR 23 81	150	193	164	155	165
MAY 05 81	216	208	218	210	209
MAY 21 81	174	194	179	199	199
JUN 02 81	209	183	173	L.A.	183
JUN 16 81	139	129	136	117	133
JUL 08 81	235	197	567	275	230
JUL 23 81	160	165	299	157	185
AUG 05 81	151	142	275	138	148
AUG 19 81	199	192	293	209	196
SEP 09 81	183	202	350	193	220
SEP 22 81	166	162	354	203	165
OCT 06 81	214	211	208	217	200
OCT 21 81	185	200	180	185	192
NOV 04 81	170	178	348	218	182
NOV 17 81	182	206	191	225	201
DEC 02 81	189	181	286	237	222
DEC 15 81	186	211	345	272	235

*Suspect values.
L.A. = Lab Accident.

TABLE A-8 TOTAL HARDNESS (mg/l-$CaCO_3$) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	443	512	659	492	547
JAN 22 81	331	334	614	508	348
FEB 04 81	287	231	409	356	332
FEB 19 81	200	269	373	245	222
MAR 05 81	313	365	596	296	322
MAR 18 81*	1,149	1,032	1,754	1,216	1,410
APR 07 81*	956	954	968	1,087	963
APR 23 81	229	290	246	235	249
MAY 05 81	300	293	305	297	293
MAY 21 81	273	295	279	305	301
JUN 02 81	298	270	262	L.A.	271
JUN 16 81	198	190	205	170	191
JUL 08 81	332	282	787	394	330
JUL 23 81	230	235	437	228	254
AUG 05 81	226	216	403	210	219
AUG 19 81	286	280	873	304	278
SEP 09 81	271	307	537	298	325
SEP 22 81	242	250	542	346	261
OCT 06 81	314	310	307	314	293
OCT 21 81	281	304	272	290	292
NOV 04 81	235	261	516	332	271
NOV 17 81	303	324	373	358	324
DEC 02 81	288	277	422	336	328
DEC 15 81	284	319	509	405	349

*Suspect values.
L.A. = Lab Accident.

TABLE A-9 TURBIDITY (N.T.U.) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	2.2	1.8	2.7	1.8	1.7
JAN 22 81	1.8	1.7	1.9	1.6	1.6
FEB 04 81	1.6	1.5	2.3	1.5	1.6
FEB 19 81	1.1	1.3	2.0	1.2	1.9
MAR 05 81	21.0	24.0	33.0	24.0	23.0
MAR 18 81*	10.0	12.0	6.0	7.0	6.0
APR 07 81	63.0	70.0	51.0	69.0	77.0
APR 23 81	24.0	23.0	28.0	25.0	23.0
MAY 05 81	84.0	78.0	73.0	81.0	108.0
MAY 21 81	26.0	34.0	32.0	34.0	34.0
JUN 02 81	139	157	154	156	156
JUN 16 81	38	69	58	49	54
JUL 08 81	50	46	115	52	L.A.
JUL 23 81	52	48	192	51	51
AUG 05 81	100	165	165	160	155
AUG 19 81	47	48	62	45	40
SEP 09 81	35	35	58	38	35
SEP 22 81	24	28	29	25	18
OCT 06 81	18	18	19	18	19
OCT 21 81	19	20	17	19	20
NOV 04 81	6.6	13	8.0	26	35
NOV 17 81	5.4	3.7	21	3.9	29
DEC 02 81	14	13	17	15.5	12
DEC 15 81	4.1	3.9	7.9	5.6	4.9

*Sample holding times exceeded.
L.A. = Laboratory Accident.

TABLE A-10 FILTRABLE RESIDUE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	367	376	1,033	465	375
JAN 22 81	439	426	977	560	450
FEB 04 81	427	415	850	469	475
FEB 19 81	303	322	878	395	333
MAR 05 81	361	382	692	421	396
MAR 18 81*	373	393	850	483	422
APR 07 81	357	395	365	378	370
APR 23 81	413	374	375	387	388
MAY 05 81	441	462	440	457	496
MAY 21 81	383	345	353	340	397
JUN 02 81	465	396	671	441	453
JUN 16 81	724	696	344	386	816
JUL 08 81	492	340	1,062	596	544
JUL 23 81	321	318	971	285	352
AUG 05 81	327	256	2,027	273	404
AUG 19 81	418	424	728	428	408
SEP 09 81	450	490	484	528	538
SEP 22 81	315	318	884	330	520
OCT 06 81	379	337	292	327	247
OCT 21 81	419	427	382	434	395
NOV 04 81	382	370	847	486	387
NOV 17 81	367	342	759	448	379
DEC 02 81	362	361	666	437	386
DEC 15 81	426	394	781	520	427

*Sample holding times exceeded.

TABLE A-11 NONFILTRABLE RESIDUE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	7	1	12	1	1
JAN 22 81	2	1	3	1	1
FEB 04 81	1	1	8	1	1
FEB 19 81	11	31	24	22	33
MAR 05 81	31	43	46	38	48
MAR 18 81*	18	20	15	16	13
APR 07 81	138	159	122	148	165
APR 23 81	69	69	90	77	68
MAY 05 81	215	186	185	199	380
MAY 21 81	135	125	100	125	128
JUN 02 81	320	312	219	293	291
JUN 16 81	808	864	472	474	860
JUL 08 81	144	118	300	198	178
JUL 23 81	192	156	395	175	205
AUG 05 81	127	287	202	266	314
AUG 19 81	106	140	128	108	110
SEP 09 81	74	82	70	58	74
SEP 22 81	108	83	79	92	76
OCT 06 81	50	66	53	64	62
OCT 21 81	28	27	20	31	33
NOV 04 81	28	32	202	39	38
NOV 17 81	25	25	106	39	27
DEC 02 81	18	21	23	24	22
DEC 15 81	14	14	9	11	3

*Sample holding times exceeded.

TABLE A-12 TOTAL RESIDUE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	374	377	1,045	466	376
JAN 22 81	441	427	980	561	451
FEB 04 81	428	416	858	470	476
FEB 19 81	313	353	902	417	366
MAR 05 81	392	425	738	459	434
MAR 18 81*	391	413	865	499	435
APR 07 81	495	554	487	526	535
APR 23 81	482	443	465	464	456
MAY 05 81	656	648	625	656	876
MAY 21 81	518	470	453	465	525
JUN 02 81	785	708	890	734	744
JUN 16 81	1,532	1,560	816	860	1,676
JUL 08 81	636	458	1,362	794	722
JUL 23 81	513	474	1,366	460	557
AUG 05 81	454	543	2,229	539	718
AUG 19 81	524	564	856	536	518
SEP 09 81	524	572	554	586	612
SEP 22 81	423	401	963	422	596
OCT 06 81	429	403	345	390	309
OCT 21 81	447	454	402	465	428
NOV 04 81	410	401	1,049	525	425
NOV 17 81	392	367	865	487	406
DEC 02 81	380	382	689	461	408
DEC 15 81	440	408	790	531	430

*Sample holding times exceeded.

TABLE A-13 TRUE COLOR (Units) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0.6	0.1	5.5	0.6	0.1
JAN 22 81	1.6	1.5	1.8	1.5	1.5
FEB 04 81	1.6	1.7	1.9	1.1	0.5
FEB 19 81	2.0	1.6	1.9	1.6	1.7
MAR 05 81	1.0	1.9	3.1	2.5	2.2
MAR 18 81*	0.8	1.0	1.9	1.6	0.9
APR 07 81	1.1	1.2	1.7	1.4	1.9
APR 23 81	56.3	17.0	28.0	40.4	34.9
MAY 05 81	38.6	34.1	31.7	35.6	80.4
MAY 21 81	31.0	43.0	50.5	54.0	32.4
JUN 02 81	228	111	127	96	96
JUN 16 81	455	514	441	469	560
JUL 08 81	63	46	100	56	58
JUL 23 81	66	93	205	95	100
AUG 05 81	87.1	120.2	113.6	70.5	187.4
AUG 19 81	313.4	325.9	450.9	413.4	379.4
SEP 09 81	146	147	352	152	188
SEP 22 81	126	113	175	133	193
OCT 06 81	31	28	17	24	20
OCT 21 81	215	95	93	137	87
NOV 04 81	65	96	113	54	70
NOV 17 81	40	78	51	66	69
DEC 02 81	3.8	3.8	28.2	16.0	8.9
DEC 15 81	23.1	52.6	39.2	71.4	82.1

*Sample holding times exceeded.

TABLE A-14 TOTAL IRON (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0.3	0.3	0.6	0.3	0.3
JAN 22 81	0.1	0.4	0.3	0.2	0.1
FEB 04 81	0.1	0.1	0.3	0.1	0.1
FEB 19 81	0.65	0.78	0.88	0.72	0.84
MAR 05 81	1.00	1.34	1.86	1.20	1.30
MAR 18 81	0.31	0.24	0.31	0.24	0.34
APR 07 81	0.68	0.92	0.78	0.74	0.77
APR 23 81	1.5	1.0	1.6	1.5	1.4
MAY 05 81	3.33	3.09	3.39	3.51	3.20
MAY 21 81	1.00	1.70	1.40	1.50	1.50
JUN 02 81	7.0	6.8	6.4	L.A.	5.4
JUN 16 81	14.0	16.2	10.9	10.9	14.1
JUL 08 81	2.6	4.9	10.1	3.9	2.9
JUL 23 81	3.9	5.9	6.9	0.3	5.8
AUG 05 81	4.03	6.06	7.37	5.54	6.78
AUG 19 81	1.63	1.87	2.58	2.58	1.92
SEP 09 81	1.78	2.02	2.50	2.10	2.18
SEP 22 81	0.79	0.65	1.14	0.86	0.58
OCT 06 81	0.48	0.82	0.84	0.65	0.64
OCT 21 81	0.67	0.81	0.70	0.69	0.67
NOV 04 81	0.81	1.20	2.27	0.98	0.79
NOV 17 81	<0.3	0.50	<0.3	<0.3	0.38
DEC 02 81	0.37	0.75	0.84	<0.04	0.57
DEC 15 81	0.11	0.28	0.67	0.36	<0.04

L.A. = Lab Accident.

TABLE A-15 AMMONIA (mg/l-N) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	1.455	1.784	2.724	0.781	2.059
JAN 22 81	1.499	2.080	0.695	1.001	2.033
FEB 04 81	1.381	1.511	0.196	0.573	0.886
FEB 19 81	0.090	0.080	0.030	0.080	0.080
MAR 05 81	0.37	0.36	0.10	0.30	0.36
MAR 18 81	0.038	0.018	0.023	0.015	0.015
APR 07 81	0.014	0.014	0.089	0.028	0.016
APR 23 81	0.131	0.044	0.084	0.043	0.022
MAY 05 81	0.037	0.018	0.069	0.024	0.127
MAY 21 81	0.050	0.039	0.039	0.041	0.062
JUN 02 81	0.012	<0.008	0.014	<0.008	<0.008
JUN 16 81	0.10	0.08	0.11	0.007	0.29
JUL 08 81	<0.01	<0.01	0.50	<0.01	<0.01
JUL 23 81	0.02	0.04	0.04	0.01	0.03
AUG 05 81	0.086	0.069	0.067	0.079	0.084
AUG 19 81	0.064	0.084	0.106	0.028	0.041
SEP 09 81	<0.01	<0.01	0.04	<0.01	<0.01
SEP 22 81	0.02	0.02	0.09	0.03	0.03
OCT 06 81	0.05	0.06	0.04	0.05	0.04
OCT 21 81	0.01	0.01	0.10	0.01	0.01
NOV 04 81	0.06	0.06	0.09	0.06	0.07
NOV 17 81	0.06	0.07	0.12	0.10	0.08
DEC 02 81	0.15	0.20	0.08	0.17	0.18
DEC 15 81	0.21	0.10	0.19	0.15	0.04

TABLE A-16 NITRATE (mg/l-N) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	4.829	4.862	9.878	5.312	4.822
JAN 22 81	4.831	4.596	10.021	5.271	4.596
FEB 04 81	5.001	4.311	9.201	5.799	5.021
FEB 19 81	4.00	4.19	8.20	4.37	4.16
MAR 05 81	8.58	8.19	13.06	9.54	8.35
MAR 18 81	5.64	6.89	6.16	6.51	6.54
APR 07 81	5.45	6.87	6.12	6.39	6.49
APR 23 81	5.47	6.47	4.49	4.94	5.01
MAY 05 81	7.38	6.91	6.81	7.33	6.54
MAY 21 81	6.77	7.02	7.11	7.05	6.81
JUN 02 81	7.77	7.51	7.52	7.47	7.53
JUN 16 81	6.81	6.32	4.93	6.21	6.02
JUL 08 81	5.88	5.89	14.97	7.39	5.89
JUL 23 81	5.74	5.54	10.2	5.69	5.57
AUG 05 81	2.32	2.08	3.36	2.09	2.07
AUG 19 81	6.93	6.93	7.84	6.51	5.11
SEP 09 81	5.85	5.79	10.03	6.39	5.77
SEP 22 81	3.63	3.44	6.35	4.07	3.79
OCT 06 81	4.41	4.64	3.78	4.11	4.30
OCT 21 81	5.54	5.54	5.20	5.54	5.84
NOV 04 81	5.34	5.34	8.50	6.16	5.58
NOV 17 81	10.9	7.54	10.4	8.29	7.46
DEC 02 81	6.90	6.40	8.64	5.85	5.52
DEC 15 81	7.23	6.19	11.3	8.42	7.60

TABLE A-17

SOLUBLE ORTHOPHOSPHATE (mg/l-P) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0.960	1.026	0.965	1.248	1.077
JAN 22 81	0.931	0.922	2.444	1.454	0.850
FEB 04 81	0.663	0.548	1.752	0.733	0.615
FEB 19 81	0.695	0.706	2.027	0.965	0.762
MAR 05 81	0.644	0.676	1.830	0.831	0.735
MAR 18 81*	0.729	0.643	1.914	0.860	0.718
APR 07 81	0.232	0.232	0.473	0.275	0.326
APR 23 81	0.193	0.224	0.208	0.272	0.190
MAY 05 81	0.738	0.890	0.603	0.581	0.419
MAY 21 81	0.009	0.009	0.054	0.029	0.021
JUN 02 81	0.890	0.956	0.956	0.956	0.989
JUN 16 81	0.223	0.182	0.860	0.223	0.148
JUL 08 81	0.200	0.320	1.34	0.360	0.320
JUL 23 81	0.480	0.460	1.75	0.500	0.460
AUG 05 81	0.31	0.31	1.15	0.41	0.31
AUG 19 81	0.427	0.230	0.850	0.155	0.146
SEP 09 81	0.42	0.28	1.00	0.34	0.28
SEP 22 81	0.22	0.25	1.25	0.41	0.42
OCT 06 81	0.15	0.11	0.31	0.21	0.11
OCT 21 81	0.23	0.23	0.27	0.18	0.18
NOV 04 81	0.24	0.24	0.32	0.34	0.25
NOV 17 81	0.19	0.25	0.62	0.42	0.25
DEC 02 81	0.16	0.22	0.79	0.49	0.16
DEC 15 81	<0.2	<0.2	0.51	<0.2	<0.2

*Sample holding times exceeded.

TABLE A-18
TOTAL PHOSPHORUS (mg/l-P) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	1.420	1.341	5.977	1.681	1.335
JAN 22 81	1.593	1.266	4.255	1.743	1.201
FEB 04 81	0.618	0.576	3.578	0.986	0.658
FEB 19 81	20.10*	1.103	3.446	1.103	0.760
MAR 05 81	0.818	0.866	2.900	1.074	1.003
MAR 18 81**	0.586	0.547	2.065	0.884	0.689
APR 07 81	0.633	0.656	1.109	0.697	0.635
APR 23 81	0.290	0.382	0.378	0.442	0.384
MAY 05 81	1.380	1.305	1.561	1.283	1.175
MAY 21 81	0.267	0.311	0.353	0.315	0.333
JUN 02 81	2.20	2.55	2.20	2.50	1.53
JUN 16 81	3.11	3.28	4.81	3.63	3.92
JUL 08 81	0.36	0.39	0.96	0.38	0.25
JUL 23 81	0.76	0.78	1.02	0.73	0.56
AUG 05 81	0.618	0.574	1.213	0.662	0.662
AUG 19 81	0.528	0.528	1.148	0.528	0.528
SEP 09 81	0.43	0.33	1.00	0.43	0.39
SEP 22 81	0.30	0.30	1.39	0.54	0.44
OCT 06 81	0.23	0.34	0.46	0.23	0.23
OCT 21 81	0.22	0.22	0.22	0.22	0.22
NOV 04 81	0.36	0.26	0.36	0.36	0.29
NOV 17 81	0.35	0.37	1.00	0.43	0.43
DEC 02 81	0.25	0.31	0.83	0.51	0.31
DEC 15 81	<0.2	<0.2	0.47	0.47	0.23

*Suspect value.
**Sample holding times exceeded.

TABLE A-19
BIOCHEMICAL OXYGEN DEMAND (5-day) (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	8.4	6.6	7.8	7.8	6.6
JAN 22 81	5.1	5.1	7.5	6.9	5.4
FEB 04 81	4.2	6.6	3.6	3.6	2.7
FEB 19 81	6.8	7.9	5.8	8.0	5.9
MAR 05 81	8.7	8.1	9.9	8.4	9.9
MAR 18 81*	16.8	15.6	14.7	18.6	14.1
APR 07 81	11.7	10.8	12.9	15.3	12.9
APR 23 81	17.7	18.6	18.9	16.8	16.8
MAY 05 81	6.3	6.6	8.4	6.0	--**
MAY 21 81	10.5	9.6	10.2	10.2	9.9
JUN 02 81	3.6	3.6	2.4	3.6	1.2
JUN 16 81	6.0	6.9	7.2	6.6	6.6
JUL 08 81	1.5	1.6	3.0	1.6	1.2
JUL 23 81	3.0	2.1	3.3	2.1	2.4
AUG 05 81	3.0	3.9	4.8	4.2	4.5
AUG 19 81	7.1	5.0	5.2	4.4	4.6
SEP 09 81	2.9	2.7	4.8	2.9	2.7
SEP 22 81	11.4	12.0	10.5	9.0	9.0
OCT 06 81	6.9	6.0	5.4	6.0	5.4
OCT 21 81	4.7	6.0	7.8	7.5	8.1
NOV 04 81	5.7	3.6	7.2	3.6	4.8
NOV 17 81	7.5	7.3	5.7	7.2	6.6
DEC 02 81	1.8	3.6	1.8	2.4	3.0
DEC 15 81	5.1	3.9	4.2	3.3	3.0

*Sample holding times exceeded; data suspect.
**Sample container broken in transit.

TABLE A-20

CHEMICAL OXYGEN DEMAND (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	146.8	360.8	23.6	432.8	43.6
JAN 22 81	29.8	23.5	15.0	17.7	17.1
FEB 04 81	9.8	7.7	57.7	12.4	126.2
FEB 19 81	87.8	84.3	103.5	120.9	168.1
MAR 05 81	13.1	72.5	72.5	41.7	76.7
MAR 18 81*	12.9	18.0	88.7	41.1	38.6
APR 07 81	45.6	20.6	41.1	52.7	32.8
APR 23 81	48.6	74.8	46.6	14.4	16.4
MAY 05 81	14.1	8.9	27.8	15.4	27.8
MAY 21 81	44.6	48.3	39.4	53.8	35.5
JUN 02 81	36.9	33.0	38.0	21.6	1.3**
JUN 16 81	91.0	105.6	126.1	88.1	127.9
JUL 08 81	15.7	7.7	43.7	5.6	18.3
JUL 23 81	13.1	5.6	26.8	3.9	7.3
AUG 05 81	37.14	53.40	71.20	46.09	32.34
AUG 19 81	24.11	31.95	56.30	25.86	28.51
SEP 09 81	18.6	25.7	45.8	22.4	29.0
SEP 22 81	40.8	66.2	70.6	45.2	45.2
OCT 06 81	50.0	29.3	22.9	73.9	42.0
OCT 21 81	10.1	22.9	10.1	10.1	16.5
NOV 04 81	11.8	27.2	61.1	26.3	37.9
NOV 17 81	30.9	43.7	56.9	17.6	36.7
DEC 02 81	47.9	57.8	45.4	45.4	41.2
DEC 15 81	4.9	5.8	11.5	6.8	9.2

* Sample holding times exceeded.

**Suspect value.

TABLE A-21 THRESHOLD ODOR (number) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0	2	2	4	2
JAN 22 81	0	2	4	1	2
FEB 04 81	0	4	2	1	2
FEB 19 81	0	1	2	2	4
MAR 05 81	0	2	4	2	2
MAR 18 81*	1	1	2	2	1
APR 07 81	0	1	2	1	2
APR 23 81	1	1	2	1	2
MAY 05 81	0	0	0	0	2
MAY 21 81	0	1	0	0	1
JUN 02 81	0	0	0	1	0
JUN 16 81	1	2	1	2	2
JUL 08 81	1	1	1	1	1
JUL 23 81	1	2	2	1	1
AUG 05 81	1	1	4	2	2
AUG 19 81	2	1	1	2	1
SEP 09 81	2	2	2	3	2
SEP 22 81	3	2	1	2	1
OCT 06 81	1	1	1	1	1
OCT 21 81	2	2	2	4	3
NOV 04 81	1	3	1	2	2
NOV 17 81	2	1	2	1	3
DEC 02 81	2	2	2	2	1
DEC 15 81	2	1	1	2	4

*Sample holding times exceeded.

TABLE A-22

TANNINS & LIGNINS AS TANNIC ACID (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Upstream of Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Downstream from Plant 4
JAN 08 81	0.32	0.28	0.63	0.66	0.32
JAN 22 81	0.38	0.38	0.38	0.38	0.38
FEB 04 81	0.36	0.39	0.38	0.35	0.32
FEB 19 81	0.66	0.66	0.79	0.55	1.00
MAR 05 81	0.61	0.72	1.12	0.60	0.57
MAR 18 81	0.07	0.05	0.69	0.13	0.08
APR 07 81	0.40	0.07	0.11	0.14	0.29
APR 23 81	0.46	0.48	0.39	0.62	0.36
MAY 05 81	0.45	0.37	0.39	0.40	0.46
MAY 21 81	0.34	0.34	0.44	0.27	0.41
JUN 02 81	0.811	0.784	0.742	0.812	1.050
JUN 16 81	7.5	7.2	11.1	9.3	6.3
JUL 08 81	0.26	0.21	1.15	0.38	0.25
JUL 23 81	0.23	0.18	1.05	0.27	0.16
AUG 05 81	1.09	1.59	1.77	1.26	1.23
AUG 19 81	0.67	0.97	1.12	0.78	0.78
SEP 09 81	0.34	0.42	0.98	0.48	0.41
SEP 22 81	0.47	0.28	1.35	0.48	0.30
OCT 06 81	0.49	0.28	0.40	0.37	0.34
OCT 21 81	0.80	0.54	0.58	0.60	0.52
NOV 04 81	0.37	0.43	0.98	0.49	0.41
NOV 17 81	0.36	0.35	0.79	0.44	0.32
DEC 02 81	0.31	0.29	0.32	0.28	0.30
DEC 15 81	0.22	0.25	0.26	0.21	0.20

TABLE A-23 CHLORIDE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	31.0	30.0	29.5	30.5	32.0
AUG 19 81	16.6	16.6	26.5	16.7	20.2
NOV 17 81	27.2	26.6	38.2	29.4	27.2

TABLE A-24 CHROMIUM (μg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	1.3	1.8	2.4	2.0	1.7
AUG 19 81	1.1	3.8	0.2	1.5	3.3
NOV 17 81	18.9	28.7	<5.0	31.2	<5.0

TABLE A-25 COPPER (μg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	6.7	6.4	12.0	7.0	11.3
AUG 19 81	12.3	4.6	15.7	6.5	4.2
NOV 17 81	22.7	7.7	28.6	5.1	153.3

TABLE A-26 LEAD (μg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	1.4	3.7	1.2	1.6	1.8
AUG 19 81	3.7	3.0	6.6	5.9	3.3
NOV 17 81	11.4	7.3	6.6	4.6	6.5

TABLE A-27 MANGANESE (mg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	0.10	0.14	0.13	0.12	0.13
AUG 19 81	0.15	0.20	0.21	0.17	0.17
NOV 17 81	0.06	0.05	0.14	0.06	0.06

TABLE A-28 MERCURY (μg/l) VALUES FROM THE CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER DURING 1981

	Sampling Locations				
	Upstream of Plant 1	Above Plant Intake 2	Discharge Canal 5	140 ft. Downstream of Discharge 3	1/2 Mile Below Plant 4
MAY 21 81	0.49	0.23	0.38	0.20	0.25
AUG 19 81	<0.03	<0.03	<0.03	<0.03	<0.03
NOV 17 81	<0.12	<0.12	<0.12	<0.12	<0.12

LIST OF TABLES

LIST OF TABLES (CONT.)

TABLE B-1

JAN 8,1981
LOCATION 1
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	OCCUR-RENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	1116.	66.30%
CYCLOTELLA MENEGHINIANA	84.	5.00%
STEPHANODISCUS TENUIS	80.	4.78%
TOTAL CENTRALES	1281.	76.07%
BACILLARIOPHYTA		
PENNALES		
NITZSCHIA LINEARIS	97.	5.77%
ASTERIONELLA FORMOSA	67.	4.00%
GOMPHONEMA PARVULUM	62.	3.66%
DIATOMA VULGARE	36.	2.11%
NITZSCHIA ACICULARIS	22.	1.33%
NAVICULA CRYPTOCEPHALA	15.	0.88%
NITZSCHIA PALEA	4.	0.22%
NAVICULA VIRIDULA	4.	0.22%
SYNEDRA ULNA	4.	0.22%
SYNEDRA FAMELICA	4.	0.22%
NITZSCHIA DISSIPATA	2.	0.11%
GYROSIGMA SCALPROIDES	2.	0.11%
NAVICULA LANCEOLATA	2.	0.11%
TOTAL PENNALES	320.	18.99%
TOTAL BACILLARIOPHYTA	1601.	95.06%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	15.	0.88%
SCENEDESMUS ACUMINATUS	6.	0.33%
ANKISTRODESMUS FALCATUS	4.	0.22%
FRANCEIA OVALIS	4.	0.22%
TOTAL NON-FILAMENTOUS	28.	1.67%
TOTAL CHLOROPHYTA	28.	1.67%
CHRYSOPHYTA		
DINOBRYON SOCIALE	17.	0.99%
SYNURA UVELLA	9.	0.56%
DINOBRYON DIVERGENS	6.	0.33%
OCHROMONAS SP.	4.	0.22%
TOTAL CHRYSOPHYTA	36.	2.11%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	7.	0.39%
TOTAL FILAMENTOUS	7.	0.39%
TOTAL CYANOPHYTA	7.	0.39%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	2.	0.11%
TOTAL EUGLENOPHYTA	2.	0.11%
CRYPTOPHYTA		
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	7.	0.44%
CRYPTOMONAS OVATA	4.	0.22%
TOTAL CRYPTOPHYTA	11.	0.66%
T O T A L P H Y T O P L A N K T O N	1684.	100.00%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 2
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	REPLICATE UNITS PER ML.	REPLICATE OCCURRENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	1086.	66.11%
STEPHANODISCUS TENUIS	97.	5.92%
CYCLOTELLA MENEGHINIANA	65.	3.98%
STEPHANODISCUS ASTRAEA	2.	0.11%
TOTAL CENTRALES	1251.	76.12%
BACILLARIOPHYTA		
PENNALES		
NITZSCHIA LINEARIS	108.	6.59%
ASTERIONELLA FORMOSA	90.	5.46%
DIATOMA VULGARE	34.	2.05%
GOMPHONEMA PARVULUM	32.	1.93%
NITZSCHIA ACICULARIS	9.	0.57%
NAVICULA CRYPTOCEPHALA	7.	0.46%
SYNEDRA ULNA	7.	0.46%
NITZSCHIA ANGUSTATA	4.	0.23%
NITZSCHIA DISSIPATA	4.	0.23%
NITZSCHIA SP.	4.	0.23%
NAVICULA LANCEOLATA	4.	0.23%
SYNEDRA FAMELICA	4.	0.23%
GYROSIGMA SCALPROIDES	2.	0.11%
NAVICULA TRIPUNCTATA	2.	0.11%
HANTZSCHIA SP.	2.	0.11%
PINNULARIA SP.	2.	0.11%
TOTAL PENNALES	314.	19.11%
TOTAL BACILLARIOPHYTA	1565.	95.23%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	15.	0.91%
SCENEDESMUS ACUMINATUS	14.	0.85%
ANKISTRODESMUS FALCATUS	9.	0.57%
TOTAL NON-FILAMENTOUS	38.	2.33%
TOTAL CHLOROPHYTA	38.	2.33%
CHRYSOPHYTA		
DINOBRYON SOCIALE	15.	0.91%
SYNURA UVELLA	6.	0.34%
OCHROMONAS SP.	6.	0.34%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 2
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	OCCUR-RENCE
TOTAL CHRYSOPHYTA	26.	1.59%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	4.	0.27%
TOTAL FILAMENTOUS	4.	0.27%
TOTAL CYANOPHYTA	4.	0.27%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	2.	0.11%
TOTAL EUGLENOPHYTA	2.	0.11%
CRYPTOPHYTA		
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	6.	0.34%
CRYPTOMONAS OVATA	2.	0.11%
TOTAL CRYPTOPHYTA	7.	0.46%
T O T A L P H Y T O P L A N K T O N	1644.	100.00%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 3
PROJECT 4096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

TAXA	REPLICATE UNITS PER ML.	REPLICATE OCCURRENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	1057.	66.47%
STEPHANODISCUS TENUIS	64.	4.00%
CYCLOTELLA MENEGHINIANA	60.	3.76%
MELOSIRA AMBIGUA	9.	0.59%
TOTAL CENTRALES	1189.	74.83%
BACILLARIOPHYTA		
PENNALES		
NITZSCHIA LINEARIS	93.	5.88%
ASTERIONELLA FORMOSA	75.	4.71%
DIATOMA VULGARE	47.	2.94%
GOMPHONEMA PARVULUM	32.	2.00%
SYNEDRA ULNA	6.	0.35%
NAVICULA CRYPTOCEPHALA	6.	0.35%
NITZSCHIA PALEA	6.	0.35%
NITZSCHIA SP.	6.	0.35%
NITZSCHIA ACICULARIS	4.	0.24%
NAVICULA LANCEOLATA	4.	0.24%
GYROSIGMA SCALPROIDES	2.	0.12%
NAVICULA TRIPUNCTATA	2.	0.12%
NAVICULA SP.	2.	0.12%
NITZSCHIA DISSIPATA	2.	0.12%
SYNEDRA FAMELICA	2.	0.12%
TOTAL PENNALES	286.	18.00%
TOTAL BACILLARIOPHYTA	1475.	92.83%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	37.	2.35%
SCENEDESMUS ACUMINATUS	13.	0.79%
ANKISTRODESMUS FALCATUS	6.	0.35%
FRANCEIA OVALIS	4.	0.24%
TOTAL NON-FILAMENTOUS	59.	3.74%
TOTAL CHLOROPHYTA	59.	3.74%
CHRYSOPHYTA		
SYNURA UVELLA	19.	1.18%
DINOBRYON DIVERGENS	13.	0.82%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 3
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

TAXA	REPLICATE UNITS PER ML.	REPLICATE OCCUR-RENCE
TOTAL CHRYSOPHYTA	32.	2.00%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	4.	0.26%
TOTAL FILAMENTOUS	4.	0.26%
TOTAL CYANOPHYTA	4.	0.26%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	6.	0.35%
TOTAL EUGLENOPHYTA	6.	0.35%
CRYPTOPHYTA		
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	11.	0.70%
CRYPTOMONAS OVATA	2.	0.12%
TOTAL CRYPTOPHYTA	13.	0.82%
TOTAL PHYTOPLANKTON	1589.	100.00%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 4
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

TAXA	REPLICATE UNITS PER ML.	REPLICATE OCCURRENCE
BACILLARIOPHYTA CENTRALES		
STEPHANODISCUS INVISITATUS	1126.	68.37%
STEPHANODISCUS TENUIS	82.	5.00%
CYCLOTELLA MENEGHINIANA	75.	4.54%
MELOSIRA GRANULATA	13.	0.79%
MELOSIRA AMBIGUA	6.	0.34%
STEPHANODISCUS ASTRAEA	4.	0.23%
TOTAL CENTRALES	1305.	79.27%
BACILLARIOPHYTA PENNALES		
NITZSCHIA LINEARIS	92.	5.57%
ASTERIONELLA FORMOSA	71.	4.32%
DIATOMA VULGARE	37.	2.27%
GOMPHONEMA PARVULUM	26.	1.59%
NITZSCHIA SP.	15.	0.90%
NAVICULA CRYPTOCEPHALA	9.	0.57%
NAVICULA LANCEOLATA	7.	0.45%
NITZSCHIA ACICULARIS	6.	0.34%
PINNULARIA SP.	4.	0.23%
NITZSCHIA PALEA	4.	0.23%
SYNEDRA ULNA	4.	0.23%
NITZSCHIA DISSIPATA	4.	0.23%
NAVICULA VIRIDULA	2.	0.11%
NAVICULA SP.	2.	0.11%
SURIRELLA OVATA	2.	0.11%
TOTAL PENNALES	284.	17.26%
TOTAL BACILLARIOPHYTA	1589.	96.54%
CHLOROPHYTA NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	15.	0.90%
SCENEDESMUS ACUMINATUS	8.	0.51%
ANKISTRODESMUS FALCATUS	4.	0.23%
TOTAL NON-FILAMENTOUS	27.	1.65%
TOTAL CHLOROPHYTA	27.	1.65%
CHRYSOPHYTA		
DINOBRYON SOCIALE	9.	0.57%
SYNURA UVELLA	6.	0.34%
OCHROMONAS SP.	4.	0.23%
TOTAL CHRYSOPHYTA	19.	1.14%
CRYPTOPHYTA		
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	9.	0.57%
CRYPTOMONAS OVATA	2.	0.11%
TOTAL CRYPTOPHYTA	11.	0.68%
TOTAL PHYTOPLANKTON	1647.	100.00%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 5
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	OCCUR-RENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	1070.	63.52%
STEPHANODISCUS TENUIS	135.	7.99%
CYCLOTELLA MENEGHINIANA	73.	4.33%
MELOSIRA AMBIGUA	4.	0.22%
TOTAL CENTRALES	1281.	76.07%
BACILLARIOPHYTA		
PENNALES		
NITZSCHIA LINEARIS	88.	5.22%
ASTERIONELLA FORMOSA	80.	4.78%
NITZSCHIA ACICULARIS	34.	2.00%
DIATOMA VULGARE	28.	1.67%
GOMPHONEMA PARVULUM	28.	1.67%
NITZSCHIA PALEA	9.	0.56%
NAVICULA CRYPTOCEPHALA VAR. VENETA	7.	0.44%
NAVICULA LANCEOLATA	6.	0.33%
NAVICULA SP.	4.	0.22%
NITZSCHIA DISSIPATA	4.	0.22%
SYNEDRA ULNA	4.	0.22%
NAVICULA VIRIDULA	2.	0.11%
HANTZSCHIA SP.	2.	0.11%
NITZSCHIA SP.	2.	0.11%
NAVICULA CAPITATA	2.	0.11%
PINNULARIA SP.	2.	0.11%
TOTAL PENNALES	301.	17.88%
TOTAL BACILLARIOPHYTA	1582.	93.95%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	30.	1.78%
SCENEDESMUS ACUMINATUS	10.	0.58%
ANKISTRODESMUS FALCATUS	7.	0.44%
TOTAL NON-FILAMENTOUS	47.	2.80%
TOTAL CHLOROPHYTA	47.	2.80%
CHRYSOPHYTA		
SYNURA UVELLA	15.	0.88%
DINOBRYON SOCIALE	9.	0.56%
OCHROMONAS SP.	6.	0.33%

TABLE B-1 (CONT.)

JAN 8,1981
LOCATION 5
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	 OCCUR-RENCE
TOTAL CHRYSOPHYTA	30.	1.78%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	12.	0.68%
TOTAL FILAMENTOUS	12.	0.68%
TOTAL CYANOPHYTA	12.	0.68%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	4.	0.22%
TOTAL EUGLENOPHYTA	4.	0.22%
CRYPTOPHYTA		
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	7.	0.44%
CRYPTOMONAS OVATA	2.	0.11%
TOTAL CRYPTOPHYTA	9.	0.56%
T O T A L P H Y T O P L A N K T O N	1684.	100.00%

TABLE B-2

JAN 22, 1981
LOCATION 1
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	OCCUR-RENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	718.	50.51%
CYCLOTELLA MENEGHINIANA	95.	6.70%
STEPHANODISCUS TENUIS	22.	1.58%
TOTAL CENTRALES	836.	58.80%
BACILLARIOPHYTA		
PENNALES		
ASTERIONELLA FORMOSA	144.	10.13%
NITZSCHIA LINEARIS	99.	6.97%
DIATOMA VULGARE	52.	3.68%
GOMPHONEMA PARVULUM	37.	2.63%
SYNEDRA ULNA	22.	1.58%
NITZSCHIA DISSIPATA	19.	1.32%
NAVICULA CRYPTOCEPHALA	17.	1.18%
NITZSCHIA ACICULARIS	7.	0.53%
NAVICULA TRIPUNCTATA	6.	0.39%
NITZSCHIA PALEA	4.	0.26%
NITZSCHIA SP.	4.	0.26%
TOTAL PENNALES	411.	28.94%
TOTAL BACILLARIOPHYTA	1247.	87.73%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	15.	1.05%
ANKISTRODESMUS FALCATUS	7.	0.53%
SCENEDESMUS ACUMINATUS	5.	0.36%
SCENEDESMUS ABUNDANS	3.	0.20%
TOTAL NON-FILAMENTOUS	30.	2.14%
TOTAL CHLOROPHYTA	30.	2.14%
CHRYSOPHYTA		
SYNURA UVELLA	84.	5.92%
DINOBRYON SOCIALE	[illegible]7.	2.63%
OCHROMONAS SP.	22.	1.58%
TOTAL CHRYSOPHYTA	144.	10.13%
T O T A L P H Y T O P L A N K T O N	1422.	100.00%

TABLE B-2 (CONT.)

JAN 27,1981
LOCATION 2
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	OCCUR-RENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	692.	44.02%
CYCLOTELLA MENEGHINIANA	120.	7.61%
STEPHANODISCUS TENUIS	37.	2.38%
MELOSIRA AMBIGUA	9.	0.59%
TOTAL CENTRALES	858.	54.61%
BACILLARIOPHYTA		
PENNALES		
ASTERIONELLA FORMOSA	151.	9.63%
NITZSCHIA LINEARIS	108.	6.90%
DIATOMA VULGARE	45.	2.86%
GOMPHONEMA PARVULUM	32.	2.02%
SYNEDRA ULNA	28.	1.78%
NITZSCHIA ACICULARIS	17.	1.07%
NITZSCHIA DISSIPATA	9.	0.59%
NITZSCHIA PALEA	6.	0.36%
NAVICULA CRYPTOCEPHALA	4.	0.24%
TOTAL PENNALES	400.	25.46%
TOTAL BACILLARIOPHYTA	1259.	80.07%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	90.	5.71%
SCENEDESMUS ACUMINATUS	7.	0.42%
TOTAL NON-FILAMENTOUS	96.	6.13%
TOTAL CHLOROPHYTA	96.	6.13%
CHRYSOPHYTA		
SYNURA UVELLA	112.	7.13%
DINOBRYON SOCIALE	62.	3.93%
OCHROMONAS SP.	34.	2.14%
TOTAL CHRYSOPHYTA	208.	13.21%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	9.	0.59%
TOTAL EUGLENOPHYTA	9.	0.59%
T O T A L P H Y T O P L A N K T O N	1572.	100.00%

JAN 22,1981
LOCATION 3
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

TAXA	REPLICATE UNITS PER ML.	REPLICATE OCCURRENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	770.	49.74%
CYCLOTELLA MENEGHINIANA	79.	5.07%
STEPHANODISCUS TENUIS	13.	0.84%
TOTAL CENTRALES	862.	55.66%
BACILLARIOPHYTA		
PENNALES		
ASTERIONELLA FORMOSA	140.	9.05%
NITZSCHIA LINEARIS	127.	8.21%
GOMPHONEMA PARVULUM	64.	4.11%
SYNEDRA ULNA	43.	2.78%
DIATOMA VULGARE	36.	2.29%
NITZSCHIA ACICULARIS	19.	1.21%
NAVICULA CRYPTOCEPHALA	13.	0.84%
NITZSCHIA DISSIPATA	11.	0.72%
NITZSCHIA PALEA	6.	0.36%
NAVICULA TRIPUNCTATA	2.	0.12%
TOTAL PENNALES	460.	29.70%
TOTAL BACILLARIOPHYTA	1322.	85.36%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	31.	2.02%
SCENEDESMUS ACUMINATUS	14.	0.90%
SCENEDESMUS ABUNDANS	3.	0.18%
TOTAL NON-FILAMENTOUS	48.	3.11%
TOTAL CHLOROPHYTA	48.	3.11%
CHRYSOPHYTA		
SYNURA UVELLA	95.	6.16%
DINOBRYON SOCIALE	47.	3.02%
OCHROMONAS SP.	24.	1.57%
TOTAL CHRYSOPHYTA	166.	10.75%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	7.	0.42%
TOTAL FILAMENTOUS	7.	0.42%
TOTAL CYANOPHYTA	7.	0.42%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	6.	0.36%
TOTAL EUGLENOPHYTA	6.	0.36%
TOTAL PHYTOPLANKTON	1549.	100.00%

TABLE B-2 (CONT.)

JAN 27,1981
LOCATION 4
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	R E P L I C A T E UNITS PER ML.	OCCUR-RENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	737.	46.88%
CYCLOTELLA MENEGHINIANA	105.	6.68%
STEPHANODISCUS TENUIS	22.	1.43%
TOTAL CENTRALES	864.	54.95%
BACILLARIOPHYTA		
PENNALES		
ASTERIONELLA FORMOSA	135.	8.58%
NITZSCHIA LINEARIS	114.	7.25%
GOMPHONEMA PARVULUM	45.	2.85%
SYNEDRA ULNA	30.	1.90%
NITZSCHIA ACICULARIS	24.	1.55%
DIATOMA VULGARE	22.	1.43%
NAVICULA CRYPTOCEPHALA	19.	1.19%
NITZSCHIA DISSIPATA	15.	0.95%
NITZSCHIA PALEA	11.	0.71%
NAVICULA SP.	7.	0.48%
NITZSCHIA PSEUDOFONTICOLA	4.	0.24%
PINNULARIA SP.	4.	0.24%
TOTAL PENNALES	430.	27.36%
TOTAL BACILLARIOPHYTA	1294.	82.31%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	60.	3.81%
SCENEDESMUS ACUMINATUS	8.	0.54%
SCENEDESMUS LONGUS	5.	0.30%
SCENEDESMUS ABUNDANS	4.	0.27%
TOTAL NON-FILAMENTOUS	77.	4.91%
TOTAL CHLOROPHYTA	77.	4.91%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	3.	0.18%
TOTAL FILAMENTOUS	3.	0.18%
TOTAL CYANOPHYTA	3.	0.18%
EUGLENOPHYTA		
EUGLENA POLYMORPHA	2.	0.12%
TOTAL EUGLENOPHYTA	2.	0.12%
T O T A L P H Y T O P L A N K T O N	1572.	100.00%

TABLE B-2 (CONT.)

JAN 22,1981
LOCATION 5
PROJECT 9096

IDENTIFICATION AND ABUNDANCE OF PHYTOPLANKTON TAXA COLLECTED IN CEDAR RIVER NEAR THE DUANE ARNOLD ENERGY CENTER.

T A X A	REPLICATE UNITS PER ML.	REPLICATE OCCUR-RENCE
BACILLARIOPHYTA		
CENTRALES		
STEPHANODISCUS INVISITATUS	727.	48.37%
CYCLOTELLA MENEGHINIANA	90.	5.97%
STEPHANODISCUS TENUIS	34.	2.24%
MELOSIRA AMBIGUA	9.	0.62%
STEPHANODISCUS ASTRAEA	2.	0.12%
TOTAL CENTRALES	862.	57.32%
BACILLARIOPHYTA		
PENNALES		
ASTERIONELLA FORMOSA	131.	8.70%
NITZSCHIA LINEARIS	114.	7.58%
GOMPHONEMA PARVULUM	49.	3.23%
DIATOMA VULGARE	39.	2.61%
NITZSCHIA ACICULARIS	22.	1.49%
NAVICULA CRYPTOCEPHALA	15.	0.99%
NITZSCHIA DISSIPATA	9.	0.62%
CYMBELLA SP.	4.	0.25%
TOTAL PENNALES	383.	25.49%
TOTAL BACILLARIOPHYTA	1245.	82.82%
CHLOROPHYTA		
NON-FILAMENTOUS		
COELASTRUM CAMBRICUM	30.	1.99%
SCENEDESMUS ACUMINATUS	8.	0.56%
ANKISTRODESMUS FALCATUS	6.	0.37%
SCENEDESMUS LONGUS	5.	0.31%
TOTAL NON-FILAMENTOUS	49.	3.23%
TOTAL CHLOROPHYTA	49.	3.23%
CHRYSOPHYTA		
SYNURA UVELLA	103.	6.83%
DINOBRYON SOCIALE	71.	4.73%
OCHROMONAS SP.	30.	1.99%
TOTAL CHRYSOPHYTA	204.	13.55%
CYANOPHYTA		
FILAMENTOUS		
OSCILLATORIA TENUIS	6.	0.40%
TOTAL FILAMENTOUS	6.	0.40%
TOTAL CYANOPHYTA	6.	0.40%
T O T A L P H Y T O P L A N K T O N	1504.	100.00%

TABLE B-3 SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1 SAMPLING DATE=02/04/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 1

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
ASTERIONELLA FORMOSA	48.20	48.20	3.01
NITZSCHIA LINEARIS	85.06	85.06	5.32
NITZSCHIA PALEA	99.24	99.24	6.21
MELOSIRA GRANULATA	5.67	5.67	0.35
SKELETONEMA POTAMOS	59.54	59.54	3.72
NITZSCHIA ACICULARIS	8.51	8.51	0.53
STEPHANODISCUS INVISITATUS	1100.12	1100.12	68.79
MELOSIRA AMBIGUA	14.18	14.18	0.89
NITZSCHIA	5.67	5.67	0.35
NITZSCHIA LAUENBURGIANA	8.51	8.51	0.53
NAVICULA	8.51	8.51	0.53
NAVICULA TRIPUNCTATA	2.84	2.84	0.18
DIATOMA VULGARE	31.19	31.19	1.95
MERIDION CIRCULARE	5.67	5.67	0.35
NITZSCHIA DISSIPATA	2.84	2.84	0.18
CYCLOTELLA MENEGHINIANA	42.53	42.53	2.66
SYNEDRA ULNA	28.35	28.35	1.77
SYNEDRA	5.67	5.67	0.35
SCENEDESMUS ACUMINATUS	9.21	9.21	0.58
SCENEDESMUS LONGISPINA	4.25	4.25	0.27
DINOBRYON SOCIALE	8.51	8.51	0.53
CRYPTOMONAS OVATA	2.84	2.84	0.18
SCENEDESMUS LONGUS	3.54	3.54	0.22
ANKISTRODESMUS FALCATUS	5.67	5.67	0.35
ANKISTRODESMUS SPIRALIS	2.84	2.84	0.18
TOTALS	1599.15	1599.15	100.0

TABLE B-3 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/04/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 1

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
2	BACILLARIOPHYTA	PENNALES	340.24	340.24	21.28
1	BACILLARIOPHYTA	CENTRALES	1222.05	1222.05	76.42
3	CHLOROPHYTA	NON-FILAMENTOUS	25.52	25.52	1.60
5	CHRYSOPHYTA		8.51	8.51	0.53
14	CRYPTOPHYTA		2.84	2.84	0.18
		TOTALS	1599.15	1599.15	100.0

TABLE B-3 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/04/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 2

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
STEPHANODISCUS INVISITATUS	1071.77	1071.77	69.69
CYCLOTELLA MENEGHINIANA	42.53	42.53	2.77
ASTERIONELLA FORMOSA	34.02	34.02	2.21
GOMPHONEMA PARVULUM	76.56	76.56	4.98
NITZSCHIA LINEARIS	102.07	102.07	6.64
NITZSCHIA PALEA	87.90	87.90	5.72
DIATOMA VULGARE	8.51	8.51	0.55
SYNEDRA ULNA	22.68	22.68	1.47
NAVICULA	19.85	19.85	1.29
NITZSCHIA ACICULARIS	8.51	8.51	0.55
NITZSCHIA DISSIPATA	5.67	5.67	0.37
NAVICULA LANCEOLATA	2.84	2.84	0.18
NAVICULA TRIPUNCTATA	2.84	2.84	0.18
MELOSIRA AMBIGUA	14.18	14.18	0.92
ANKISTRODESMUS FALCATUS	5.67	5.67	0.37
DINOBRYON SOCIALE	8.51	8.51	0.55
SCENEDESMUS ACUMINATUS	9.21	9.21	0.60
OSCILLATORIA	6.80	6.80	0.44
DICTYOSPHAERIUM PULCHELLUM	7.80	7.80	0.51
TOTALS	1537.91	1537.91	100.0

TABLE B-3 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/04/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2
STATIONS PICKED = 2

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	1128.48	1128.48	73.38
2	BACILLARIOPHYTA	PENNALES	371.43	371.43	24.15
3	CHLOROPHYTA	NON-FILAMENTOUS	22.68	22.68	1.47
5	CHRYSOPHYTA		8.51	8.51	0.55
7	CYANOPHYTA	FILAMENTOUS	6.80	6.80	0.44
		TOTALS	1537.91	1537.91	100.0

TABLE B-3 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/04/81   UNITS = #/ML   TYPE = SPECIES TOTALS   PAGE = 1
STATIONS PICKED = 3

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
DIATOMA VULGARE	14.18	14.18	0.84
STEPHANODISCUS INVISITATUS	1091.62	1091.62	64.77
GOMPHONEMA PARVULUM	90.73	90.73	5.38
SKELETONEMA POTAMOS	34.02	34.02	2.02
NITZSCHIA PALEA	107.74	107.74	6.39
NITZSCHIA LINEARIS	99.24	99.24	5.89
NITZSCHIA LAUENBURGIANA	17.01	17.01	1.01
NITZSCHIA DISSIPATA	5.67	5.67	0.34
NITZSCHIA ACICULARIS	2.84	2.84	0.17
CYCLOTELLA MENEGHINIANA	31.19	31.19	1.85
SYNEDRA ULNA	39.70	39.70	2.36
ASTERIONELLA FORMOSA	51.04	51.04	3.03
MELOSIRA AMBIGUA	8.51	8.51	0.50
NAVICULA	17.01	17.01	1.01
NAVICULA TRIPUNCTATA	2.84	2.84	0.17
GYROSIGMA SCALPROIDES	2.84	2.84	0.17
DINOBRYON SOCIALE	22.68	22.68	1.35
SCENEDESMUS ABUNDANS	3.54	3.54	0.21
SCENEDESMUS ACUMINATUS	7.09	7.09	0.42
DICTYOSPHAERIUM PULCHELLUM	5.67	5.67	0.34
OSCILLATORIA	4.82	4.82	0.29
ANKISTRODESMUS FALCATUS	5.67	5.67	0.34
CRYPTOMONAS OVATA	2.84	2.84	0.17
EUGLENA	2.84	2.84	0.17
TRACHELOMONAS HISPIDA	8.51	8.51	0.50
MELOSIRA GRANULATA	5.67	5.67	0.34
TOTALS	16[illegible]49	1685.49	100.0

B-23

TABLE B-3 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/04/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2
STATIONS PICKED = 3

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
2	BACILLARIOPHYTA	PENNALES	450.82	450.82	26.75
1	BACILLARIOPHYTA	CENTRALES	1171.01	1171.01	69.48
5	CHRYSOPHYTA		22.68	22.68	1.35
3	CHLOROPHYTA	NON-FILAMENTOUS	21.97	21.97	1.30
7	CYANOPHYTA	FILAMENTOUS	4.82	4.82	0.29
14	CRYPTOPHYTA		2.84	2.84	0.17
8	EUGLENOPHYTA		11.34	11.34	0.67
		TOTALS	1685.49	1685.49	100.0

TABLE B-3 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/04/81   UNITS = #/ML   TYPE = SPECIES TOTALS   PAGE = 1
STATIONS PICKED = 4

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
STEPHANODISCUS INVISITATUS	1111.47	1111.47	65.71
NITZSCHIA ACICULARIS	8.51	8.51	0.50
ASTERIONELLA FORMOSA	22.68	22.68	1.34
CYCLOTELLA MENEGHINIANA	59.54	59.54	3.52
GOMPHONEMA PARVULUM	107.74	107.74	6.37
NITZSCHIA LINEARIS	121.92	121.92	7.21
DIATOMA VULGARE	8.51	8.51	0.50
SYNEDRA ULNA	36.86	36.86	2.18
MELOSIRA AMBIGUA	5.67	5.67	0.34
MELOSIRA GRANULATA	5.67	5.67	0.34
NITZSCHIA LAUENBURGIANA	8.51	8.51	0.50
NITZSCHIA PALEA	90.73	90.73	5.36
SKELETONEMA POTAMOS	53.87	53.87	3.18
NAVICULA	14.18	14.18	0.84
OSCILLATORIA	10.77	10.77	0.64
TRACHELOMONAS HISPIDA	2.84	2.84	0.17
ANKISTRODESMUS SPIRALIS	2.84	2.84	0.17
ANKISTRODESMUS FALCATUS	5.67	5.67	0.34
CRYPTOMONAS OVATA	5.67	5.67	0.34
EUGLENA POLYMORPHA	2.84	2.84	0.17
SCENEDESMUS ACUMINATUS	4.96	4.96	0.29
TOTALS	1691.44	1691.44	100.0

TABLE B-3 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/04/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 4

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	1236.22	1236.22	73.09
2	BACILLARIOPHYTA	PENNALES	419.64	419.64	24.81
7	CYANOPHYTA	FILAMENTOUS	10.77	10.77	0.64
8	EUGLENOPHYTA		5.67	5.67	0.34
3	CHLOROPHYTA	NON-FILAMENTOUS	13.47	13.47	0.80
14	CRYPTOPHYTA		5.67	5.67	0.34
		TOTALS	1691.44	1691.44	100.0

TABLE B-3 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/04/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 5

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
CYCLOTELLA MENEGHINIANA	93.57	93.57	4.80
STEPHANODISCUS INVISITATUS	1145.49	1145.49	58.76
NITZSCHIA PALEA	144.60	144.60	7.42
SKELETONEMA POTAMOS	79.39	79.39	4.07
MELOSIRA GRANULATA	11.34	11.34	0.58
NITZSCHIA LINEARIS	161.62	161.62	8.29
NITZSCHIA LAUENBURGIANA	17.01	17.01	0.87
GOMPHONEMA PARVULUM	127.59	127.59	6.55
SYNEDRA ULNA	51.04	51.04	2.62
NITZSCHIA PSEUDOFONTICOLA	2.84	2.84	0.15
MERIDION CIRCULARE	2.84	2.84	0.15
ASTERIONELLA FORMOSA	11.34	11.34	0.58
DIATOMA VULGARE	17.01	17.01	0.87
NAVICULA	25.52	25.52	1.31
GOMPHONEMA ABBREVIATUM	5.67	5.67	0.29
NITZSCHIA ACICULARIS	2.84	2.84	0.15
NAVICULA TRIPUNCTATA	2.84	2.84	0.15
NITZSCHIA	5.67	5.67	0.29
SCENEDESMUS LONGISPINA	8.51	8.51	0.44
TRACHELOMONAS	2.84	2.84	0.15
DINOBRYON SOCIALE	5.67	5.67	0.29
SCENEDESMUS ACUMINATUS	7.09	7.09	0.36
SCENEDESMUS ABUNDANS	2.84	2.84	0.15
GYROSIGMA SCALPROIDES	2.84	2.84	0.15
NITZSCHIA DISSIPATA	8.51	8.51	0.44
FRUSTULIA	2.84	2.84	0.15
TOTALS	1949.32	1949.32	100.0

TABLE B-3 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/04/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 5

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	1329.79	1329.79	68.22
2	BACILLARIOPHYTA	PENNALES	592.59	592.59	30.40
3	CHLOROPHYTA	NON-FILAMENTOUS	18.43	18.43	0.95
8	EUGLENOPHYTA		2.84	2.84	0.15
5	CHRYSOPHYTA		5.67	5.67	0.29
		TOTALS	1949.32	1949.32	100.0

TABLE B-4 SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 1

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
STEPHANODISCUS INVISITATUS	4933.55	4933.55	47.12
NITZSCHIA LINEARIS	2254.12	2254.12	21.53
GOMPHONEMA PARVULUM	1219.21	1219.21	11.65
DIATOMA VULGARE	311.89	311.89	2.98
NAVICULA TRIPUNCTATA	42.53	42.53	0.41
SYNEDRA ULNA	198.48	198.48	1.90
NITZSCHIA LAUENBURGIANA	70.88	70.88	0.68
NAVICULA	255.18	255.18	2.44
DICTYOSPHAERIUM PULCHELLUM	95.69	95.69	0.91
NITZSCHIA PALEA	141.77	141.77	1.35
NAVICULA LANCEOLATA	56.71	56.71	0.54
NITZSCHIA ACICULARIS	113.41	113.41	1.08
SYNEDRA	14.18	14.18	0.14
ASTERIONELLA FORMOSA	212.65	212.65	2.03
NITZSCHIA DISSIPATA	99.24	99.24	0.95
SCENEDESMUS ACUMINATUS	60.25	60.25	0.58
SCENEDESMUS ABUNDANS	35.44	35.44	0.34
ANKISTRODESMUS FALCATUS	70.88	70.88	0.68
COELASTRUM CAMBRICUM	226.83	226.83	2.17
PERIDINIUM	56.71	56.71	0.54
TOTALS	10469.61	10469.61	100.0

TABLE B-4 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/19/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2
STATIONS PICKED = 1

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	4933.55	4933.55	47.12
2	BACILLARIOPHYTA	PENNALES	4990.25	4990.25	47.66
3	CHLOROPHYTA	NON-FILAMENTOUS	489.10	489.10	4.67
10	PYRRHOPHYTA		56.71	56.71	0.54
		TOTALS	10469.61	10469.61	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 2

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
STEPHANODISCUS INVISITATUS	4990.25	4990.25	40.61
GOMPHONEMA PARVULUM	2707.78	2707.78	22.04
NITZSCHIA LINEARIS	2480.95	2480.95	20.19
DIATOMA VULGARE	368.60	368.60	3.00
NITZSCHIA PALEA	184.30	184.30	1.50
NITZSCHIA LAUENBURGIANA	99.24	99.24	0.81
ASTERIONELLA FORMOSA	311.89	311.89	2.54
NITZSCHIA ACICULARIS	56.71	56.71	0.46
NITZSCHIA FRUSTULUM	14.18	14.18	0.12
NITZSCHIA COMMUNIS	14.18	14.18	0.12
NAVICULA TRIPUNCTATA	28.35	28.35	0.23
NAVICULA LANCEOLATA	42.53	42.53	0.35
NAVICULA	269.36	269.36	2.19
SYNEDRA ULNA	255.18	255.18	2.08
CYMBELLA	14.18	14.18	0.12
FRUSTULIA	14.18	14.18	0.12
NITZSCHIA DISSIPATA	28.35	28.35	0.23
CALONEIS BACILLUM	28.35	28.35	0.23
NITZSCHIA ANGUSTATA	14.18	14.18	0.12
NITZSCHIA	113.41	113.41	0.92
UNIDENTIFIED DINOFLAGELLATE	42.53	42.53	0.35
SCENEDESMUS ABUNDANS	28.35	28.35	0.23
SCENEDESMUS ACUMINATUS	74.43	74.43	0.61
SCENEDESMUS LONGUS	14.18	14.18	0.12
ANKISTRODESMUS FALCATUS	42.53	42.53	0.35
ANKISTRODESMUS SPIRALIS	14.18	14.18	0.12
DICTYOSPHAERIUM PULCHELLUM	35.44	35.44	0.29
TOTALS	12287.79	12287.79	100.0

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TABLE B-4 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/19/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2
STATIONS PICKED = 2

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	4990.25	4990.25	40.61
2	BACILLARIOPHYTA	PENNALES	7045.90	7045.90	57.34
10	PYRRHOPHYTA		42.53	42.53	0.35
3	CHLOROPHYTA	NON-FILAMENTOUS	209.11	209.11	1.70
		TOTALS	12287.79	12287.79	100.0

TABLE B-4 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 3

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
GOMPHONEMA PARVULUM	1318.45	1318.45	11.79
NITZSCHIA LINEARIS	2438.42	2438.42	21.81
SYNEDRA ULNA	311.89	311.89	2.79
STEPHANODISCUS INVISITATUS	5046.96	5046.96	45.13
NITZSCHIA PALEA	212.65	212.65	1.90
CYCLOTELLA MENEGHINIANA	70.88	70.88	0.63
NAVICULA TRIPUNCTATA	28.35	28.35	0.25
NAVICULA	170.12	170.12	1.52
NITZSCHIA FRUSTULUM	14.18	14.18	0.13
NITZSCHIA ACICULARIS	155.95	155.95	1.39
ASTERIONELLA FORMOSA	255.18	255.18	2.28
DIATOMA VULGARE	226.83	226.83	2.03
NITZSCHIA LAUENBURGIANA	113.41	113.41	1.01
NITZSCHIA	141.77	141.77	1.27
NITZSCHIA DISSIPATA	28.35	28.35	0.25
MELOSIRA AMBIGUA	28.35	28.35	0.25
GYROSIGMA	28.35	28.35	0.25
NAVICULA VIRIDULA	14.18	14.18	0.13
NAVICULA LANCEOLATA	42.53	42.53	0.38
CALONEIS BACILLUM	14.18	14.18	0.13
ANKISTRODESMUS SPIRALIS	28.35	28.35	0.25
SCENEDESMUS ACUMINATUS	49.62	49.62	0.44
COELASTRUM CAMBRICUM	113.41	113.41	1.01
SCENEDESMUS LONGISPINA	17.72	17.72	0.16
PERIDINIUM	56.71	56.71	0.51
ANKISTRODESMUS FALCATUS	85.06	85.06	0.76
SURIRELLA OVATA	14.18	14.18	0.13
MELOSIRA GRANULATA	42.53	42.53	0.38
SKELETONEMA POTAMOS	113.41	113.41	1.01
TOTALS	11182.00	11182.00	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 3

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
2	BACILLARIOPHYTA	PENNALES	5528.98	5528.98	49.45
1	BACILLARIOPHYTA	CENTRALES	5302.15	5302.15	47.42
3	CHLOROPHYTA	NON-FILAMENTOUS	294.17	294.17	2.63
10	PYRRHOPHYTA		56.71	56.71	0.51
		TOTALS	11182.00	11182.00	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 4

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
STEPHANODISCUS INVISITATUS	5557.33	5557.33	49.62
ASTERIONELLA FORMOSA	269.36	269.36	2.41
NITZSCHIA LINEARIS	2339.18	2339.18	20.89
GOMPHONEMA PARVULUM	1162.50	1162.50	10.38
DIATOMA VULGARE	368.60	368.60	3.29
NITZSCHIA DISSIPATA	42.53	42.53	0.38
NITZSCHIA PALEA	198.48	198.48	1.77
NITZSCHIA ANGUSTATA	14.18	14.18	0.13
NITZSCHIA FRUSTULUM	14.18	14.18	0.13
NAVICULA TRIPUNCTATA	28.35	28.35	0.25
NAVICULA	198.48	198.48	1.77
NITZSCHIA LAUENBURGIANA	127.59	127.59	1.14
SYNEDRA ULNA	241.01	241.01	2.15
NITZSCHIA ACICULARIS	184.30	184.30	1.65
NITZSCHIA	28.35	28.35	0.25
CYMBELLA	14.18	14.18	0.13
NAVICULA LANCEOLATA	14.18	14.18	0.13
SYNEDRA	14.18	14.18	0.13
SCENEDESMUS ACUMINATUS	106.33	106.33	0.95
SCENEDESMUS ABUNDANS	21.27	21.27	0.19
COELASTRUM CAMBRICUM	113.41	113.41	1.01
PERIDINIUM	42.53	42.53	0.38
EUGLENA	14.18	14.18	0.13
ANKISTRODESMUS FALCATUS	70.88	70.88	0.63
SCENEDESMUS	14.18	14.18	0.13
TOTALS	11199.72	11199.72	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 4

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	5557.33	5557.33	49.62
2	BACILLARIOPHYTA	PENNALES	5259.62	5259.62	46.96
3	CHLOROPHYTA	NON-FILAMENTOUS	326.07	326.07	2.91
10	PYRRHOPHYTA		42.53	42.53	0.38
8	EUGLENOPHYTA		14.18	14.18	0.13
		TOTALS	11199.72	11199.72	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 5

SPECIES	REP 1	TOTALS	PERCENT OCCURANCE
DIATOMA VULGARE	212.65	212.65	2.00
SKELETONEMA POTAMOS	113.41	113.41	1.06
NITZSCHIA LINEARIS	2622.72	2622.72	24.62
GOMPHONEMA PARVULUM	1020.73	1020.73	9.58
ASTERIONELLA FORMOSA	170.12	170.12	1.60
NITZSCHIA PALEA	212.65	212.65	2.00
NITZSCHIA	113.41	113.41	1.06
NAVICULA	155.95	155.95	1.46
MELOSIRA AMBIGUA	85.06	85.06	0.80
STEPHANODISCUS INVISITATUS	5316.32	5316.32	49.90
CYCLOTELLA MENEGHINIANA	85.06	85.06	0.80
NITZSCHIA DISSIPATA	14.18	14.18	0.13
NITZSCHIA PSEUDOFONTICOLA	14.18	14.18	0.13
SYNEDRA ULNA	226.83	226.83	2.13
NAVICULA LANCEOLATA	28.35	28.35	0.27
NAVICULA TRIPUNCTATA	28.35	28.35	0.27
ANKISTRODESMUS FALCATUS	99.24	99.24	0.93
ANKISTRODESMUS SPIRALIS	28.35	28.35	0.27
NITZSCHIA LAUENBURGIANA	56.71	56.71	0.53
SCENEDESMUS ACUMINATUS	49.62	49.62	0.47
TOTALS	10653.91	10653.91	100.0

TABLE B-4 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=02/19/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2
STATIONS PICKED = 5

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
2	BACILLARIOPHYTA	PENNALES	4876.84	4876.84	45.78
1	BACILLARIOPHYTA	CENTRALES	5599.86	5599.86	52.56
3	CHLOROPHYTA	NON-FILAMENTOUS	177.21	177.21	1.66
		TOTALS	10653.91	10653.91	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = IN

SPECIES	CODE			REP 1	TOTALS	PERCENT OCCURANCE
STEPHANODISCUS INVISITATUS	1	10	10	6096.05	6096.05	45.01
GOMPHONEMA PARVULUM	2	28	38	1672.87	1672.87	12.35
DIATOMA VULGARE	2	20	11	467.84	467.84	3.45
ASTERIONELLA FORMOSA	2	8	2	155.95	155.95	1.15
NITZSCHIA LINEARIS	2	35	15	3430.80	3430.80	25.33
NITZSCHIA LAUENBURGIANA	2	35	51	113.41	113.41	0.84
NAVICULA	2	33	0	184.30	184.30	1.36
NAVICULA LANCEOLATA	2	33	249	28.35	28.35	0.21
NITZSCHIA PALEA	2	35	17	99.24	99.24	0.73
NITZSCHIA ACICULARIS	2	35	1	56.71	56.71	0.42
NITZSCHIA DISSIPATA	2	35	9	28.35	28.35	0.21
NITZSCHIA ANGUSTATA	2	35	3	14.18	14.18	0.10
SYNEDRA ULNA	2	44	60	269.36	269.36	1.99
NITZSCHIA	2	35	0	70.88	70.88	0.52
SYNEDRA	2	44	0	28.35	28.35	0.21
NAVICULA TRIPUNCTATA	2	33	477	14.18	14.18	0.10
CYMBELLA	2	18	0	14.18	14.18	0.10
FRUSTULIA	2	26	0	14.18	14.18	0.10
ANKISTRODESMUS FALCATUS	3	4	4	28.35	28.35	0.21
ANKISTRODESMUS SPIRALIS	3	4	12	14.18	14.18	0.10
PERIDINIUM	10	14	0	70.88	70.88	0.52
SCENEDESMUS ACUMINATUS	3	115	6	106.33	106.33	0.79
COELASTRUM CAMBRICUM	3	30	1	453.66	453.66	3.35
DICTYOSPHAERIUM PULCHELLUM	3	42	2	60.25	60.25	0.44
SCENEDESMUS LONGUS	3	115	30	21.27	21.27	0.16
SCENEDESMUS ABUNDANS	3	115	1	28.35	28.35	0.21
TOTALS				13542.45	13542.45	100.0

TABLE B-4 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=02/19/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = IN

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURANCE
1	BACILLARIOPHYTA	CENTRALES	6096.05	6096.05	45.01
2	BACILLARIOPHYTA	PENNALES	6663.12	6663.12	49.20
3	CHLOROPHYTA	NON-FILAMENTOUS	712.39	712.39	5.26
10	PYRRHOPHYTA		70.88	70.88	0.52
		TOTALS	13542.45	13542.45	100.0

TABLE B-5 SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 1

SPECIES	REP 1	TOTALS	PERCENT OCCURRENCE
STEPHANODISCUS INVISITATUS	34033.92	34033.92	67.42
NAVICULA DECUSSIS	37.40	37.40	0.07
NAVICULA TRIPUNCTATA	149.60	149.60	0.30
NAVICULA LANCEOLATA	261.80	261.80	0.52
NAVICULA	112.20	112.20	0.22
NITZSCHIA	299.20	299.20	0.59
CYCLOTELLA MENEGHINIANA	261.80	261.80	0.52
ASTERIONELLA FORMOSA	1234.20	1234.20	2.44
NITZSCHIA PALEA	187.00	187.00	0.37
BACILLARIA PARADOXA	74.80	74.80	0.15
NITZSCHIA DISSIPATA	74.80	74.80	0.15
NITZSCHIA ACICULARIS	6993.76	6993.78	13.85
NITZSCHIA LINEARIS	710.60	710.60	1.41
SYNEDRA ULNA	336.60	336.60	0.67
DIATOMA VULGARE	224.40	224.40	0.44
GYROSIGMA	37.40	37.40	0.07
GOMPHONEMA PARVULUM	935.00	935.00	1.85
DINOBRYON SERTULARIA	860.20	860.20	1.70
DINOBRYON DIVERGENS	299.20	299.20	0.59
CRYPTOMONAS OVATA	74.80	74.80	0.15
EUGLENA POLYMORPHA	112.20	112.20	0.22
DICHOTOMOCOCCUS LUNATUS	93.50	93.50	0.19
SCENEDESMUS ACUMINATUS	158.95	158.95	0.31
OCHROMONAS	374.00	374.00	0.74
CHLAMYDOMONAS	2543.19	2543.19	5.04
TOTALS	50480.53	50480.53	100.0

TABLE B-5 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = PHYLA TOTALS
STATIONS PICKED = 1

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURRENCE
1	BACILLARIOPHYTA	CENTRALES	34295.72	34295.72	67.94
2	BACILLARIOPHYTA	PENNALES	11668.77	11668.77	23.12
5	CHRYSOPHYTA		1626.90	1626.90	3.22
14	CRYPTOPHYTA		74.80	74.80	0.15
8	EUGLENOPHYTA		112.20	112.20	0.22
3	CHLOROPHYTA	NON-FILAMENTOUS	2702.14	2702.14	5.35
		TOTALS	50480.53	50480.53	100.0

TABLE B-5 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 2

SPECIES	REP 1	TOTALS	PERCENT OCCURRENCE
NITZSCHIA LINEARIS	897.60	897.60	1.57
SYNEDRA ULNA	1084.60	1084.60	1.90
NAVICULA TRIPUNCTATA	187.00	187.00	0.33
SURIRELLA OVATA	37.40	37.40	0.07
NAVICULA	336.60	336.60	0.59
DIATOMA VULGARE	598.40	598.40	1.05
NITZSCHIA PALEA	74.80	74.80	0.13
NITZSCHIA DISSIPATA	74.80	74.80	0.13
STEPHANODISCUS INVISITATUS	38147.91	38147.91	66.73
NAVICULA DECUSSIS	112.20	112.20	0.20
NAVICULA LANCEOLATA	336.60	336.60	0.59
NITZSCHIA	224.40	224.40	0.39
NITZSCHIA ACICULARIS	8265.38	8265.38	14.46
MELOSIRA AMBIGUA	74.80	74.80	0.13
STEPHANODISCUS ASTRAEA	149.60	149.60	0.26
GYROSIGMA	37.40	37.40	0.07
ASTERIONELLA FORMOSA	1720.40	1720.40	3.01
DINOBRYON DIVERGENS	149.60	149.60	0.26
DINOBRYON SERTULARIA	1084.60	1084.60	1.90
CRYPTOMONAS OVATA	74.80	74.80	0.13
OCHROMONAS	112.20	112.20	0.20
SCENEDESMUS ABUNDANS	93.50	93.50	0.16
SCENEDESMUS ACUMINATUS	112.20	112.20	0.20
GOMPHONEMA PARVULUM	486.20	486.20	0.85
CHLAMYDOMONAS	2692.79	2692.79	4.71
TOTALS	57165.76	57165.76	100.0

TABLE B-5 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 2

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURRENCE
2	BACILLARIOPHYTA	PENNALES	14473.77	14473.77	25.32
1	BACILLARIOPHYTA	CENTRALES	38372.31	38372.31	67.12
5	CHRYSOPHYTA		1346.40	1346.40	2.36
14	CRYPTOPHYTA		74.80	74.80	0.13
3	CHLOROPHYTA	NON-FILAMENTOUS	2898.49	2898.49	5.07
		TOTALS	57165.77	57165.77	100.0

TABLE B-5 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 3

SPECIES	REP 1	TOTALS	PERCENT OCCURRENCE
STEPHANODISCUS INVISITATUS	36726.71	36726.71	66.20
ASTERIONELLA FORMOSA	1421.20	1421.20	2.56
SYNEDRA ULNA	860.20	860.20	1.55
DIATOMA VULGARE	299.20	299.20	0.54
NITZSCHIA ACICULARIS	7517.38	7517.38	13.55
NITZSCHIA PALEA	112.20	112.20	0.20
NITZSCHIA DISSIPATA	74.80	74.80	0.13
NITZSCHIA PARVULA	74.80	74.80	0.13
NITZSCHIA LINEARIS	598.40	598.40	1.08
NAVICULA TRIPUNCTATA	336.60	336.60	0.61
NAVICULA LANCEOLATA	561.00	561.00	1.01
NAVICULA	224.40	224.40	0.40
CHLAMYDOMONAS SPP.	3104.19	3104.19	5.60
DINOBRYON SERTULARIA	1196.80	1196.80	2.16
SCENEDESMUS ACUMINATUS	617.10	617.10	1.11
SCENEDESMUS ABUNDANS	121.55	121.55	0.22
OSCILLATORIA TENUIS	127.16	127.16	0.23
CRYPTOMONAS OVATA	149.60	149.60	0.27
GOMPHONEMA PARVULUM	299.20	299.20	0.54
DICTYOSPHAERIUM PULCHELLUM	233.75	233.75	0.42
OCHROMONAS	187.00	187.00	0.34
ANKISTRODESMUS FALCATUS	336.60	336.60	0.61
EUGLENA POLYMORPHA	149.60	149.60	0.27
NAVICULA DECUSSIS	74.80	74.80	0.13
SURIRELLA OVATA	37.40	37.40	0.07
CYMATOPLEURA SOLEA	37.40	37.40	0.07
TOTALS	55479.03	55479.03	100.0

TABLE B-5 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=03/05/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2

STATIONS PICKED = 3

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURRENCE
1	BACILLARIOPHYTA	CENTRALES	36726.71	36726.71	66.20
2	BACILLARIOPHYTA	PENNALES	12528.97	12528.97	22.58
3	CHLOROPHYTA	NON-FILAMENTOUS	4413.19	4413.19	7.95
5	CHRYSOPHYTA		1383.80	1383.80	2.49
7	CYANOPHYTA	FILAMENTOUS	127.16	127.16	0.23
14	CRYPTOPHYTA		149.60	149.60	0.27
8	EUGLENOPHYTA		149.60	149.60	0.27
		TOTALS	55479.04	[illegible]479.04	100.0

TABLE B-5 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 4

SPECIES	REF 1	TOTALS	PERCENT OCCURRENCE
ASTERIONELLA FORMOSA	1683.00	1683.00	3.47
NITZSCHIA ACICULARIS	6283.19	6283.19	12.94
STEPHANODISCUS INVISITATUS	31079.32	31079.32	64.03
CYCLOTELLA MENEGHINIANA	411.40	411.40	0.85
STEPHANODISCUS ASTRAEA	748.00	748.00	1.54
NITZSCHIA LINEARIS	523.60	523.60	1.08
NITZSCHIA DISSIPATA	74.80	74.80	0.15
SYNEDRA ULNA	448.80	448.80	0.92
GOMPHONEMA PARVULUM	149.60	149.60	0.31
NAVICULA LANCEOLATA	299.20	299.20	0.62
NAVICULA TRIPUNCTATA	187.00	187.00	0.39
DIATOMA VULGARE	411.40	411.40	0.85
NAVICULA	561.00	561.00	1.16
DINOBRYON SERTULARIA	972.40	972.40	2.00
CRYPTOMONAS OVATA	187.00	187.00	0.39
SCENEDESMUS ACUMINATUS	383.35	383.35	0.79
ANKISTRODESMUS FALCATUS	261.80	261.80	0.54
DICHOTOMOCOCCUS LUNATUS	140.25	140.25	0.29
SCENEDESMUS ABUNDANS	84.15	84.15	0.17
CRUCIGENIA QUADRATA	37.40	37.40	0.08
EUGLENA POLYMORPHA	112.20	112.20	0.23
DICTYOSPHAERIUM PULCHELLUM	168.30	168.30	0.35
GYROSIGMA	37.40	37.40	0.08
SURIRELLA OVATA	37.40	37.40	0.08
CHLAMYDOMONAS SPP.	2505.79	2505.79	5.16
OCHROMONAS	448.80	448.80	0.92
OSCILLATORIA TENUIS	302.94	302.94	0.62
TOTALS	48539.47	48539.47	100.0

TABLE B-5 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 4

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURRENCE
2	BACILLARIOPHYTA	PENNALES	10696.38	10696.38	22.04
1	BACILLARIOPHYTA	CENTRALES	32238.72	32238.72	66.42
5	CHRYSOPHYTA		1561.45	1561.45	3.22
14	CRYPTOPHYTA		187.00	187.00	0.39
3	CHLOROPHYTA	NON-FILAMENTOUS	3440.79	3440.79	7.09
8	EUGLENOPHYTA		112.20	112.20	0.23
7	CYANOPHYTA	FILAMENTOUS	302.94	302.94	0.62
		TOTALS	48539.47	48539.47	100.0

TABLE B-5 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/05/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 5

SPECIES	REP 1	TOTALS	PERCENT OCCURRENCE
NITZSCHIA	411.40	411.40	0.71
NAVICULA TRIPUNCTATA	112.20	112.20	0.19
NAVICULA DECUSSIS	37.40	37.40	0.06
NAVICULA	261.80	261.80	0.45
NAVICULA LANCEOLATA	187.00	187.00	0.32
NITZSCHIA ACICULARIS	7479.98	7479.98	12.95
STEPHANODISCUS INVISITATUS	41214.70	41214.70	71.35
ASTERIONELLA FORMOSA	972.40	972.40	1.68
NAVICULA VIRIDULA	37.40	37.40	0.06
NITZSCHIA LINEARIS	598.40	598.40	1.04
DIATOMA VULGARE	411.40	411.40	0.71
GOMPHONEMA PARVULUM	374.00	374.00	0.65
BACILLARIA PARADOXA	187.00	187.00	0.32
CYCLOTELLA MENEGHINIANA	448.80	448.80	0.78
CRYPTOMONAS OVATA	74.80	74.80	0.13
CHLAMYDOMONAS	2692.79	2692.79	4.66
DINOBRYON SERTULARIA	673.20	673.20	1.17
DINOBRYON DIVERGENS	112.20	112.20	0.19
SYNEDRA ULNA	448.80	448.80	0.78
SCENEDESMUS ACUMINATUS	84.15	84.15	0.15
ANKISTRODESMUS FALCATUS	149.60	149.60	0.26
OCHROMONAS	374.00	374.00	0.65
EUGLENA POLYMORPHA	74.80	74.80	0.13
DICHOTOMOCOCCUS LUNATUS	187.00	187.00	0.32
ANKISTRODESMUS SPIRALIS	74.80	74.80	0.13
OSCILLATORIA TENUIS	82.28	82.28	0.14
TOTALS	57762.30	57762.30	100.0

TABLE B-5 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1 SAMPLING DATE=03/05/81
STATIONS PICKED = 5

UNITS = # /ML TYPE = PHYLA TOTALS PAGE = 2

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURRENCE
2	BACILLARIOPHYTA	PENNALES	11519.17	11519.17	19.94
1	BACILLARIOPHYTA	CENTRALES	41663.50	41663.50	72.13
14	CRYPTOPHYTA		74.80	74.80	0.13
3	CHLOROPHYTA	NON-FILAMENTOUS	3001.34	3001.34	5.20
5	CHRYSOPHYTA		1346.40	1346.40	2.33
8	EUGLENOPHYTA		74.80	74.80	0.13
7	CYANOPHYTA	FILAMENTOUS	82.28	82.28	0.14
		TOTALS	57762.30	57762.30	100.0

TABLE B-6 SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = # /ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 1

SPECIES	REP 1	TOTALS	PERCENT OCCURENCE
DIATOMA VULGARE	112.20	112.20	1.80
NITZSCHIA LINEARIS	1496.00	1496.00	23.96
STEPHANODISCUS INVISITATUS	2187.89	2187.89	35.04
NITZSCHIA PALEA	386.47	386.47	6.19
GOMPHONEMA PARVULUM	467.50	467.50	7.49
NITZSCHIA ACICULARIS	1059.66	1059.66	16.97
NAVICULA TRIPUNCTATA	43.63	43.63	0.70
ASTERIONELLA FORMOSA	24.93	24.93	0.40
SYNEDRA ULNA	49.87	49.87	0.80
NITZSCHIA DISSIPATA	18.70	18.70	0.30
PLEUROSIGMA	12.47	12.47	0.20
NAVICULA LANCEOLATA	12.47	12.47	0.20
CHLAMYDOMONAS	31.17	31.17	0.50
SCENEDESMUS ACUMINATUS	7.79	7.79	0.12
OSCILLATORIA TENUIS	7.48	7.48	0.12
DICTYOSPHAERIUM PULCHELLUM	14.02	14.02	0.22
ANKISTRODESMUS FALCATUS	18.70	18.70	0.30
DINOBRYON SERTULARIA	112.20	112.20	1.80
DINOBRYON DIVERGENS	137.13	137.13	2.20
CRYPTOMONAS OVATA	12.47	12.47	0.20
SCENEDESMUS INTERMEDIUS	6.23	6.23	0.10
NAVICULA DECUSSIS	12.47	12.47	0.20
NAVICULA CAPITATA	6.23	6.23	0.10
NITZSCHIA	6.23	6.23	0.10
TOTALS	6243.92	6243.92	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81
STATIONS PICKED = 1

UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2

CODE	PHYLA		REF 1	TOTALS	PERCENT OCCURENCE
2	BACILLARIOPHYTA	PENNALES	3708.82	3708.82	59.40
1	BACILLARIOPHYTA	CENTRALES	2187.89	2187.89	35.04
3	CHLOROPHYTA	NON-FILAMENTOUS	77.92	77.92	1.25
7	CYANOPHYTA	FILAMENTOUS	7.48	7.48	0.12
5	CHRYSOPHYTA		249.33	249.33	3.99
14	CRYPTOPHYTA		12.47	12.47	0.20
		TOTALS	6243.92	6243.92	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 2

SPECIES	REP 1	TOTALS	PERCENT OCCURENCE
STEPHANODISCUS INVISITATUS	2505.79	2505.79	34.55
ASTERIONELLA FORMOSA	112.20	112.20	1.55
NITZSCHIA LINEARIS	1277.83	1277.83	17.62
DIATOMA VULGARE	155.83	155.83	2.15
NITZSCHIA ACICULARIS	1134.46	1134.46	15.64
GOMPHONEMA PARVULUM	548.53	548.53	7.56
SYNEDRA ULNA	74.80	74.80	1.03
NITZSCHIA PALEA	442.57	442.57	6.10
NAVICULA TRIPUNCTATA	56.10	56.10	0.77
GYROSIGMA	6.23	6.23	0.09
PLEUROSIGMA	6.23	6.23	0.09
NITZSCHIA	74.80	74.80	1.03
MELOSIRA GRANULATA	31.17	31.17	0.43
SURIRELLA OVATA	6.23	6.23	0.09
ANKISTRODESMUS FALCATUS	31.17	31.17	0.43
OSCILLATORIA TENUIS	15.58	15.58	0.21
DINOBRYON DIVERGENS	280.50	280.50	3.87
DINOBRYON SERTULARIA	218.17	218.17	3.01
CHLAMYDOMONAS	112.20	112.20	1.55
CRYPTOMONAS OVATA	31.17	31.17	0.43
SCENEDESMUS ACUMINATUS	23.37	23.37	0.32
NAVICULA LANCEOLATA	31.17	31.17	0.43
DICTYOSPHAERIUM PULCHELLUM	45.19	45.19	0.62
NAVICULA CAPITATA	6.23	6.23	0.09
NAVICULA DECUSSIS	6.23	6.23	0.09
NAVICULA	18.70	18.70	0.26
TOTALS	7252.47	7252.47	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = # /ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 2

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURENCE
1	BACILLARIOPHYTA	CENTRALES	2536.96	2536.96	34.98
2	BACILLARIOPHYTA	PENNALES	3958.16	3958.16	54.58
3	CHLOROPHYTA	NON-FILAMENTOUS	211.93	211.93	2.92
7	CYANOPHYTA	FILAMENTOUS	15.58	15.58	0.21
5	CHRYSOPHYTA		498.67	498.67	6.88
14	CRYPTOPHYTA		31.17	31.17	0.43
		TOTALS	7252.47	7252.47	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = # /ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 3

SPECIES	REP 1	TOTALS	PERCENT OCCURENCE
STEPHANODISCUS INVISITATUS	2144.26	2144.26	36.28
NAVICULA DECUSSIS	6.23	6.23	0.11
NAVICULA TRIPUNCTATA	31.17	31.17	0.53
NAVICULA LANCEOLATA	31.17	31.17	0.53
GOMPHONEMA PARVULUM	374.00	374.00	6.33
ASTERIONELLA FORMOSA	62.33	62.33	1.05
STEPHANODISCUS ASTRAEA	24.93	24.93	0.42
CYCLOTELLA MENEGHINIANA	37.40	37.40	0.63
NITZSCHIA ACICULARIS	947.46	947.46	16.03
NITZSCHIA LINEARIS	1421.20	1421.20	24.05
NITZSCHIA PALEA	249.33	249.33	4.22
GYROSIGMA	6.23	6.23	0.11
DIATOMA VULGARE	31.17	31.17	0.53
SYNEDRA ULNA	68.57	68.57	1.16
NITZSCHIA DISSIPATA	6.23	6.23	0.11
NITZSCHIA	12.47	12.47	0.21
NAVICULA	43.63	43.63	0.74
DINOBRYON DIVERGENS	112.20	112.20	1.90
DINOBRYON SERTULARIA	93.50	93.50	1.58
SCENEDESMUS INTERMEDIUS	7.79	7.79	0.13
SCENEDESMUS ACUMINATUS	15.58	15.58	0.26
ANKISTRODESMUS FALCATUS	31.17	31.17	0.53
CRYPTOMONAS OVATA	12.47	12.47	0.21
OCHROMONAS	12.47	12.47	0.21
CHLAMYDOMONAS	99.73	99.73	1.69
ANKISTRODESMUS SPIRALIS	12.47	12.47	0.21
OSCILLATORIA	8.10	8.10	0.14
CALONEIS	6.23	6.23	0.11
TOTALS	5909.50	5909.50	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81
STATIONS PICKED = 3

UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURENCE
1	BACILLARIOPHYTA	CENTRALES	2206.59	2206.59	37.34
2	BACILLARIOPHYTA	PENNALES	3297.43	3297.43	55.80
5	CHRYSOPHYTA		218.17	218.17	3.69
3	CHLOROPHYTA	NON-FILAMENTOUS	166.74	166.74	2.82
14	CRYPTOPHYTA		12.47	12.47	0.21
7	CYANOPHYTA	FILAMENTOUS	8.10	8.10	0.14
		TOTALS	5909.50	5909.50	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = # /ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 4

SPECIES	REF 1	TOTALS	PERCENT OCCURENCE
STEPHANODISCUS INVISITATUS	2300.09	2300.09	35.71
NITZSCHIA DISSIPATA	6.23	6.23	0.10
NITZSCHIA ACICULARIS	947.46	947.46	14.71
NITZSCHIA LINEARIS	1446.13	1446.13	22.45
NITZSCHIA	62.33	62.33	0.97
NITZSCHIA PALEA	268.03	268.03	4.16
NITZSCHIA ANGUSTATA	6.23	6.23	0.10
NAVICULA DECUSSIS	6.23	6.23	0.10
STEPHANODISCUS ASTRAEA	18.70	18.70	0.29
SYNEDRA ULNA	43.63	43.63	0.68
NAVICULA LANCEOLATA	49.87	49.87	0.77
NAVICULA TRIPUNCTATA	87.27	87.27	1.35
CHLAMYDOMONAS	62.33	62.33	0.97
CRYPTOMONAS OVATA	24.93	24.93	0.39
EUGLENA	6.23	6.23	0.10
DINOBRYON DIVERGENS	218.17	218.17	3.39
DINOBRYON SERTULARIA	74.80	74.80	1.16
SCENEDESMUS ACUMINATUS	51.42	51.42	0.80
SCENEDESMUS ABUNDANS	15.58	15.58	0.24
ANKISTRODESMUS FALCATUS	31.17	31.17	0.48
GYROSIGMA	6.23	6.23	0.10
DIATOMA VULGARE	74.80	74.80	1.16
GOMPHONEMA PARVULUM	336.60	336.60	5.23
ASTERIONELLA FORMOSA	112.20	112.20	1.74
SYNEDRA	6.23	6.23	0.10
NAVICULA	24.93	24.93	0.39
RHOICOSPHENIA CURVATA	12.47	12.47	0.19
OCHROMONAS	68.57	68.57	1.06
SCENEDESMUS LONGUS	15.58	15.58	0.24
NAVICULA SYMMETRICA	6.23	6.23	0.10
CALONEIS BACILLUM	6.23	6.23	0.10
NAVICULA PUPULA	6.23	6.23	0.10
NITZSCHIA PSEUDOFONTICOLA	6.23	6.23	0.10
CYCLOTELLA ATOMUS	31.17	31.17	0.48
TOTALS	6440.58	6440.58	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = #/ML TYPE = PHYLA TOTALS PAGE = 2
STATIONS PICKED = 4

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURENCE
1	BACILLARIOPHYTA	CENTRALES	2349.96	2349.96	36.49
2	BACILLARIOPHYTA	PENNALES	3521.83	3521.83	54.68
3	CHLOROPHYTA	NON-FILAMENTOUS	176.09	176.09	2.73
14	CRYPTOPHYTA		24.93	24.93	0.39
8	EUGLENOPHYTA		6.23	6.23	0.10
5	CHRYSOPHYTA		361.53	361.53	5.61
		TOTALS	6440.58	6440.58	100.0

TABLE B-6 (CONT.)

PHYTOPLANKTON DATA LISTING

PROJECT=IEL1 SAMPLING DATE=03/18/81 UNITS = #/ML TYPE = SPECIES TOTALS PAGE = 1
STATIONS PICKED = 5

SPECIES	REP 1	TOTALS	PERCENT OCCURENCE
STEPHANODISCUS INVISITATUS	2312.56	2312.56	39.55
NITZSCHIA ACICULARIS	829.03	829.03	14.18
NITZSCHIA LINEARIS	1358.86	1358.86	23.24
NITZSCHIA PSEUDOFONTICOLA	6.23	6.23	0.11
NITZSCHIA PALEA	193.23	193.23	3.31
NITZSCHIA	37.40	37.40	0.64
NITZSCHIA DISSIPATA	12.47	12.47	0.21
NAVICULA TRIPUNCTATA	74.80	74.80	1.28
NAVICULA CAPITATA	6.23	6.23	0.11
NAVICULA CRYPTOCEPHALA VAR. VENETA	6.23	6.23	0.11
NAVICULA	49.87	49.87	0.85
NAVICULA LANCEOLATA	93.50	93.50	1.60
ASTERIONELLA FORMOSA	130.90	130.90	2.24
STEPHANODISCUS ASTRAEA	12.47	12.47	0.21
NAVICULA DECUSSIS	6.23	6.23	0.11
CYCLOTELLA MENEGHINIANA	49.87	49.87	0.85
CYCLOTELLA ATOMUS	24.93	24.93	0.43
SYNEDRA ULNA	68.57	68.57	1.17
RHOICOSPHENIA CURVATA	18.70	18.70	0.32
SCENEDESMUS ACUMINATUS	17.14	17.14	0.29
SCENEDESMUS LONGUS	9.35	9.35	0.16
DICTYOSPHAERIUM PULCHELLUM	28.05	28.05	0.48
ANKISTRODESMUS FALCATUS	43.63	43.63	0.75
ANKISTRODESMUS SPIRALIS	12.47	12.47	0.21
GYROSIGMA	6.23	6.23	0.11
CALONEIS BACILLUM	6.23	6.23	0.11
CALONEIS AMPHISBAENA	6.23	6.23	0.11
DINOBRYON DIVERGENS	168.30	168.30	2.88
DINOBRYON SERTULARIA	62.33	62.33	1.07
CRYPTOMONAS OVATA	12.47	12.47	0.21
OSCILLATORIA TENUIS	13.71	13.71	0.23
CHLAMYDOMONAS	118.43	118.43	2.03
OCHROMONAS	49.87	49.87	0.85
TOTALS	5846.54	5846.54	100.0

TABLE B-6 (CONT.)

P H Y T O P L A N K T O N   D A T A   L I S T I N G

PROJECT=IEL1   SAMPLING DATE=03/18/81   UNITS = #/ML   TYPE = PHYLA TOTALS   PAGE = 2
STATIONS PICKED = 5

CODE	PHYLA		REP 1	TOTALS	PERCENT OCCURENCE
1	BACILLARIOPHYTA	CENTRALES	2399.83	2399.83	41.05
2	BACILLARIOPHYTA	PENNALES	2910.96	2910.96	49.79
3	CHLOROPHYTA	NON-FILAMENTOUS	229.07	229.07	3.92
5	CHRYSOPHYTA		280.50	280.50	4.80
14	CRYPTOPHYTA		12.47	12.47	0.21
7	CYANOPHYTA	FILAMENTOUS	13.71	13.71	0.23
		TOTALS	5846.54	5846.54	100.0

TABLE B-7

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	15012.	15011.8	49.3
STEPHANODISCUS TENUIS	4935.	4934.7	16.2
TOTAL CENTRALES	19946.	19946.5	65.5
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	1351.	1350.5	4.4
NAVICULA TRIPUNCTATA	987.	986.9	3.2
NITZSCHIA LINEARIS	831.	831.1	2.7
DIATOMA VULGARE	675.	675.3	2.2
NITZSCHIA PALEA	519.	519.4	1.7
GOMPHONEMA PARVULUM	416.	415.6	1.4
SYNEDRA ULNA	416.	415.6	1.4
NITZSCHIA SPP.	364.	363.6	1.2
NAVICULA SPP.	312.	311.7	1.0
NAVICULA LANCEOLATA	260.	259.7	0.9
NAVICULA CRYPTOCEPHALA	260.	259.7	0.9
GOMPHONEMA SPP.	208.	207.8	0.7
NAVICULA HEUFLERI	156.	155.8	0.5
RHOICOSPHENIA CURVATA	104.	103.9	0.3
NITZSCHIA DISSIPATA	104.	103.9	0.3
NITZSCHIA PSEUDOFONTICOLA	104.	103.9	0.3
NAVICULA SALINARUM VAR. INTERMEDIA	104.	103.9	0.3
NAVICULA PYGMAEA	52.	51.9	0.2
CALONEIS AMPHISBAENA	52.	51.9	0.2
NAVICULA CRYPTOCEPHALA VAR. VENETA	52.	51.9	0.2
SURIRELLA OVATA	52.	51.9	0.2
NAVICULA DECUSSIS	52.	51.9	0.2
PLEUROSIGMA SPP.	52.	51.9	0.2
TOTAL PENNALES	7480.	7479.9	24.5
CHLOROPHYTA			
NON-FILAMENTOUS			
ANKISTRODESMUS FALCATUS	31[illegible].	311.7	1.0

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
SCENEDESMUS ACUMINATUS	312.	311.7	1.0
TOTAL NON-FILAMENTOUS	623.	623.3	2.0
CYANOPHYTA			
FILAMENTOUS			
OSCILLATORIA TENUIS	192.	192.2	0.6
TOTAL FILAMENTOUS	192.	192.2	0.6
EUGLENOPHYTA			
EUGLENA POLYMORPHA	104.	103.9	0.3
TOTAL EUGLENOPHYTA	104.	103.9	0.3
CRYPTOPHYTA			
CRYPTOMONAS OVATA	2130.	2129.7	7.0
TOTAL CRYPTOPHYTA	2130.	2129.7	7.0
TOTAL PHYTOPLANKTON	30475.	30475.5	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	30		

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IELII   STATION: 2   COLLECTION DATE: 7-APR-81   SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	14544.	14544.3	52.5
STEPHANODISCUS TENUIS	4259.	4259.4	15.4
STEPHANODISCUS ASTRAEA	104.	103.9	0.4
MELOSIRA VARIANS	104.	103.9	0.4
TOTAL CENTRALES	19011.	19011.5	68.6
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	935.	935.0	3.4
GOMPHONEMA PARVULUM	779.	779.2	2.8
DIATOMA VULGARE	519.	519.4	1.9
NAVICULA TRIPUNCTATA	519.	519.4	1.9
NITZSCHIA SPP.	416.	415.6	1.5
NAVICULA HEUFLERI	416.	415.6	1.5
NAVICULA CRYPTOCEPHALA	312.	311.7	1.1
NAVICULA LANCEOLATA	312.	311.7	1.1
NITZSCHIA PALEA	260.	259.7	0.9
NAVICULA SPP.	208.	207.8	0.8
SURIRELLA OVATA	156.	155.8	0.6
NITZSCHIA DISSIPATA	156.	155.8	0.6
ACHNANTHES LANCEOLATA	156.	155.8	0.6
NITZSCHIA LINEARIS	156.	155.8	0.6
NAVICULA CRYPTOCEPHALA VAR. VENETA	104.	103.9	0.4
NITZSCHIA FRUSTULUM	52.	51.9	0.2
NAVICULA MUTICA	52.	51.9	0.2
CALONEIS AMPHISBAENA	52.	51.9	0.2
PLEUROSIGMA SPP.	52.	51.9	0.2
TOTAL PENNALES	5610.	5609.9	20.3
CHLOROPHYTA			
NON-FILAMENTOUS			
DICTYOSPHAERIUM PULCHELLUM	571.	571.4	2.1

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
SCENEDESMUS ACUMINATUS	221.	220.8	0.8
ANKISTRODESMUS FALCATUS	156.	155.8	0.6
TOTAL NON-FILAMENTOUS	948.	948.0	3.4
EUGLENOPHYTA			
EUGLENA POLYMORPHA	104.	103.9	0.4
TOTAL EUGLENOPHYTA	104.	103.9	0.4
CRYPTOPHYTA			
CRYPTOMONAS OVATA	1818.	1818.0	6.6
CRYPTOMONAS EROSA	208.	207.8	0.8
TOTAL CRYPTOPHYTA	2026.	2025.8	7.3
TOTAL PHYTOPLANKTON	27699.	27699.1	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	29		

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: TEL11 STATION: 3 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	15635.	15635.1	51.3
STEPHANODISCUS TENUIS	3221.	3220.5	10.6
CYCLOTELLA MENEGHINIANA	156.	155.8	0.5
MELOSIRA VARIANS	104.	103.9	0.3
TOTAL CENTRALES	19115.	19115.4	62.7
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	1091.	1090.8	3.6
NAVICULA TRIPUNCTATA	727.	727.2	2.4
NITZSCHIA LINEARIS	675.	675.3	2.2
NITZSCHIA PALEA	623.	623.3	2.0
GOMPHONEMA PARVULUM	571.	571.4	1.9
SYNEDRA ULNA	571.	571.4	1.9
NAVICULA HEUFLERI	571.	571.4	1.9
DIATOMA VULGARE	519.	519.4	1.7
NAVICULA CRYPTOCEPHALA	416.	415.6	1.4
NAVICULA SPP.	312.	311.7	1.0
NAVICULA LANCEOLATA	260.	259.7	0.9
NAVICULA CRYPTOCEPHALA VAR. VENETA	260.	259.7	0.9
SURIRELLA OVATA	208.	207.8	0.7
NAVICULA MUTICA	156.	155.8	0.5
CALONEIS AMPHISBAENA	156.	155.8	0.5
NITZSCHIA DISSIPATA	156.	155.8	0.5
NITZSCHIA PSEUDOFONTICOLA	104.	103.9	0.3
NAVICULA DECUSSIS	104.	103.9	0.3
ACHNANTHES LANCEOLATA	104.	103.9	0.3
NAVICULA PYGMAEA	52.	51.9	0.2
CYMBELLA TUMIDA	52.	51.9	0.2
NAVICULA CUSPIDATA	52.	51.9	0.2
PLEUROSIGMA SPP.	52.	51.9	0.2
TOTAL PENNALES	7792.	7791.6	25.6

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
CHLOROPHYTA			
NON-FILAMENTOUS			
PEDIASTRUM BORYANUM	831.	831.1	2.7
DICTYOSPHAERIUM PULCHELLUM	779.	779.2	2.6
ANKISTRODESMUS FALCATUS	208.	207.8	0.7
SCENEDESMUS ACUMINATUS	208.	207.8	0.7
SCENEDESMUS ABUNDANS	156.	155.8	0.5
TOTAL NON-FILAMENTOUS	2182.	2181.6	7.2
CYANOPHYTA			
FILAMENTOUS			
OSCILLATORIA TENUIS	390.	389.6	1.3
TOTAL FILAMENTOUS	390.	389.6	1.3
CRYPTOPHYTA			
CRYPTOMONAS OVATA	779.	779.2	2.6
CRYPTOMONAS EROSA	208.	207.8	0.7
TOTAL CRYPTOPHYTA	987.	986.9	3.2
TOTAL PHYTOPLANKTON	30465.	30465.1	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	35		

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA CENTRALES			
STEPHANODISCUS INVISITATUS	13402.	13401.5	46.9
STEPHANODISCUS TENUIS	4519.	4519.1	15.8
MELOSIRA GRANULATA	623.	623.3	2.2
CYCLOTELLA ATOMUS	312.	311.7	1.1
CYCLOTELLA MENEGHINIANA	156.	155.8	0.5
TOTAL CENTRALES	19011.	19011.5	66.5
BACILLARIOPHYTA PENNALES			
NITZSCHIA ACICULARIS	1247.	1246.7	4.4
NITZSCHIA LINEARIS	1195.	1194.7	4.2
NAVICULA TRIPUNCTATA	623.	623.3	2.2
NITZSCHIA PALEA	364.	363.6	1.3
SYNEDRA ULNA	312.	311.7	1.1
GOMPHONEMA PARVULUM	312.	311.7	1.1
NAVICULA HEUFLERI	273.	272.7	1.0
NAVICULA SPP.	260.	259.7	0.9
DIATOMA VULGARE	208.	207.8	0.7
NAVICULA LANCEOLATA	208.	207.8	0.7
SURIRELLA OVATA	156.	155.8	0.5
NITZSCHIA PSEUDOFONTICOLA	104.	103.9	0.4
NAVICULA DECUSSIS	104.	103.9	0.4
NAVICULA CRYPTOCEPHALA	104.	103.9	0.4
NAVICULA PUPULA	52.	51.9	0.2
NITZSCHIA DISSIPATA	52.	51.9	0.2
CYMATOPLEURA SOLEA	52.	51.9	0.2
NAVICULA SALINARUM VAR. INTERMEDIA	52.	51.9	0.2
RHOICOSPHENIA CURVATA	52.	51.9	0.2
CYMBELLA SPP.	52.	51.9	0.2
NAVICULA CRYPTOCEPHALA VAR. VENETA	52.	51.9	0.2
TOTAL PENNALES	5831.	5830.7	20.4

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
CHLOROPHYTA			
NON-FILAMENTOUS			
DICTYOSPHAERIUM PULCHELLUM	1130.	1129.8	4.0
SCENEDESMUS ABUNDANS	234.	233.7	0.8
ANKISTRODESMUS FALCATUS	156.	155.8	0.5
SCENEDESMUS ACUMINATUS	104.	103.9	0.4
TOTAL NON-FILAMENTOUS	1623.	1623.2	5.7
CYANOPHYTA			
FILAMENTOUS			
OSCILLATORIA TENUIS	234.	233.7	0.8
TOTAL FILAMENTOUS	234.	233.7	0.8
EUGLENOPHYTA			
EUGLENA POLYMORPHA	52.	51.9	0.2
TOTAL EUGLENOPHYTA	52.	51.9	0.2
CRYPTOPHYTA			
CRYPTOMONAS OVATA	1714.	1714.1	6.0
CRYPTOMONAS EROSA	104.	103.9	0.4
TOTAL CRYPTOPHYTA	1818.	1818.0	6.4
TOTAL PHYTOPLANKTON	28569.	28569.2	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	34		

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IELI1 STATION: 5 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	14285.	14284.6	53.2
STEPHANODISCUS TENUIS	4156.	4155.5	15.5
STEPHANODISCUS ASTRAEA	104.	103.9	0.4
MELOSIRA GRANULATA	104.	103.9	0.4
TOTAL CENTRALES	18648.	18647.9	69.4
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	883.	883.0	3.3
DIATOMA VULGARE	831.	831.1	3.1
GOMPHONEMA PARVULUM	571.	571.4	2.1
NAVICULA HEUFLERI	416.	415.6	1.5
NITZSCHIA LINEARIS	364.	363.6	1.4
NITZSCHIA SPP.	312.	311.7	1.2
NITZSCHIA PALEA	260.	259.7	1.0
SURIRELLA OVATA	156.	155.8	0.6
NAVICULA SPP.	104.	103.9	0.4
NAVICULA TRIPUNCTATA	104.	103.9	0.4
SYNEDRA ULNA VAR. AMPHIRHYNCHUS	104.	103.9	0.4
RHOICOSPHENIA CURVATA	104.	103.9	0.4
NITZSCHIA DISSIPATA	104.	103.9	0.4
SYNEDRA ULNA	104.	103.9	0.4
ASTERIONELLA FORMOSA	104.	103.9	0.4
NITZSCHIA PSEUDOFONTICOLA	52.	51.9	0.2
SURIRELLA SPP.	52.	51.9	0.2
NAVICULA DECUSSIS	52.	51.9	0.2
NAVICULA CUSPIDATA	52.	51.9	0.2
TOTAL PENNALES	4727.	4726.9	17.6
CHLOROPHYTA			
NON-FILAMENTOUS			
DICTYOSPHAERIUM PULCHELLUM	792.	792.1	2.9

TABLE B-7 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 7-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
ANKISTRODESMUS FALCATUS	519.	519.4	1.9
SCENEDESMUS ACUMINATUS	182.	181.8	0.7
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	117.	116.9	0.4
TOTAL NON-FILAMENTOUS	1610.	1610.3	6.0
EUGLENOPHYTA			
EUGLENA SPP.	52.	51.9	0.2
TOTAL EUGLENOPHYTA	52.	51.9	0.2
CRYPTOPHYTA			
CRYPTOMONAS OVATA	1662.	1662.2	6.2
CRYPTOMONAS EROSA	156.	155.8	0.6
TOTAL CRYPTOPHYTA	1818.	1818.0	6.8
TOTAL PHYTOPLANKTON	26855.	26855.0	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	30		

TABLE B-8

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 23-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	20198.	20198.1	57.8
STEPHANODISCUS TENUIS	8449.	8449.4	24.2
MELOSIRA GRANULATA	563.	563.3	1.6
MELOSIRA VARIANS	161.	160.9	0.5
TOTAL CENTRALES	29372.	29371.7	84.0
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	1851.	1850.8	5.3
GOMPHONEMA PARVULUM	402.	402.4	1.2
NAVICULA SALINARUM VAR. INTERMEDIA	322.	321.9	0.9
SYNEDRA ULNA	241.	241.4	0.7
NAVICULA TRIPUNCTATA	161.	160.9	0.5
NITZSCHIA PALEA	161.	160.9	0.5
NAVICULA LANCEOLATA	161.	160.9	0.5
DIATOMA VULGARE	161.	160.9	0.5
NAVICULA DECUSSIS	80.	80.5	0.2
CYMBELLA SPP.	80.	80.5	0.2
CALONEIS SPP.	80.	80.5	0.2
NAVICULA CRYPTOCEPHALA	80.	80.5	0.2
NITZSCHIA PSEUDOFONTICOLA	80.	80.5	0.2
NITZSCHIA LINEARIS	80.	80.5	0.2
PLEUROSIGMA SPP.	80.	80.5	0.2
TOTAL PENNALES	4024.	4023.5	11.5
CHLOROPHYTA			
NON-FILAMENTOUS			
SCENEDESMUS ABUNDANS	302.	301.8	0.9
ANKISTRODESMUS SPIRALIS	241.	241.4	0.7
SCENEDESMUS ACUMINATUS	201.	201.2	0.6

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 23-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	161.	160.9	0.5
DICTYOSPHAERIUM PULCHELLUM	161.	160.9	0.5
ANKISTRODESMUS FALCATUS	161.	160.9	0.5
SCENEDESMUS LONGUS	101.	100.6	0.3
TOTAL NON-FILAMENTOUS	1328.	1327.8	3.8
CYANOPHYTA			
NON-FILAMENTOUS			
APHANOCAPSA SPP.	161.	160.9	0.5
TOTAL NON-FILAMENTOUS	161.	160.9	0.5
CRYPTOPHYTA			
CRYPTOMONAS OVATA	80.	80.5	0.2
TOTAL CRYPTOPHYTA	80.	80.5	0.2
TOTAL PHYTOPLANKTON	34964.	34964.4	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	28		

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IELII   STATION: 2   COLLECTION DATE: 23-APR-81   SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	13921.	13921.4	39.5
STEPHANODISCUS TENUIS	12553.	12553.4	35.6
MELOSIRA GRANULATA	966.	965.6	2.7
MELOSIRA VARIANS	241.	241.4	0.7
TOTAL CENTRALES	27682.	27681.8	78.5
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	2575.	2575.1	7.3
SYNEDRA ULNA	644.	643.8	1.8
GOMPHONEMA PARVULUM	563.	563.3	1.6
DIATOMA VULGARE	322.	321.9	0.9
NAVICULA TRIPUNCTATA	241.	241.4	0.7
NITZSCHIA LINEARIS	161.	160.9	0.5
NITZSCHIA PALEA	161.	160.9	0.5
NAVICULA SALINARUM VAR. INTERMEDIA	161.	160.9	0.5
NAVICULA LANCEOLATA	161.	160.9	0.5
NAVICULA SPP.	80.	80.5	0.2
NAVICULA CRYPTOCEPHALA	80.	80.5	0.2
NAVICULA DECUSSIS	80.	80.5	0.2
PLEUROSIGMA SPP.	80.	80.5	0.2
TOTAL PENNALES	5311.	5311.1	15.1
CHLOROPHYTA			
NON-FILAMENTOUS			
SCENEDESMUS ABUNDANS	443.	442.6	1.3
ANKISTRODESMUS SPIRALIS	402.	402.4	1.1
SCENEDESMUS ACUMINATUS	342.	342.0	1.0
DICTYOSPHAERIUM PULCHELLUM	302.	301.8	0.9
ANKISTRODESMUS FALCATUS	241.	241.4	0.7

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 23-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	221.	221.3	0.6
SCENEDESMUS LONGUS	161.	160.9	0.5
TOTAL NON-FILAMENTOUS	2112.	2112.4	6.0
CRYPTOPHYTA			
CRYPTOMONAS OVATA	161.	160.9	0.5
TOTAL CRYPTOPHYTA	161.	160.9	0.5
TOTAL PHYTOPLANKTON	35266.	35266.2	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	25		

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 3   COLLECTION DATE: 23-APR-81   SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	16255.	16255.0	40.9
STEPHANODISCUS TENUIS	14565.	14565.2	36.7
MELOSIRA GRANULATA	322.	321.9	0.8
TOTAL CENTRALES	31142.	31142.1	78.4
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	2253.	2253.2	5.7
GOMPHONEMA PARVULUM	966.	965.6	2.4
DIATOMA VULGARE	805.	804.7	2.0
NAVICULA TRIPUNCTATA	563.	563.3	1.4
SYNEDRA ULNA	563.	563.3	1.4
NAVICULA CRYPTOCEPHALA	241.	241.4	0.6
NITZSCHIA LINEARIS	241.	241.4	0.6
NAVICULA DECUSSIS	241.	241.4	0.6
NITZSCHIA PALEA	241.	241.4	0.6
NAVICULA SPP.	161.	160.9	0.4
CALONEIS SPP.	80.	80.5	0.2
CYMBELLA SPP.	80.	80.5	0.2
NITZSCHIA PSEUDOFONTICOLA	80.	80.5	0.2
NAVICULA SALINARUM VAR. INTERMEDIA	80.	80.5	0.2
TOTAL PENNALES	6599.	6598.6	16.6
CHLOROPHYTA			
NON-FILAMENTOUS			
SCENEDESMUS ABUNDANS	583.	583.4	1.5
SCENEDESMUS ACUMINATUS	483.	482.8	1.2
DICTYOSPHAERIUM PULCHELLUM	443.	442.6	1.1
ANKISTRODESMUS FALCATUS	161.	160.9	0.4
ANKISTRODESMUS SPIRALIS	80.	80.5	0.2

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 3   COLLECTION DATE: 23-APR-81   SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
TOTAL NON-FILAMENTOUS	1750.	1750.2	4.4
CYANOPHYTA			
NON-FILAMENTOUS			
APHANOCAPSA SPP.	241.	241.4	0.6
TOTAL NON-FILAMENTOUS	241.	241.4	0.6
TOTAL PHYTOPLANKTON	39732.	39732.3	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	23		

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 23-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	17784.	17784.0	42.6
STEPHANODISCUS TENUIS	15450.	15450.3	37.0
MELOSIRA GRANULATA	322.	321.9	0.8
MELOSIRA VARIANS	161.	160.9	0.4
TOTAL CENTRALES	33717.	33717.1	80.8
BACILLARIOPHYTA			
PENNALES			
GOMPHONEMA PARVULUM	2816.	2816.5	6.8
NAVICULA LANCEOLATA	402.	402.4	1.0
DIATOMA VULGARE	402.	402.4	1.0
NAVICULA SPP.	322.	321.9	0.8
NAVICULA CRYPTOCEPHALA	241.	241.4	0.6
SYNEDRA ULNA	241.	241.4	0.6
NAVICULA SALINARUM VAR. INTERMEDIA	161.	160.9	0.4
NITZSCHIA LINEARIS	161.	160.9	0.4
NITZSCHIA PALEA	161.	160.9	0.4
CYMBELLA SPP.	80.	80.5	0.2
NITZSCHIA FRUSTULUM	80.	80.5	0.2
NAVICULA CAPITATA	80.	80.5	0.2
NAVICULA DECUSSIS	80.	80.5	0.2
PLEUROSIGMA SPP.	80.	80.5	0.2
TOTAL PENNALES	5311.	5311.1	12.7
CHLOROPHYTA			
NON-FILAMENTOUS			
SCENEDESMUS ABUNDANS	764.	764.5	1.8
SCENEDESMUS ACUMINATUS	463.	462.7	1.1
ANKISTRODESMUS FALCATUS	402.	402.4	1.0
DICTYOSPHAERIUM PULCHELLUM	362.	362.1	0.9

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 4   COLLECTION DATE: 23-APR-81   SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	282.	281.6	0.7
ANKISTRODESMUS SPIRALIS	161.	160.9	0.4
SCENEDESMUS LONGUS	161.	160.9	0.4
SCENEDESMUS ARCUATUS	80.	80.5	0.2
TOTAL NON-FILAMENTOUS	2676.	2675.6	6.4
TOTAL PHYTOPLANKTON	41704.	41703.8	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	26		

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IELII STATION: 5 COLLECTION DATE: 23-APR-81 SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
BACILLARIOPHYTA			
CENTRALES			
STEPHANODISCUS INVISITATUS	15370.	15369.9	40.2
STEPHANODISCUS TENUIS	14485.	14484.7	37.9
MELOSIRA GRANULATA	241.	241.4	0.6
MELOSIRA VARIANS	161.	160.9	0.4
TOTAL CENTRALES	30257.	30256.9	79.2
BACILLARIOPHYTA			
PENNALES			
NITZSCHIA ACICULARIS	2495.	2494.6	6.5
GOMPHONEMA PARVULUM	1207.	1207.1	3.2
DIATOMA VULGARE	402.	402.[illegible]	1.1
NAVICULA SPP.	322.	321.9	0.8
NAVICULA CRYPTOCEPHALA	241.	241.4	0.6
NITZSCHIA SPP.	241.	241.4	0.6
NITZSCHIA LINEARIS	241.	241.4	0.6
NAVICULA LANCEOLATA	161.	160.9	0.4
NITZSCHIA PALEA	161.	160.9	0.4
NAVICULA TRIPUNCTATA	161.	160.9	0.4
NAVICULA DECUSSIS	80.	80.5	0.2
NITZSCHIA DISSIPATA	80.	80.5	0.2
NITZSCHIA FRUSTULUM	80.	80.5	0.2
NITZSCHIA PSEUDOFONTICOLA	80.	80.5	0.2
TOTAL PENNALES	5955.	5954.8	15.6
CHLOROPHYTA			
NON-FILAMENTOUS			
ANKISTRODESMUS FALCATUS	402.	402.4	1.1
SCENEDESMUS ACUMINATUS	342.	342.0	0.9
DICTYOSPHAERIUM PULCHELLUM	322.	321.9	0.8
SCENEDESMUS ABUNDANS	161.	160.9	0.4

TABLE B-8 (CONT.)

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IELII   STATION: 5   COLLECTION DATE: 23-APR-81   SCOPE TYPE: INVERTED

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR
SCENEDESMUS LONGUS	141.	140.8	0.4
ANKISTRODESMUS SPIRALIS	80.	80.5	0.2
SCENEDESMUS ARCUATUS	80.	80.5	0.2
TOTAL NON-FILAMENTOUS	1529.	1528.9	4.0
CYANOPHYTA			
NON-FILAMENTOUS			
APHANOCAPSA SPP.	322.	321.9	0.8
TOTAL NON-FILAMENTOUS	322.	321.9	0.8
CRYPTOPHYTA			
CRYPTOMONAS OVATA	161.	160.9	0.4
TOTAL CRYPTOPHYTA	161.	160.9	0.4
TOTAL PHYTOPLANKTON	38223.	38223.5	100.0
NUMBER OF SPECIES FOUND IN EACH REPLICATE	27		

TABLE B-9

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	941.	941.2	31.4	-	-
STEPHANODISCUS INVISITATUS	573.	573.5	19.1	-	-
CYCLOTELLA MENEGHINIANA	50.	49.9	1.7	-	-
MELOSIRA VARIANS	19.	18.7	0.6	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	12.	12.5	0.4	-	-
STEPHANODISCUS NIAGARAE	6.	6.2	0.2	-	-
TOTAL CENTRALES	1602.	1602.0	53.4	-	-
BACILLARIOPHYTA					
PENNALES					
GOMPHONEMA PARVULUM	231.	230.6	7.7	-	-
NAVICULA TRIPUNCTATA	168.	168.3	5.6	-	-
NAVICULA SPP.	112.	112.2	3.7	-	-
NITZSCHIA PALEA	112.	112.2	3.7	-	-
NITZSCHIA LINEARIS	112.	112.2	3.7	-	-
NITZSCHIA ACICULARIS	93.	93.5	3.1	-	-
NAVICULA CRYPTOCEPHALA	81.	81.0	2.7	-	-
NAVICULA LANCEOLATA	50.	49.9	1.7	-	-
DIATOMA VULGARE	44.	43.6	1.5	-	-
SYNEDRA ULNA	19.	18.7	0.6	-	-
SURIRELLA OVATA	12.	12.5	0.4	-	-
SYNEDRA ULNA VAR. OXYRHYNCHUS F. MEDIOCONTRACT	12.	12.5	0.4	-	-
NAVICULA PUPULA	6.	6.2	0.2	-	-
NAVICULA DECUSSIS	6.	6.2	0.2	-	-
GYROSIGMA SCALPROIDES	6.	6.2	0.2	-	-
CALONEIS SPP.	6.	6.2	0.2	-	-
CYMBELLA MINUTA VAR. SILESIACA	6.	6.2	0.2	-	-
TOTAL PENNALES	1078.	1078.4	35.9	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	179.	179.2	6.0	-	-

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	75.	74.8	2.5	-	-
SCENEDESMUS LONGUS	22.	21.8	0.7	-	-
ANKISTRODESMUS SPIRALIS	19.	18.7	0.6	-	-
TOTAL NON-FILAMENTOUS	295.	294.5	9.8	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	12.	12.5	0.4	-	-
TOTAL EUGLENOPHYTA	12.	12.5	0.4	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	12.	12.5	0.4	-	-
TOTAL CRYPTOPHYTA	12.	12.5	0.4	-	-
TOTAL PHYTOPLANKTON	3000.	2999.8	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	29				

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	817.	816.6	27.7	-	-
STEPHANODISCUS INVISITATUS	742.	741.8	25.1	-	-
MELOSIRA AMBIGUA	75.	74.8	2.5	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	31.	31.2	1.1	-	-
MELOSIRA VARIANS	25.	24.9	0.8	-	-
TOTAL CENTRALES	1689.	1689.2	57.3	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA LINEARIS	137.	137.1	4.6	-	-
NITZSCHIA ACICULARIS	137.	137.1	4.6	-	-
NAVICULA TRIPUNCTATA	137.	137.1	4.6	-	-
NAVICULA CRYPTOCEPHALA	100.	99.7	3.4	-	-
GOMPHONEMA PARVULUM	100.	99.7	3.4	-	-
NAVICULA LANCEOLATA	75.	74.8	2.5	-	-
DIATOMA VULGARE	75.	74.8	2.5	-	-
NITZSCHIA PALEA	37.	37.4	1.3	-	-
NITZSCHIA SPP.	31.	31.2	1.1	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.6	-	-
CYMBELLA MINUTA VAR. SILESIACA	12.	12.5	0.4	-	-
SURIRELLA OVATA	12.	12.5	0.4	-	-
NAVICULA PUPULA	12.	12.5	0.4	-	-
SYNEDRA ULNA	12.	12.5	0.4	-	-
NAVICULA SPP.	12.	12.5	0.4	-	-
CALONEIS SPP.	6.	6.2	0.2	-	-
NAVICULA CAPITATA	6.	6.2	0.2	-	-
CYMBELLA SPP.	6.	6.2	0.2	-	-
SYNEDRA RADIANS	6.	6.2	0.2	-	-
CYMATOPLEURA SOLEA	6.	6.2	0.2	-	-
TOTAL PENNALES	941.	941.2	31.9	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	117.	116.9	4.0	-	-

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	62.	62.3	2.1	-	-
DICTYOSPHAERIUM PULCHELLUM	59.	59.2	2.0	-	-
ANKISTRODESMUS SPIRALIS	31.	31.2	1.1	-	-
SCENEDESMUS LONGUS	16.	15.6	0.5	-	-
TETRASTRUM ELEGANS	14.	14.0	0.5	-	-
SCENEDESMUS OPOLIENSIS	8.	7.8	0.3	-	-
TOTAL NON-FILAMENTOUS	307.	307.0	10.4	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	12.	12.5	0.4	-	-
TOTAL CRYPTOPHYTA	12.	12.5	0.4	-	-
TOTAL PHYTOPLANKTON	2950.	2949.9	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	779.	779.2	24.7	-	-
STEPHANODISCUS INVISITATUS	723.	723.1	22.9	-	-
CYCLOTELLA MENEGHINIANA	50.	49.9	1.6	-	-
MELOSIRA VARIANS	19.	18.7	0.6	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	12.	12.5	0.4	-	-
STEPHANODISCUS NIAGARAE	6.	6.2	0.2	-	-
TOTAL CENTRALES	1589.	1589.5	50.3	-	-
BACILLARIOPHYTA					
PENNALES					
GOMPHONEMA PARVULUM	262.	261.8	8.3	-	-
NITZSCHIA LINEARIS	243.	243.1	7.7	-	-
NAVICULA TRIPUNCTATA	162.	162.1	5.1	-	-
NITZSCHIA ACICULARIS	131.	130.9	4.1	-	-
NAVICULA CRYPTOCEPHALA	106.	106.0	3.4	-	-
NAVICULA LANCEOLATA	75.	74.8	2.4	-	-
DIATOMA VULGARE	44.	43.6	1.4	-	-
NAVICULA SPP.	25.	24.9	0.8	-	-
ASTERIONELLA FORMOSA	19.	18.7	0.6	-	-
NITZSCHIA SPP.	19.	18.7	0.6	-	-
CALONEIS SPP.	12.	12.5	0.4	-	-
SURIRELLA OVATA	12.	12.5	0.4	-	-
SYNEDRA ULNA	12.	12.5	0.4	-	-
CALONEIS AMPHISBAENA	12.	12.5	0.4	-	-
SYNEDRA ULNA VAR. OXYRHYNCHUS F. MEDIOCONTRACT	12.	12.5	0.4	-	-
NAVICULA PUPULA	6.	6.2	0.2	-	-
NAVICULA CAPITATA	6.	6.2	0.2	-	-
GYROSIGMA SCALPROIDES	6.	6.2	0.2	-	-
CALONEIS VENTRICOSA	6.	6.2	0.2	-	-
TOTAL PENNALES	1172.	1171.9	37.1	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	189.	188.6	6.0	-	-

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	81.	81.0	2.6	-	-
SCENEDESMUS QUADRICAUDA	23.	23.4	0.7	-	-
ANKISTRODESMUS SPIRALIS	19.	18.7	0.6	-	-
SCENEDESMUS LONGUS	16.	15.6	0.5	-	-
SCENEDESMUS ABUNDANS	14.	14.0	0.4	-	-
TOTAL NON-FILAMENTOUS	341.	341.3	10.8	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	25.	24.9	0.8	-	-
TOTAL EUGLENOPHYTA	25.	24.9	0.8	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	31.	31.2	1.0	-	-
TOTAL CRYPTOPHYTA	31.	31.2	1.0	-	-
TOTAL PHYTOPLANKTON	3159.	3158.7	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

SUMMARY OF .HYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURR..NCE
PROJECT NO: IEI11 STATION: 4 COLLECTION DATE: 5-MAY-81 SCOPE TYPE: INVERTED

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	630.	629.6	20.5	-	-
STEPHANODISCUS INVISITATUS	555.	554.8	18.1	-	-
MELOSIRA AMBIGUA	118.	118.4	3.9	-	-
CYCLOTELLA MENEGHINIANA	81.	81.0	2.6	-	-
MELOSIRA VARIANS	31.	31.2	1.0	-	-
STEPHANODISCUS NIAGARAE	12.	12.5	0.4	-	-
TOTAL CENTRALES	1427.	1427.4	46.5	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	218.	218.2	7.1	-	-
NAVICULA TRIPUNCTATA	193.	193.2	6.3	-	-
NITZSCHIA LINEARIS	162.	162.1	5.3	-	-
GOMPHONEMA PARVULUM	143.	143.4	4.7	-	-
DIATOMA VULGARE	112.	112.2	3.7	-	-
NITZSCHIA PALEA	93.	93.5	3.0	-	-
NAVICULA CRYPTOCEPHALA	75.	74.8	2.4	-	-
NAVICULA LANCEOLATA	56.	56.1	1.8	-	-
NAVICULA SPP.	50.	49.9	1.6	-	-
NITZSCHIA DISSIPATA	37.	37.4	1.2	-	-
SYNEDRA ULNA	31.	31.2	1.0	-	-
NITZSCHIA SPP.	19.	18.7	0.6	-	-
CYMBELLA SPP.	12.	12.5	0.4	-	-
COCCONEIS PLACENTULA	6.	6.2	0.2	-	-
CYMATOPLEURA SOLEA	6.	6.2	0.2	-	-
SURIRELLA OVATA	6.	6.2	0.2	-	-
SYNEDRA RADIANS	6.	6.2	0.2	-	-
NAVICULA PUPULA	6.	6.2	0.2	-	-
TOTAL PENNALES	1234.	1234.2	40.2	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	148.	148.0	4.8	-	-

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
DICTYOSPHAERIUM PULCHELLUM	76.	76.4	2.5	-	-
ANKISTRODESMUS FALCATUS	62.	62.3	2.0	-	-
TETRASTRUM ELEGANS	34.	34.3	1.1	-	-
ANKISTRODESMUS SPIRALIS	19.	18.7	0.6	-	-
SCENEDESMUS OPOLIENSIS	14.	14.0	0.5	-	-
PEDIASTRUM TETRAS	12.	12.5	0.4	-	-
TOTAL NON-FILAMENTOUS	366.	366.2	11.9	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	12.	12.5	0.4	-	-
TOTAL EUGLENOPHYTA	12.	12.5	0.4	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	31.	31.2	1.0	-	-
TOTAL CRYPTOPHYTA	31.	31.2	1.0	-	-
TOTAL PHYTOPLANKTON	3071.	3071.4	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	679.	679.4	23.6	-	-
STEPHANODISCUS INVISITATUS	430.	430.1	14.9	-	-
MELOSIRA VARIANS	50.	49.9	1.7	-	-
CYCLOTELLA MENEGHINIANA	37.	37.4	1.3	-	-
MELOSIRA AMBIGUA	25.	24.9	0.9	-	-
STEPHANODISCUS ASTRAEA	12.	12.5	0.4	-	-
TOTAL CENTRALES	1234.	1234.2	42.9	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA LINEARIS	299.	299.2	10.4	-	-
NAVICULA TRIPUNCTATA	224.	224.4	7.8	-	-
GOMPHONEMA PARVULUM	168.	168.3	5.8	-	-
DIATOMA VULGARE	143.	143.4	5.0	-	-
NAVICULA LANCEOLATA	118.	118.4	4.1	-	-
NITZSCHIA PALEA	93.	93.5	3.2	-	-
NAVICULA CRYPTOCEPHALA	75.	74.8	2.6	-	-
ASTERIONELLA FORMOSA	69.	68.6	2.4	-	-
SYNEDRA ULNA	56.	56.1	1.9	-	-
NITZSCHIA ACICULARIS	37.	37.4	1.3	-	-
NITZSCHIA DISSIPATA	31.	31.2	1.1	-	-
NAVICULA SPP.	25.	24.9	0.9	-	-
NAVICULA PUPULA	19.	18.7	0.6	-	-
CYMATOPLEURA SOLEA	12.	12.5	0.4	-	-
RHOICOSPHENIA CURVATA	12.	12.5	0.4	-	-
NAVICULA CAPITATA	6.	6.2	0.2	-	-
CYMBELLA MINUTA VAR. SILESIACA	6.	6.2	0.2	-	-
TOTAL PENNALES	1396.	1396.3	48.5	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	89.	88.8	3.1	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE SCOPE TYPE: INVERTED
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 5-MAY-81

TABLE B-9 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS QUADRICAUDA	53.	53.0	1.8	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	1.3	-	-
ANKISTRODESMUS FALCATUS	19.	18.7	0.6	-	-
SCENEDESMUS OPOLIENSIS	8.	7.8	0.3	-	-
TOTAL NON-FILAMENTOUS	206.	205.7	7.1	-	-
EUGLENOPHYTA					
TRACHELOMONAS SPP.	6.	6.2	0.2	-	-
TOTAL EUGLENOPHYTA	6.	6.2	0.2	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	37.	37.4	1.3	-	-
TOTAL CRYPTOPHYTA	37.	37.4	1.3	-	-
TOTAL PHYTOPLANKTON	2880.	2879.8	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	30				

TABLE B-10

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	35436.	35436.1	55.3	-	-
STEPHANODISCUS TENUIS	6264.	6264.4	9.8	-	-
STEPHANODISCUS NIAGARAE	1215.	1215.5	1.9	-	-
SKELETONEMA POTAMOS	187.	187.0	0.3	-	-
TOTAL CENTRALES	43103.	43103.1	67.2	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	4768.	4768.5	7.4	-	-
NITZSCHIA LINEARIS	374.	374.0	0.6	-	-
SYNEDRA RADIANS	374.	374.0	0.6	-	-
GYROSIGMA SCALPROIDES	93.	93.5	0.1	-	-
GOMPHONEMA PARVULUM	93.	93.5	0.1	-	-
NITZSCHIA PALEA	93.	93.5	0.1	-	-
CALONEIS AMPHISBAENA	93.	93.5	0.1	-	-
SYNEDRA ULNA	93.	93.5	0.1	-	-
TOTAL PENNALES	5984.	5983.9	9.3	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	3202.	3202.3	5.0	-	-
MICRACTINIUM PUSILLUM	1823.	1823.2	2.8	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	1730.	1729.7	2.7	-	-
TETRASTRUM STAUROGENIAEFORME	1075.	1075.2	1.7	-	-
SCENEDESMUS ABUNDANS	701.	701.2	1.1	-	-
SCENEDESMUS LONGUS	678.	677.9	1.1	-	-
SCENEDESMUS QUADRICAUDA	678.	677.9	1.1	-	-
ANKISTRODESMUS SPIRALIS	654.	654.5	1.0	-	-
ANKISTRODESMUS FALCATUS	654.	654.5	1.0	-	-
SCENEDESMUS OPOLIENSIS	467.	467.5	0.7		

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
DICTYOSPHAERIUM PULCHELLUM	444.	444.1	0.7	-	-
SCHROEDERIA SETIGERA	280.	280.5	0.4	-	-
LAGERHEIMIA QUADRISETA	187.	187.0	0.3	-	-
TOTAL NON-FILAMENTOUS	12576.	12575.6	19.6	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1412.	1411.8	2.2	-	-
ANABAENA SPP.	673.	673.2	1.0	-	-
TOTAL FILAMENTOUS	2085.	2085.0	3.3	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	187.	187.0	0.3	-	-
TOTAL EUGLENOPHYTA	187.	187.0	0.3	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	187.	187.0	0.3	-	-
TOTAL CRYPTOPHYTA	187.	187.0	0.3	-	-
TOTAL PHYTOPLANKTON	64122.	64121.7	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	29				

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	20850.	20850.3	38.1	-	-
STEPHANODISCUS TENUIS	7760.	7760.4	14.2	-	-
STEPHANODISCUS NIAGARAE	1776.	1776.5	3.2	-	-
MELOSIRA AMBIGUA	467.	467.5	0.9	-	-
SKELETONEMA POTAMOS	467.	467.5	0.9	-	-
MELOSIRA GRANULATA	280.	280.5	0.5	-	-
MELOSIRA VARIANS	187.	187.0	0.3	-	-
TOTAL CENTRALES	31790.	31789.7	58.1	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	3927.	3927.0	7.2	-	-
NITZSCHIA LINEARIS	280.	280.5	0.5	-	-
SYNEDRA RADIANS	187.	187.0	0.3	-	-
NITZSCHIA PALEA	187.	187.0	0.3	-	-
GOMPHONEMA PARVULUM	187.	187.0	0.3	-	-
GYROSIGMA SCALPROIDES	93.	93.5	0.2	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.2	-	-
DIATOMA VULGARE	93.	93.5	0.2	-	-
TOTAL PENNALES	5049.	5048.9	9.2	-	-
CHLOROPHYTA NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	3880.	3880.2	7.1	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	2992.	2992.0	5.5	-	-
MICRACTINIUM PUSILLUM	2852.	2851.7	5.2	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	1426.	1425.9	2.6	-	-
SCENEDESMUS QUADRICAUDA	865.	864.9	1.6	-	-
SCHROEDERIA SETIGERA	841.	841.5	1.5	-	-
SCENEDESMUS ABUNDANS	608.	607.7	1.1	-	-

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
DICTYOSPHAERIUM PULCHELLUM	584.	584.4	1.1	-	-
ANKISTRODESMUS SPIRALIS	561.	561.0	1.0	-	-
SCENEDESMUS LONGUS	491.	490.9	0.9	-	-
SCENEDESMUS OPOLIENSIS	444.	444.1	0.8	-	-
ANKISTRODESMUS FALCATUS	374.	374.0	0.7	-	-
LAGERHEIMIA QUADRISETA	187.	187.0	0.3	-	-
TETRASTRUM STAUROGENIAEFORME	187.	187.0	0.3	-	-
TOTAL NON-FILAMENTOUS	16292.	16292.2	29.8	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1421.	1421.2	2.6	-	-
TOTAL FILAMENTOUS	1421.	1421.2	2.6	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	93.	93.5	0.2	-	-
TOTAL EUGLENOPHYTA	93.	93.5	0.2	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	93.	93.5	0.2	-	-
TOTAL CRYPTOPHYTA	93.	93.5	0.2	-	-
TOTAL PHYTOPLANKTON	54739.	54739.0	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 21-MAY-81 SCOPE TYPE: INVERTED

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	21972.	21972.3	35.3	-	-
STEPHANODISCUS TENUIS	6358.	6357.9	10.2	-	-
STEPHANODISCUS NIAGARAE	2057.	2057.0	3.3	-	-
SKELETONEMA POTAMOS	1122.	1122.0	1.8	-	-
MELOSIRA AMBIGUA	467.	467.5	0.8	-	-
MELOSIRA GRANULATA	280.	280.5	0.5	-	-
TOTAL CENTRALES	32257.	32257.2	51.8	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	3085.	3085.5	5.0	-	-
NAVICULA SPP.	374.	374.0	0.6	-	-
NITZSCHIA PALEA	280.	280.5	0.5	-	-
NITZSCHIA SPP.	280.	280.5	0.5	-	-
NITZSCHIA LINEARIS	187.	187.0	0.3	-	-
GOMPHONEMA PARVULUM	187.	187.0	0.3	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.2	-	-
NITZSCHIA DISSIPATA	93.	93.5	0.2	-	-
DIATOMA VULGARE	93.	93.5	0.2	-	-
NAVICULA LANCEOLATA	93.	93.5	0.2	-	-
SURIRELLA OVATA	93.	93.5	0.2	-	-
TOTAL PENNALES	4862.	4862.0	7.8	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ABUNDANS	7714.	7713.7	12.4	-	-
SCENEDESMUS ACUMINATUS	4067.	4067.2	6.5	-	-
MICRACTINIUM PUSILLUM	2922.	2921.8	4.7	-	-
SCENEDESMUS LONGUS	1566.	1566.1	2.5	-	-
PEDIASTRUM BORYANUM	1496.	1496.0	2.4	-	-

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	1145.	1145.4	1.8	-	-
DICTYOSPHAERIUM PULCHELLUM	912.	911.6	1.5	-	-
ANKISTRODESMUS SPIRALIS	748.	748.0	1.2	-	-
SCENEDESMUS QUADRICAUDA	701.	701.2	1.1	-	-
SCENEDESMUS OPOLIENSIS	608.	607.7	1.0	-	-
SCHROEDERIA SETIGERA	561.	561.0	0.9	-	-
ANKISTRODESMUS FALCATUS	280.	280.5	0.5	-	-
TETRASTRUM STAUROGENIAEFORME	280.	280.5	0.5	-	-
LAGERHEIMIA QUADRISETA	187.	187.0	0.3	-	-
SCENEDESMUS DIMORPHUS	117.	116.9	0.2	-	-
SCENEDESMUS DENTICULATUS	93.	93.5	0.2	-	-
TETRASTRUM ELEGANS	93.	93.5	0.2	-	-
TOTAL NON-FILAMENTOUS	23492.	23491.6	37.8	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1328.	1327.7	2.1	-	-
TOTAL FILAMENTOUS	1328.	1327.7	2.1	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	93.	93.5	0.2	-	-
EUGLENA SPP.	93.	93.5	0.2	-	-
TOTAL EUGLENOPHYTA	187.	187.0	0.3	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	93.	93.5	0.2	-	-
TOTAL CRYPTOPHYTA	93.	93.5	0.2	-	-

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL PHYTOPLANKTON	62219.	62219.0	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	38				

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	24964.	24964.2	41.7	-	-
STEPHANODISCUS TENUIS	10752.	10752.4	18.0	-	-
STEPHANODISCUS NIAGARAE	1589.	1589.5	2.7	-	-
MELOSIRA GRANULATA	280.	280.5	0.5	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	280.	280.5	0.5	-	-
MELOSIRA AMBIGUA	187.	187.0	0.3	-	-
SKELETONEMA POTAMOS	187.	187.0	0.3	-	-
TOTAL CENTRALES	38241.	38241.1	64.0	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	2431.	2431.0	4.1	-	-
FRAGILARIA CROTONENSIS	1963.	1963.5	3.3	-	-
NITZSCHIA LINEARIS	280.	280.5	0.5	-	-
NAVICULA TRIPUNCTATA	187.	187.0	0.3	-	-
NITZSCHIA PALEA	187.	187.0	0.3	-	-
GOMPHONEMA PARVULUM	93.	93.5	0.2	-	-
DIATOMA VULGARE	93.	93.5	0.2	-	-
TOTAL PENNALES	5236.	5235.9	8.8	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
MICRACTINIUM PUSILLUM	4254.	4254.2	7.1	-	-
SCENEDESMUS ACUMINATUS	2478.	2477.7	4.1	-	-
DICTYOSPHAERIUM PULCHELLUM	1987.	1986.9	3.3	-	-
PANDORINA MORUM	1122.	1122.0	1.9	-	-
ANKISTRODESMUS FALCATUS	1028.	1028.5	1.7	-	-
SCENEDESMUS QUADRICAUDA	888.	888.2	1.5	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	701.	701.2	1.2	-	-
TETRASTRUM ELEGANS	561.	561.0	0.9	-	-

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCHROEDERIA SETIGERA	444.	444.1	0.7	-	-
ANKISTRODESMUS SPIRALIS	374.	374.0	0.6	-	-
SCENEDESMUS OPOLIENSIS	257.	257.1	0.4	-	-
SCENEDESMUS DIMORPHUS	210.	210.4	0.4	-	-
SCENEDESMUS ABUNDANS	210.	210.4	0.4	-	-
SCENEDESMUS LONGUS	187.	187.0	0.3	-	-
TOTAL NON-FILAMENTOUS	14703.	14702.7	24.6	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	673.	673.2	1.1	-	-
APHANIZOMENON FLOS-AQUAE	477.	476.8	0.8	-	-
TOTAL FILAMENTOUS	1150.	1150.0	1.9	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	187.	187.0	0.3	-	-
PHACUS CAUDATUS	187.	187.0	0.3	-	-
TOTAL EUGLENOPHYTA	374.	374.0	0.6	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	93.	93.5	0.2	-	-
TOTAL CRYPTOPHYTA	93.	93.5	0.2	-	-
TOTAL PHYTOPLANKTON	59797.	59797.3	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	20009.	20008.8	36.4	-	-
STEPHANODISCUS TENUIS	4955.	4955.4	9.0	-	-
MELOSIRA AMBIGUA	1496.	1496.0	2.7	-	-
STEPHANODISCUS NIAGARAE	841.	841.5	1.5	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	467.	467.5	0.8	-	-
SKELETONEMA POTAMOS	374.	374.0	0.7	-	-
TOTAL CENTRALES	28143.	28143.2	51.1	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	2711.	2711.5	4.9	-	-
NITZSCHIA PALEA	374.	374.0	0.7	-	-
NAVICULA LANCEOLATA	187.	187.0	0.3	-	-
NAVICULA TRIPUNCTATA	187.	187.0	0.3	-	-
GOMPHONEMA PARVULUM	187.	187.0	0.3	-	-
NITZSCHIA DISSIPATA	93.	93.5	0.2	-	-
DIATOMA VULGARE	93.	93.5	0.2	-	-
SYNEDRA ULNA	93.	93.5	0.2	-	-
TOTAL PENNALES	3927.	3927.0	7.1	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	4418.	4417.8	8.0	-	-
MICRACTINIUM PUSILLUM	3787.	3786.7	6.9	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	2992.	2992.0	5.4	-	-
DICTYOSPHAERIUM PULCHELLUM	1706.	1706.4	3.1	-	-
PEDIASTRUM BORYANUM	1496.	1496.0	2.7	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	1169.	1168.7	2.1	-	-
TETRASTRUM STAUROGENIAEFORME	1145.	1145.4	2.1	-	-
SCENEDESMUS LONGUS	1145.	1145.4	2.1	-	-

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS OPOLIENSIS	608.	607.7	1.1	-	-
TETRASTRUM ELEGANS	584.	584.4	1.1	-	-
PANDORINA MORUM	397.	397.4	0.7	-	-
SCENEDESMUS QUADRICAUDA	397.	397.4	0.7	-	-
SCENEDESMUS ABUNDANS	327.	327.2	0.6	-	-
SCHROEDERIA SETIGERA	280.	280.5	0.5	-	-
ANKISTRODESMUS SPIRALIS	187.	187.0	0.3	-	-
ANKISTRODESMUS FALCATUS	187.	187.0	0.3	-	-
LAGERHEIMIA QUADRISETA	93.	93.5	0.2	-	-
TOTAL NON-FILAMENTOUS	20920.	20920.4	38.0	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1851.	1851.3	3.4	-	-
TOTAL FILAMENTOUS	1851.	1851.3	3.4	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	93.	93.5	0.2	-	-
TOTAL EUGLENOPHYTA	93.	93.5	0.2	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	93.	93.5	0.2	-	-
TOTAL CRYPTOPHYTA	93.	93.5	0.2	-	-
TOTAL PHYTOPLANKTON	55029.	55028.9	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	34				

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	26367.	26366.7	46.2	-	-
STEPHANODISCUS TENUIS	6638.	6638.4	11.6	-	-
STEPHANODISCUS NIAGARAE	1589.	1589.5	2.8	-	-
MELOSIRA AMBIGUA	748.	748.0	1.3	-	-
CYCLOTELLA MENEGHINIANA	374.	374.0	0.7	-	-
MELOSIRA GRANULATA	374.	374.0	0.7	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	280.	280.5	0.5	-	-
TOTAL CENTRALES	36371.	36371.1	63.7	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	3833.	3833.5	6.7	-	-
SYNEDRA RADIANS	467.	467.5	0.8	-	-
SURIRELLA OVATA	187.	187.0	0.3	-	-
NITZSCHIA CLOSTERIUM	187.	187.0	0.3	-	-
DIATOMA VULGARE	93.	93.5	0.2	-	-
NITZSCHIA SIGMOIDEA	93.	93.5	0.2	-	-
TOTAL PENNALES	4862.	4862.0	8.5	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
MICRACTINIUM PUSILLUM	4441.	4441.2	7.8	-	-
SCENEDESMUS ACUMINATUS	3717.	3716.6	6.5	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	865.	864.9	1.5	-	-
ANKISTRODESMUS FALCATUS	841.	841.5	1.5	-	-
DICTYOSPHAERIUM PULCHELLUM	795.	794.7	1.4	-	-
SCENEDESMUS OPOLIENSIS	678.	677.9	1.2	-	-
SCENEDESMUS ABUNDANS	631.	631.1	1.1	-	-
ANKISTRODESMUS SPIRALIS	467.	467.5	0.8	-	-
TETRASTRUM STAUROGENIAEFORME	421.	420.7	0.7	-	-

TABLE B-10 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS LONGUS	397.	397.4	0.7	-	-
SCENEDESMUS QUADRICAUDA	327.	327.2	0.6	-	-
LAGERHEIMIA QUADRISETA	280.	280.5	0.5	-	-
CRUCIGENIA QUADRATA	187.	187.0	0.3	-	-
CLOSTERIOPSIS LONGISSIMA VAR. TROPICA	93.	93.5	0.2	-	-
TOTAL NON-FILAMENTOUS	14142.	14141.7	24.8	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1141.	1140.7	2.0	-	-
ANABAENA SPP.	262.	261.8	0.5	-	-
TOTAL FILAMENTOUS	1402.	1402.5	2.5	-	-
EUGLENOPHYTA					
EUGLENA SPP.	187.	187.0	0.3	-	-
TOTAL EUGLENOPHYTA	187.	187.0	0.3	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	93.	93.5	0.2	-	-
TOTAL CRYPTOPHYTA	93.	93.5	0.2	-	-
TOTAL PHYTOPLANKTON	57058.	57057.8	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	31				

TABLE B-11

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	84.	84.1	3.9	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	47.	46.7	2.2	-	-
CYCLOTELLA MENEGHINIANA	28.	28.0	1.3	-	-
MELOSIRA GRANULATA	19.	18.7	0.9	-	-
CYCLOTELLA ATOMUS	9.	9.3	0.4	-	-
TOTAL CENTRALES	187.	187.0	8.7	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	458.	458.1	21.3	-	-
NITZSCHIA PALEA	159.	158.9	7.4	-	-
NAVICULA TRIPUNCTATA	159.	158.9	7.4	-	-
NITZSCHIA LINEARIS	150.	149.6	6.9	-	-
NAVICULA LANCEOLATA	112.	112.2	5.2	-	-
NAVICULA CRYPTOCEPHALA	84.	84.1	3.9	-	-
SYNEDRA ULNA	84.	84.1	3.9	-	-
GOMPHONEMA PARVULUM	84.	84.1	3.9	-	-
NITZSCHIA SPP.	65.	65.4	3.0	-	-
DIATOMA VULGARE	47.	46.7	2.2	-	-
NAVICULA SPP.	47.	46.7	2.2	-	-
CALONEIS AMPHISBAENA	9.	9.3	0.4	-	-
NITZSCHIA DISSIPATA	9.	9.3	0.4	-	-
NAVICULA DECUSSIS	9.	9.3	0.4	-	-
NAVICULA PUPULA	9.	9.3	0.4	-	-
ACHNANTHES LANCEOLATA	9.	9.3	0.4	-	-
SURIRELLA OVATA	9.	9.3	0.4	-	-
FRAGILARIA VAUCHERIAE	9.	9.3	0.4	-	-
TOTAL PENNALES	1515.	1514.7	70.3	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	112.	112.2	5.2	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 2-JUN-81 SCOPE TYPE: INVERTED

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	77.	77.1	3.6	-	-
SCENEDESMUS OPOLIENSIS	63.	63.1	2.9	-	-
SCENEDESMUS ABUNDANS	42.	42.1	2.0	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	1.7	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	19.	18.7	0.9	-	-
DICTYOSPHAERIUM PULCHELLUM	19.	18.7	0.9	-	-
LAGERHEIMIA QUADRISETA	9.	9.3	0.4	-	-
SCENEDESMUS LONGUS	9.	9.3	0.4	-	-
TOTAL NON-FILAMENTOUS	388.	388.0	18.0	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	25.	25.2	1.2	-	-
OSCILLATORIA TENUIS	10.	10.3	0.5	-	-
TOTAL FILAMENTOUS	36.	35.5	1.7	-	-
EUGLENOPHYTA					
EUGLENA SPP.	9.	9.3	0.4	-	-
TOTAL EUGLENOPHYTA	9.	9.3	0.4	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	19.	18.7	0.9	-	-
TOTAL CRYPTOPHYTA	19.	18.7	0.9	-	-
TOTAL PHYTOPLANKTON	2153.	2153.3	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	36				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE SCOPE TYPE: INVERTED
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 2-JUN-81

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	103.	102.8	5.3	-	-
MELOSIRA GRANULATA VAR. ANGUSTISSIMA	37.	37.4	1.9	-	-
MELOSIRA AMBIGUA	19.	18.7	1.0	-	-
CYCLOTELLA MENEGHINIANA	19.	18.7	1.0	-	-
STEPHANODISCUS TENUIS	9.	9.3	0.5	-	-
TOTAL CENTRALES	187.	187.0	9.7	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	365.	364.6	18.8	-	-
NITZSCHIA LINEARIS	234.	233.7	12.1	-	-
NAVICULA TRIPUNCTATA	178.	177.6	9.2	-	-
NAVICULA LANCEOLATA	140.	140.2	7.2	-	-
NITZSCHIA PALEA	112.	112.2	5.8	-	-
SYNEDRA ULNA	65.	65.4	3.4	-	-
NITZSCHIA SPP.	47.	46.7	2.4	-	-
GOMPHONEMA PARVULUM	37.	37.4	1.9	-	-
NAVICULA SPP.	28.	28.0	1.4	-	-
NAVICULA CRYPTOCEPHALA	28.	28.0	1.4	-	-
NAVICULA PUPULA	19.	18.7	1.0	-	-
ACHNANTHES LANCEOLATA	19.	18.7	1.0	-	-
CYMBELLA MINUTA VAR. SILESIACA	19.	18.7	1.0	-	-
DIATOMA VULGARE	19.	18.7	1.0	-	-
GYROSIGMA SPP.	9.	9.3	0.5	-	-
RHOICOSPHENIA CURVATA	9.	9.3	0.5	-	-
SYNEDRA RADIANS	9.	9.3	0.5	-	-
GOMPHONEMA SPP.	9.	9.3	0.5	-	-
TOTAL PENNALES	1346.	1346.4	69.6	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	84.	84.1	4.3	-	-

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	51.	51.4	2.7	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	42.	42.1	2.2	-	-
ANKISTRODESMUS SPIRALIS	28.	28.0	1.4	-	-
SCENEDESMUS ABUNDANS	21.	21.0	1.1	-	-
SCENEDESMUS OPOLIENSIS	16.	16.4	0.8	-	-
SCENEDESMUS LONGUS	9.	9.3	0.5	-	-
SCENEDESMUS QUADRICAUDA	9.	9.3	0.5	-	-
TOTAL NON-FILAMENTOUS	262.	261.8	13.5	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	39.	39.3	2.0	-	-
OSCILLATORIA TENUIS	17.	16.8	0.9	-	-
TOTAL FILAMENTOUS	56.	56.1	2.9	-	-
EUGLENOPHYTA					
EUGLENA SPP.	19.	18.7	1.0	-	-
TOTAL EUGLENOPHYTA	19.	18.7	1.0	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	65.	65.4	3.4	-	-
TOTAL CRYPTOPHYTA	65.	65.4	3.4	-	-
TOTAL PHYTOPLANKTON	1935.	1935.4	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	35				

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	84.	84.1	4.2	-	-
MELOSIRA AMBIGUA	37.	37.4	1.9	-	-
CYCLOTELLA MENEGHINIANA	19.	18.7	0.9	-	-
MELOSIRA GRANULATA	19.	18.7	0.9	-	-
MELOSIRA VARIANS	19.	[illegible]8.7	0.9	-	-
STEPHANODISCUS TENUIS	19.	[illegible]7	0.9	-	-
TOTAL CENTRALES	196.	[illegible]	9.9	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	411.	411.4	20.7	-	-
NAVICULA TRIPUNCTATA	215.	215.0	10.8	-	-
NITZSCHIA LINEARIS	196.	196.3	9.9	-	-
NITZSCHIA PALEA	178.	177.6	8.9	-	-
NAVICULA LANCEOLATA	103.	102.8	5.2	-	-
NAVICULA SPP.	84.	84.1	4.2	-	-
NAVICULA CRYPTOCEPHALA	56.	56.1	2.8	-	-
NITZSCHIA SPP.	47.	46.7	2.4	-	-
DIATOMA VULGARE	37.	37.4	1.9	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.9	-	-
SYNEDRA ULNA	19.	18.7	0.9	-	-
NAVICULA DECUSSIS	9.	[illegible].3	0.5	-	-
RHOICOSPHENIA CURVATA	9.	9.3	0.5	-	-
SYNEDRA RADIANS	9.	9.3	0.5	-	-
GOMPHONEMA PARVULUM	9.	9.3	0.5	-	-
TOTAL PENNALES	1402.	1402.5	70.7	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	75.	74.8	3.8	-	-

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	[illegible].	58.4	2.9	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	40.	39.7	2.0	-	-
ANKISTRODESMUS SPIRALIS	28.	28.0	1.4	-	-
SCENEDESMUS ABUNDANS	23.	23.4	1.2	-	-
SCENEDESMUS LONGUS	19.	18.7	0.9	-	-
SCENEDESMUS OPOLIENSIS	14.	14.0	0.7	-	-
SCENEDESMUS DIMORPHUS	9.	9.3	0.5	-	-
TOTAL NON-FILAMENTOUS	266.	266.5	13.4	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	44.	43.9	2.2	-	-
APHANIZOMENON FLOS-AQUAE	20.	19.6	1.0	-	-
TOTAL FILAMENTOUS	64.	63.6	3.2	-	-
EUGLENOPHYTA					
EUGLENA SPP.	19.	18.7	0.9	-	-
TOTAL EUGLENOPHYTA	19.	18.7	0.9	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	37.	37.4	1.9	-	-
TOTAL CRYPTOPHYTA	37.	37.4	1.9	-	-
TOTAL PHYTOPLANKTON	1985.	1985.0	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	131.	130.9	6.0	-	-
MELOSIRA AMBIGUA	47.	46.7	2.1	-	-
CYCLOTELLA MENEGHINIANA	28.	28.0	1.3	-	-
STEPHANODISCUS TENUIS	28.	28.0	1.3	-	-
TOTAL CENTRALES	234.	233.7	10.7	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	580.	579.7	26.6	-	-
NITZSCHIA LINEARIS	168.	168.3	7.7	-	-
NAVICULA LANCEOLATA	140.	140.2	6.4	-	-
NITZSCHIA PALEA	122.	121.5	5.6	-	-
GOMPHONEMA PARVULUM	112.	112.2	5.1	-	-
NAVICULA SPP.	75.	74.8	3.4	-	-
NAVICULA CRYPTOCEPHALA	65.	65.4	3.0	-	-
DIATOMA VULGARE	56.	56.1	2.6	-	-
NITZSCHIA SPP.	47.	46.7	2.1	-	-
SYNEDRA ULNA	37.	37.4	1.7	-	-
ACHNANTHES LANCEOLATA	19.	18.7	0.9	-	-
NAVICULA PUPULA	19.	18.7	0.9	-	-
NAVICULA DECUSSIS	19.	18.7	0.9	-	-
CYMBELLA SPP.	9.	9.3	0.4	-	-
NITZSCHIA DISSIPATA	9.	9.3	0.4	-	-
NITZSCHIA FRUSTULUM	9.	9.3	0.4	-	-
CALONEIS AMPHISBAENA	9.	9.3	0.4	-	-
TOTAL PENNALES	1496.	1496.0	68.6	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	112.	112.2	5.1	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 2-JUN-81 SCOPE TYPE: INVERTED

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	65.	65.4	3.0	-	-
SCENEDESMUS ACUMINATUS	54.	53.8	2.5	-	-
SCENEDESMUS ABUNDANS	37.	37.4	1.7	-	-
SCENEDESMUS OPOLIENSIS	30.	30.4	1.4	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	28.	28.0	1.3	-	-
SCENEDESMUS QUADRICAUDA	9.	9.3	0.4	-	-
TOTAL NON-FILAMENTOUS	337.	336.6	15.4	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	21.	20.6	0.9	-	-
OSCILLATORIA TENUIS	20.	19.6	0.9	-	-
TOTAL FILAMENTOUS	40.	40.2	1.8	-	-
EUGLENOPHYTA					
EUGLENA SPP.	37.	37.4	1.7	-	-
TOTAL EUGLENOPHYTA	37.	37.4	1.7	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	37.	37.4	1.7	-	-
TOTAL CRYPTOPHYTA	37.	37.4	1.7	-	-
TOTAL PHYTOPLANKTON	2181.	2181.3	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	140.	140.2	6.3	-	-
STEPHANODISCUS TENUIS	28.	28.0	1.3	-	-
MELOSIRA GRANULATA	19.	18.7	0.8	-	-
CYCLOTELLA MENEGHINIANA	19.	18.7	0.8	-	-
TOTAL CENTRALES	206.	205.7	9.2	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	393.	392.7	17.6	-	-
NITZSCHIA PALEA	224.	224.4	10.1	-	-
NITZSCHIA LINEARIS	196.	196.3	8.8	-	-
NAVICULA LANCEOLATA	140.	140.2	6.3	-	-
NAVICULA TRIPUNCTATA	140.	140.2	6.3	-	-
NITZSCHIA SPP.	112.	112.2	5.0	-	-
NAVICULA SPP.	84.	84.1	3.8	-	-
NAVICULA CRYPTOCEPHALA	75.	74.8	3.4	-	-
GOMPHONEMA PARVULUM	56.	56.1	2.5	-	-
DIATOMA VULGARE	56.	56.1	2.5	-	-
SYNEDRA ULNA	28.	28.0	1.3	-	-
SURIRELLA OVATA	19.	18.7	0.8	-	-
SYNEDRA RADIANS	19.	18.7	0.8	-	-
NAVICULA EXIGUA	9.	9.3	0.4	-	-
NAVICULA DECUSSIS	9.	9.3	0.4	-	-
NITZSCHIA DISSIPATA	9.	9.3	0.4	-	-
CALONEIS AMPHISBAENA	9.	9.3	0.4	-	-
ACHNANTHES SPP.	9.	9.3	0.4	-	-
GYROSIGMA SPP.	9.	9.3	0.4	-	-
RHOICOSPHENIA CURVATA	9.	9.3	0.4	-	-
NAVICULA CAPITATA	9.	9.3	0.4	-	-
NITZSCHIA ANGUSTATA	9.	9.3	0.4	-	-
NAVICULA CUSPIDATA	9.	9.3	0.4	-	-
TOTAL PENNALES	1636.	1636.2	73.3	-	-

TABLE B-11 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	77.	77.1	3.5	-	-
ANKISTRODESMUS FALCATUS	56.	56.1	2.5	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	37.	37.4	1.7	-	-
SCENEDESMUS OPOLIENSIS	33.	32.7	1.5	-	-
SCENEDESMUS ABUNDANS	21.	21.0	0.9	-	-
ANKISTRODESMUS SPIRALIS	19.	18.7	0.8	-	-
LAGERHEIMIA QUADRISETA	9.	9.3	0.4	-	-
SCENEDESMUS DIMORPHUS	9.	9.3	0.4	-	-
TOTAL NON-FILAMENTOUS	262.	261.8	11.7	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	52.	52.4	2.3	-	-
OSCILLATORIA TENUIS	30.	29.9	1.3	-	-
TOTAL FILAMENTOUS	82.	82.3	3.7	-	-
EUGLENOPHYTA					
EUGLENA SPP.	28.	28.0	1.3	-	-
TOTAL EUGLENOPHYTA	28.	28.0	1.3	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	19.	18.7	0.8	-	-
TOTAL CRYPTOPHYTA	19.	18.7	0.8	-	-
TOTAL PHYTOPLANKTON	2233.	2232.8	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

TABLE B-12

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	187.	187.0	8.0	-	-
SKELETONEMA POTAMOS	56.	56.1	2.4	-	-
STEPHANODISCUS TENUIS	37.	37.4	1.6	-	-
TOTAL CENTRALES	280.	280.5	12.1	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	879.	878.9	37.8	-	-
NITZSCHIA LINEARIS	131.	130.9	5.6	-	-
GOMPHONEMA PARVULUM	112.	112.2	4.8	-	-
NAVICULA LANCEOLATA	112.	112.2	4.8	-	-
NAVICULA SPP.	93.	93.5	4.0	-	-
NAVICULA TRIPUNCTATA	93.	93.5	4.0	-	-
NAVICULA CRYPTOCEPHALA	56.	56.1	2.4	-	-
NITZSCHIA ACICULARIS	56.	56.1	2.4	-	-
PINNULARIA SPP.	37.	37.4	1.6	-	-
NITZSCHIA DISSIPATA	37.	37.4	1.6	-	-
CYMATOPLEURA SOLEA	19.	18.7	0.8	-	-
NAVICULA VIRIDULA	19.	18.7	0.8	-	-
CYMBELLA SINUATA	19.	18.7	0.8	-	-
NAVICULA PUPULA	19.	18.7	0.8	-	-
ACHNANTHES LANCEOLATA	19.	18.7	0.8	-	-
SURIRELLA OVATA	19.	18.7	0.8	-	-
TOTAL PENNALES	1720.	1720.4	74.0	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS OPOLIENSIS	117.	116.9	5.0	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	61.	60.8	2.6	-	-
ANKISTRODESMUS FALCATUS	37.	37.4	1.6	-	-

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL NON-FILAMENTOUS	215.	215.0	9.2	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	69.	69.2	3.0	-	-
OSCILLATORIA SPP.	22.	22.4	1.0	-	-
TOTAL FILAMENTOUS	92.	91.6	3.9	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	19.	18.7	0.8	-	-
TOTAL CRYPTOPHYTA	19.	18.7	0.8	-	-
TOTAL PHYTOPLANKTON	2326.	2326.3	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	25				

SUMMARY OF PH[illegible]PLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRE[illegible]
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 16-JUN-81 SCOPE TYPE: INVERTED

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	56.	56.1	2.2	-	-
STEPHANODISCUS TENUIS	56.	56.1	2.2	-	-
SKELETONEMA POTAMOS	56.	56.1	2.2	-	-
CYCLOTELLA MENEGHINIANA	37.	37.4	1.5	-	-
MELOSIRA GRANULATA	37.	37.4	1.5	-	-
STEPHANODISCUS ASTRAEA	19.	18.7	0.7	-	-
TOTAL CENTRALES	262.	261.8	10.5	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	785.	785.4	31.5	-	-
NAVICULA SPP.	168.	168.3	6.7	-	-
NAVICULA LANCEOLATA	131.	130.9	5.2	-	-
NITZSCHIA LINEARIS	112.	112.2	4.5	-	-
NAVICULA TRIPUNCTATA	112.	112.2	4.5	-	-
NITZSCHIA SPP.	93.	93.5	3.7	-	-
GOMPHONEMA PARVULUM	75.	74.8	3.0	-	-
NITZSCHIA ACICULARIS	56.	56.1	2.2	-	-
DIATOMA VULGARE	37.	37.4	1.5	-	-
NAVICULA CRYPTOCEPHALA	37.	37.4	1.5	-	-
NAVICULA CAPITATA	19.	18.7	0.7	-	-
NITZSCHIA FRUSTULUM	19.	18.7	0.7	-	-
NAVICULA CUSPIDATA	19.	18.7	0.7	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.7	-	-
CALONEIS SPP.	19.	18.7	0.7	-	-
SURIRELLA OVATA	19.	18.7	0.7	-	-
PLEUROSIGMA SPP.	19.	18.7	0.7	-	-
TOTAL PENNALES	1739.	1739.1	69.7	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	93.	93.5	3.7	-	-

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS OPOLIENSIS	89.	88.8	3.6	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	70.	70.1	2.8	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	1.5	-	-
SCENEDESMUS ACUMINATUS	23.	23.4	0.9	-	-
SCENEDESMUS QUADRICAUDA	19.	18.7	0.7	-	-
TOTAL NON-FILAMENTOUS	332.	331.9	13.3	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	84.	84.1	3.4	-	-
OSCILLATORIA SPP.	39.	39.3	1.6	-	-
TOTAL FILAMENTOUS	123.	123.4	4.9	-	-
EUGLENOPHYTA					
EUGLENA SPP.	37.	37.4	1.5	-	-
TOTAL EUGLENOPHYTA	37.	37.4	1.5	-	-
TOTAL PHYTOPLANKTON	2494.	2493.6	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE SCOPE TYPE: INVERTED
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 16-JUN-81

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	93.	93.5	3.2	-	-
CYCLOTELLA MENEGHINIANA	56.	56.1	1.9	-	-
STEPHANODISCUS ASTRAEA	19.	18.7	0.6	-	-
STEPHANODISCUS TENUIS	19.	18.7	0.6	-	-
TOTAL CENTRALES	187.	187.0	6.4	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	991.	991.1	33.8	-	-
NAVICULA TRIPUNCTATA	243.	243.1	8.3	-	-
NITZSCHIA LINEARIS	168.	168.3	5.7	-	-
GOMPHONEMA PARVULUM	150.	149.6	5.1	-	-
NAVICULA SPP.	131.	130.9	4.5	-	-
NITZSCHIA SPP.	131.	130.9	4.5	-	-
DIATOMA VULGARE	93.	93.5	3.2	-	-
NAVICULA LANCEOLATA	75.	74.8	2.6	-	-
SYNEDRA ULNA	56.	56.1	1.9	-	-
NITZSCHIA DISSIPATA	37.	37.4	1.3	-	-
NITZSCHIA ACICULARIS	37.	37.4	1.3	-	-
NAVICULA CRYPTOCEPHALA	37.	37.4	1.3	-	-
SURIRELLA OVATA	37.	37.4	1.3	-	-
CALONEIS AMPHISBAENA	19.	18.7	0.6	-	-
NAVICULA DECUSSIS	19.	18.7	0.6	-	-
NAVICULA PUPULA	19.	18.7	0.6	-	-
NITZSCHIA SIGMOIDEA	19.	18.7	0.6	-	-
NAVICULA VIRIDULA	19.	18.7	0.6	-	-
ACHNANTHES LANCEOLATA	19.	18.7	0.6	-	-
NAVICULA CUSPIDATA	19.	18.7	0.6	-	-
PLEUROSIGMA SPP.	19.	18.7	0.6	-	-
TOTAL PENNALES	2337.	2337.5	79.7	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS OPOLIENSIS	79.	79.5	2.7	-	-

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	56.	56.1	1.9	-	-
SCENEDESMUS ACUMINATUS	47.	46.7	1.6	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	47.	46.7	1.6	-	-
TOTAL NON-FILAMENTOUS	229.	229.1	7.8	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	135.	134.6	4.6	-	-
OSCILLATORIA SPP.	43.	43.0	1.5	-	-
TOTAL FILAMENTOUS	178.	177.6	6.1	-	-
TOTAL PHYTOPLANKTON	2931.	2931.2	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	31				

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
CYCLOTELLA MENEGHINIANA	75.	74.8	3.8	-	-
STEPHANODISCUS INVISITATUS	37.	37.4	1.9	-	-
SKELETONEMA POTAMOS	37.	37.4	1.9	-	-
STEPHANODISCUS TENUIS	19.	18.7	0.9	-	-
TOTAL CENTRALES	168.	168.3	8.5	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	393.	392.7	19.8	-	-
NITZSCHIA LINEARIS	206.	205.7	10.4	-	-
MERIDION CIRCULARE	131.	130.9	6.6	-	-
NAVICULA TRIPUNCTATA	131.	130.9	6.6	-	-
NAVICULA SPP.	131.	130.9	6.6	-	-
NITZSCHIA ACICULARIS	112.	112.2	5.7	-	-
NAVICULA LANCEOLATA	75.	74.8	3.8	-	-
GOMPHONEMA PARVULUM	75.	74.8	3.8	-	-
SYNEDRA ULNA	56.	56.1	2.8	-	-
DIATOMA VULGARE	56.	56.1	2.8	-	-
NAVICULA PUPULA	37.	37.4	1.9	-	-
NAVICULA CRYPTOCEPHALA	37.	37.4	1.9	-	-
NAVICULA DECUSSIS	37.	37.4	1.9	-	-
NITZSCHIA SPP.	19.	18.7	0.9	-	-
PINNULARIA OBSCURA	19.	18.7	0.9	-	-
PINNULARIA SPP.	19.	18.7	0.9	-	-
FRAGILARIA VAUCHERIAE	19.	18.7	0.9	-	-
TOTAL PENNALES	1552.	1552.1	78.4	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	89.	88.8	4.5	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 16-JUN-81 SCOPE TYPE: INVERTED

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS OPOLIENSIS	61.	60.8	3.1	-	-
SCENEDESMUS ABUNDANS	47.	46.7	2.4	-	-
TOTAL NON-FILAMENTOUS	196.	196.3	9.9	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA SPP.	43.	43.0	2.2	-	-
TOTAL FILAMENTOUS	43.	43.0	2.2	-	-
EUGLENOPHYTA					
EUGLENA SPP.	19.	18.7	0.9	-	-
TOTAL EUGLENOPHYTA	19.	18.7	0.9	-	-
TOTAL PHYTOPLANKTON	1978.	1978.4	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	26				

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	187.	187.0	7.0	-	-
CYCLOTELLA MENEGHINIANA	93.	93.5	3.5	-	-
MELOSIRA GRANULATA	37.	37.4	1.4	-	-
STEPHANODISCUS TENUIS	37.	37.4	1.4	-	-
STEPHANODISCUS ASTRAEA	19.	18.7	0.7	-	-
TOTAL CENTRALES	374.	374.0	14.0	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	729.	729.3	27.3	-	-
NAVICULA TRIPUNCTATA	206.	205.7	7.7	-	-
NITZSCHIA SPP.	187.	187.0	7.0	-	-
NITZSCHIA LINEARIS	112.	112.2	4.2	-	-
NAVICULA LANCEOLATA	112.	112.2	4.2	-	-
NAVICULA CRYPTOCEPHALA	93.	93.5	3.5	-	-
NAVICULA SPP.	75.	74.8	2.8	-	-
DIATOMA VULGARE	56.	56.1	2.1	-	-
NAVICULA CAPITATA	19.	18.7	0.7	-	-
GYROSIGMA SPP.	19.	18.7	0.7	-	-
MERIDION CIRCULARE	19.	18.7	0.7	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.7	-	-
NITZSCHIA FRUSTULUM	19.	18.7	0.7	-	-
NAVICULA DECUSSIS	19.	18.7	0.7	-	-
CYMBELLA SPP.	19.	18.7	0.7	-	-
NITZSCHIA SIGMOIDEA	19.	18.7	0.7	-	-
NAVICULA VIRIDULA	19.	18.7	0.7	-	-
NITZSCHIA PSEUDOFONTICOLA	19.	18.7	0.7	-	-
TOTAL PENNALES	1758.	1757.8	65.9	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	98.	98.2	3.7	-	-

TABLE B-12 (CONT.)

IOWA ELECTRIC - PHYTOPLANKTON
COMPOSITION AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS OPOLIENSIS	98.	98.2	3.7	-	-
ANKISTRODESMUS FALCATUS	75.	74.8	2.8	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	1.4	-	-
SCENEDESMUS ACUMINATUS	28.	28.0	1.1	-	-
SCENEDESMUS ABUNDANS	23.	23.4	0.9	-	-
SCENEDESMUS ARCUATUS	19.	18.7	0.7	-	-
TOTAL NON-FILAMENTOUS	379.	378.7	14.2	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	80.	80.4	3.0	-	-
OSCILLATORIA SPP.	39.	39.3	1.5	-	-
TOTAL FILAMENTOUS	120.	119.7	4.5	-	-
EUGLENOPHYTA					
EUGLENA SPP.	19.	18.7	0.7	-	-
TOTAL EUGLENOPHYTA	19.	18.7	0.7	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	19.	18.7	0.7	-	-
TOTAL CRYPTOPHYTA	19.	18.7	0.7	-	-
TOTAL PHYTOPLANKTON	2668.	2667.5	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	34				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 6-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	399.	399.5	10.14	-	-
STEPHANODISCUS INVISITATUS	280.	280.5	7.12	-	-
CYCLOTELLA MENEGHINIANA	263.	263.5	6.69	-	-
MELOSIRA GRANULATA	195.	195.5	4.96	-	-
STEPHANODISCUS NIAGARAE	93.	93.5	2.37	-	-
RHIZOSOLENIA ERIENSIS	17.	17.0	0.43	-	-
COSCINODISCUS ROTHII VAR. SUBSALSA	17.	17.0	0.43	-	-
ATTHEYA ZACHARIASI	8.	8.5	0.22	-	-
STEPHANODISCUS TENUIS	8.	8.5	0.22	-	-
TOTAL CENTRALES	1283.	1283.5	32.59	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	246.	246.5	6.26	-	-
NITZSCHIA ACICULARIS	204.	204.0	5.18	-	-
NITZSCHIA ACTINASTROIDES	76.	76.5	1.94	-	-
NITZSCHIA PSEUDOFONTICOLA	25.	25.5	0.65	-	-
DIATOMA VULGARE	17.	17.0	0.43	-	-
NAVICULA CRYPTOCEPHALA	8.	8.5	0.22	-	-
NAVICULA EXIGUA	8.	8.5	0.22	-	-
NITZSCHIA LINEARIS	8.	8.5	0.22	-	-
CYMATOPLEURA SOLEA	8.	8.5	0.22	-	-
ACHNANTHES LANCEOLATA	8.	8.5	0.22	-	-
NAVICULA CAPITATA	8.	8.5	0.22	-	-
RHOICOSPHENIA CURVATA	8.	8.5	0.22	-	-
SURIRELLA OVATA	8.	8.5	0.22	-	-
SYNEDRA ULNA	8.	8.5	0.22	-	-
TOTAL PENNALES	646.	646.0	16.40	-	-
TOTAL BACILLARIOPHYTA	1929.	1929.5	48.99	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	178.	178.5	4.53	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 8-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	123.	123.2	3.13	-	-
PEDIASTRUM BORYANUM	68.	68.0	1.73	-	-
SCENEDESMUS ABUNDANS	57.	57.4	1.46	-	-
SCENEDESMUS QUADRICAUDA	40.	40.4	1.03	-	-
SCENEDESMUS OPOLIENSIS	30.	29.7	0.76	-	-
SCHROEDERIA SETIGERA	25.	25.5	0.65	-	-
SCENEDESMUS ARCUATUS	19.	19.1	0.49	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	19.	19.1	0.49	-	-
ANKISTRODESMUS SPIRALIS	17.	17.0	0.43	-	-
SCENEDESMUS DIMORPHUS	17.	17.0	0.43	-	-
LAGERHEIMIA QUADRISETA	17.	17.0	0.43	-	-
SCENEDESMUS INTERMEDIUS	11.	10.6	0.27	-	-
CLOSTERIOPSIS LONGISSIMA VAR. TROPICA	8.	8.5	0.22	-	-
TOTAL NON-FILAMENTOUS	631.	631.1	16.02	-	-
TOTAL CHLOROPHYTA	631.	631.1	16.02	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	529.	529.1	13.43	-	-
MICROCYSTIS AERUGINOSA	34.	34.0	0.86	-	-
TOTAL NON-FILAMENTOUS	563.	563.1	14.30	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	526.	526.1	13.36	-	-
OSCILLATORIA TENUIS	121.	120.7	3.06	-	-
ANABAENA FLOS-AQUAE	66.	66.3	1.68	-	-
TOTAL FILAMENTOUS	713.	713.1	18.11	-	-
TOTAL CYANOPHYTA	1276.	1276.3	32.40	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	102.	102.0	2.59	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 8-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	102.	102.0	2.59	-	-
TOTAL PHYTOPLANKTON	3939.	3938.9	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	43				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 8-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	433.	433.5	11.81	-	-
STEPHANODISCUS INVISITATUS	374.	374.0	10.19	-	-
MELOSIRA GRANULATA	204.	204.0	5.56	-	-
CYCLOTELLA MENEGHINIANA	187.	187.0	5.09	-	-
STEPHANODISCUS NIAGARAE	68.	68.0	1.85	-	-
RHIZOSOLENIA ERIENSIS	8.	8.5	0.23	-	-
TOTAL CENTRALES	1275.	1275.0	34.72	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	212.	212.5	5.79	-	-
NITZSCHIA ACICULARIS	144.	144.5	3.94	-	-
NITZSCHIA LINEARIS	42.	42.5	1.16	-	-
SURIRELLA OVATA	17.	17.0	0.46	-	-
DIATOMA VULGARE	8.	8.5	0.23	-	-
SYNEDRA RADIANS	8.	8.5	0.23	-	-
SYNEDRA ULNA	8.	8.5	0.23	-	-
TOTAL PENNALES	442.	442.0	12.04	-	-
TOTAL BACILLARIOPHYTA	1717.	1717.0	46.76	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
PEDIASTRUM BORYANUM	272.	272.0	7.41	-	-
ANKISTRODESMUS FALCATUS	195.	195.5	5.32	-	-
SCENEDESMUS ABUNDANS	87.	87.1	2.37	-	-
SCENEDESMUS ACUMINATUS	87.	87.1	2.37	-	-
SCENEDESMUS OPOLIENSIS	64.	63.7	1.74	-	-
DICTYOSPHAERIUM PULCHELLUM	40.	40.4	1.10	-	-
SCENEDESMUS QUADRICAUDA	28.	27.6	0.75	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 2   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	17.	17.0	0.46	-	-
SCHROEDERIA SETIGERA	17.	17.0	0.46	-	-
TETRALLANTOS LAGERHEIMII	17.	17.0	0.46	-	-
TETRASTRUM STAUROGENIAEFORME	11.	10.6	0.29	-	-
TETRAEDRON MINIMUM	8.	8.5	0.23	-	
TOTAL NON-FILAMENTOUS	844.	843.6	22.97	-	-
TOTAL CHLOROPHYTA	844.	843.6	22.97	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	221.	221.0	6.02	-	-
COELOSPHAERIUM NAEGELIANUM	219.	218.9	5.96	-	-
MICROCYSTIS AERUGINOSA	25.	25.5	0.69	-	-
TOTAL NON-FILAMENTOUS	465.	465.4	12.67	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	507.	507.4	13.82	-	-
ANABAENA FLOS-AQUAE	45.	45.0	1.23	-	-
TOTAL FILAMENTOUS	552.	552.5	15.05	-	-
TOTAL CYANOPHYTA	1018.	1017.9	27.72	-	-
EUGLENOPHYTA					
EUGLENA MINUTA	8.	8.5	0.23	-	-
TOTAL EUGLENOPHYTA	8.	8.5	0.23	-	-
PYRRHOPHYTA					
GLENODINIUM SPP.	8.	8.5	0.23	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 2   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL PYRRHOPHYTA	8.	8.5	0.23	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	76.	76.5	2.08	-	-
TOTAL CRYPTOPHYTA	76.	76.5	2.08	-	-
TOTAL PHYTOPLANKTON	3672.	3672.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 8-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	408.	408.0	13.16	-	-
STEPHANODISCUS INVISITATUS	357.	357.0	11.51	-	-
CYCLOTELLA MENEGHINIANA	187.	187.0	6.03	-	-
MELOSIRA GRANULATA	127.	127.5	4.11	-	-
STEPHANODISCUS NIAGARAE	68.	68.0	2.19	-	-
STEPHANODISCUS TENUIS	25.	25.5	0.82	-	-
MELOSIRA VARIANS	17.	17.0	0.55	-	-
TOTAL CENTRALES	1190.	1190.0	38.37	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	289.	289.0	9.32	-	-
NITZSCHIA ACICULARIS	178.	178.5	5.76	-	-
NITZSCHIA ACTINASTROIDES	51.	51.0	1.64	-	-
NITZSCHIA SPP.	34.	34.0	1.10	-	-
NAVICULA LANCEOLATA	25.	25.5	0.82	-	-
GOMPHONEMA PARVULUM	17.	17.0	0.55	-	-
DIATOMA VULGARE	17.	17.0	0.55	-	-
SYNEDRA ULNA	17.	17.0	0.55	-	-
CYMATOPLEURA SOLEA	8.	8.5	0.27	-	-
RHOICOSPHENIA CURVATA	8.	8.5	0.27	-	-
SYNEDRA RADIANS	8.	8.5	0.27	-	-
NITZSCHIA FRUSTULUM	8.	8.5	0.27	-	-
TOTAL PENNALES	663.	663.0	21.38	-	-
TOTAL BACILLARIOPHYTA	1853.	1853.0	59.75	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	136.	136.0	4.39	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 3   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	96.	95.6	3.08	-	-
SCENEDESMUS OPOLIENSIS	32.	31.9	1.03	-	-
SCENEDESMUS ABUNDANS	30.	29.7	0.96	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	28.	27.6	0.89	-	-
SCENEDESMUS DIMORPHUS	28.	27.6	0.89	-	-
ANKISTRODESMUS SPIRALIS	25.	25.5	0.82	-	-
SCENEDESMUS LONGUS	21.	21.2	0.69	-	-
SCENEDESMUS QUADRICAUDA	21.	21.2	0.69	-	-
SCENEDESMUS ARCUATUS	11.	10.6	0.34	-	-
SCENEDESMUS INTERMEDIUS	8.	8.5	0.27	-	-
TOTAL NON-FILAMENTOUS	436.	435.6	14.05	-	-
TOTAL CHLOROPHYTA	436.	435.6	14.05	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	581.	580.5	18.72	-	-
ANABAENA FLOS-AQUAE	94.	94.3	3.04	-	-
OSCILLATORIA TENUIS	36.	35.7	1.15	-	-
TOTAL FILAMENTOUS	711.	710.6	22.91	-	-
TOTAL CYANOPHYTA	711.	710.6	22.91	-	-
EUGLENOPHYTA					
EUGLENA SPP.	17.	17.0	0.55	-	-
TRACHELOMONAS HISPIDA	8.	8.5	0.27	-	-
TOTAL EUGLENOPHYTA	25.	25.5	0.82	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	76.	76.5	2.47	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 3   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	76.	76.5	2.47	--	--
TOTAL PHYTOPLANKTON	3101.	3101.2	100.00	--	
NUMBER OF SPECIES FOUND IN EACH REPLICATE	36				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 4   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	493.	493.0	13.63	-	-
STEPHANODISCUS INVISITATUS	323.	323.0	8.93	-	-
CYCLOTELLA MENEGHINIANA	272.	272.0	7.52	-	-
MELOSIRA GRANULATA	263.	263.5	7.29	-	-
STEPHANODISCUS NIAGARAE	102.	102.0	2.82	-	-
TOTAL CENTRALES	1453.	1453.5	40.19	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	246.	246.5	6.82	-	-
NITZSCHIA ACICULARIS	119.	119.0	3.29	-	-
NITZSCHIA SPP.	42.	42.5	1.18	-	-
NITZSCHIA LINEARIS	25.	25.5	0.71	-	-
NAVICULA TRIPUNCTATA	17.	17.0	0.47	-	-
NITZSCHIA DISSIPATA	17.	17.0	0.47	-	-
NAVICULA LANCEOLATA	17.	17.0	0.47	-	-
SYNEDRA RADIANS	17.	17.0	0.47	-	-
DIATOMA VULGARE	8.	8.5	0.24	-	-
NAVICULA DECUSSIS	8.	8.5	0.24	-	-
NITZSCHIA FRUSTULUM	8.	8.5	0.24	-	-
NAVICULA EXIGUA	8.	8.5	0.24	-	-
MERIDION CIRCULARE	8.	8.5	0.24	-	-
NAVICULA SYMMETRICA	8.	8.5	0.24	-	-
CALONEIS AMPHISBAENA	8.	8.5	0.24	-	-
SYNEDRA ULNA	8.	8.5	0.24	-	-
TOTAL PENNALES	569.	569.5	15.75	-	-
TOTAL BACILLARIOPHYTA	2023.	2023.0	55.94	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	238.	238.0	6.58	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 9-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	117.	116.9	3.23	-	
SCENEDESMUS ABUNDANS	70.	70.1	1.94	-	-
ANKISTRODESMUS SPIRALIS	51.	51.0	1.41	-	-
SCENEDESMUS QUADRICAUDA	21.	21.2	0.59	-	-
SCHROEDERIA SETIGERA	17.	17.0	0.47	-	-
SCENEDESMUS LONGUS	15.	14.9	0.41	-	-
SCENEDESMUS ARCUATUS	11.	10.6	0.29	-	-
SCENEDESMUS DENTICULATUS	8.	8.5	0.24	-	-
SCENEDESMUS INTERMEDIUS	8.	8.5	0.24	-	-
TETRAEDRON MINIMUM	8.	8.5	0.24	-	-
TOTAL NON-FILAMENTOUS	565.	565.2	15.63	-	-
TOTAL CHLOROPHYTA	565.	565.2	15.63	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	212.	212.5	5.88	-	-
MERISMOPEDIA TENUISSIMA	104.	104.1	2.88	-	-
TOTAL NON-FILAMENTOUS	317.	316.6	8.76	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	427.	426.7	11.80	-	-
ANABAENA FLOS-AQUAE	104.	103.7	2.87	-	-
OSCILLATORIA TENUIS	62.	62.0	1.72	-	-
TOTAL FILAMENTOUS	592.	592.4	16.38	-	-
TOTAL CYANOPHYTA	909.	909.1	25.14	-	-
EUGLENOPHYTA					
EUGLENA SPP.	8.	8.5	0.24	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: TEL11   STATION: 4   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL EUGLENOPHYTA	8.	8.5	0.24	-	
CRYPTOPHYTA					
CRYPTOMONAS OVATA	110.	110.5	3.06	-	-
TOTAL CRYPTOPHYTA	110.	110.5	3.06	-	-
TOTAL PHYTOPLANKTON	3616.	3616.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 5   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

T A X A	REPLICATES (#/ML.) 6	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	578.	578.0	16.07	-	
STEPHANODISCUS INVISITATUS	272.	272.0	7.56	-	-
CYCLOTELLA MENEGHINIANA	110.	110.5	3.07	-	-
MELOSIRA GRANULATA	68.	68.0	1.89	-	-
STEPHANODISCUS NIAGARAE	42.	42.5	1.18	-	-
TOTAL CENTRALES	1071.	1071.0	29.78	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	178.	178.5	4.96	-	-
NITZSCHIA ACICULARIS	85.	85.0	2.36	-	-
NITZSCHIA SPP.	51.	51.0	1.42	-	-
NAVICULA LANCEOLATA	34.	34.0	0.95	-	-
NAVICULA DECUSSIS	17.	17.0	0.47	-	-
NAVICULA TRIPUNCTATA	17.	17.0	0.47	-	-
DIATOMA VULGARE	17.	17.0	0.47	-	-
GOMPHONEMA PARVULUM	17.	17.0	0.47	-	-
NITZSCHIA DISSIPATA	17.	17.0	0.47	-	-
NITZSCHIA FRUSTULUM	8.	8.5	0.24	-	-
NITZSCHIA LINEARIS	8.	8.5	0.24	-	-
NAVICULA PUPULA	8.	8.5	0.24	-	-
RHOICOSPHENIA CURVATA	8.	8.5	0.24	-	-
TOTAL PENNALES	467.	467.5	13.00	-	-
TOTAL BACILLARIOPHYTA	1538.	1538.5	42.77	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
PEDIASTRUM BORYANUM	136.	136.0	3.78	-	-
DICTYOSPHAERIUM PULCHELLUM	102.	102.0	2.84	-	

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 5   COLLECTION DATE: 8-JUL-81   SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	79.	78.6	2.19	-	-
ANKISTRODESMUS FALCATUS	68.	68.0	1.89	-	-
SCENEDESMUS ABUNDANS	55.	55.2	1.54	-	-
SCHROEDERIA SETIGERA	34.	34.0	0.95	-	-
SCENEDESMUS OPOLIENSIS	32.	31.9	0.87	-	-
SCENEDESMUS DIMORPHUS	21.	21.2	0.59	-	-
SCENEDESMUS QUADRICAUDA	17.	17.0	0.47	-	-
SCENEDESMUS DENTICULATUS	11.	1[illegible]	0.30	-	-
SCENEDESMUS ARCUATUS	8.	8.5	0.24	-	-
ANKISTRODESMUS SPIRALIS	8.	8.5	0.24	-	-
TOTAL NON-FILAMENTOUS	572.	571.6	15.89	-	-
TOTAL CHLOROPHYTA	572.	571.6	15.89	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	429.	429.2	11.93	-	-
MERISMOPEDIA TENUISSIMA	153.	153.0	4.25	-	-
TOTAL NON-FILAMENTOUS	582.	582.2	16.19	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	420.	419.9	11.67	-	-
ANABAENA FLOS-AQUAE	191.	191.2	5.32	-	-
OSCILLATORIA TENUIS	132.	131.7	3.66	-	-
TOTAL FILAMENTOUS	743.	742.9	20.65	-	-
TOTAL CYANOPHYTA	1325.	1325.1	36.84	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	161.	161.5	4.49	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 8-JUL-81 SCOPE TYPE: INVERTED

TABLE B-13 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	161.	161.5	4.49	-	-
TOTAL PHYTOPLANKTON	3597.	3596.7	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	36				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 1   COLLECTION DATE: 22-JUL-81   SCOPE TYPE: INVERTED

TABLE B-14

TAXA	REPLICATES (#/ML.) A	MEAN (# ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
MELOSIRA GRANULATA	425.	425.0	5.91	-	-
STEPHANODISCUS INVISITATUS	238.	238.0	3.31	-	-
SKELETONEMA POTAMOS	170.	170.0	2.36	-	-
CYCLOTELLA MENEGHINIANA	136.	136.0	1.89	-	-
STEPHANODISCUS NIAGARAE	136.	136.0	1.89	-	-
MELOSIRA DISTANS	68.	68.0	0.95	-	-
STEPHANODISCUS TENUIS	34.	34.0	0.47	-	-
RHIZOSOLENIA ERIENSIS	17.	17.0	0.24	-	-
TOTAL CENTRALES	1224.	1224.0	17.02	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	527.	527.0	7.33	-	-
NITZSCHIA ACI[illegible]IDES	1[illegible].	1[illegible].0	2.[illegible]	-	-
NITZSCHIA SPP.	68.	68.0	0.95	-	-
NAVICULA TRIPUNCTATA	51.	51.0	0.71	-	-
NAVICULA LANCEOLATA	34.	34.0	0.47	-	-
NITZSCHIA DISSIPATA	17.	17.0	0.24	-	-
CYMBELLA SPP.	17.	17.0	0.24	-	-
NITZSCHIA FRUSTULUM	17.	17.0	0.24	-	-
TOTAL PENNALES	1088.	1088.0	15.13	-	-
TOTAL BACILLARIOPHYTA	2312.	2312.0	32.16	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	136.	136.0	1.89	-	-
SCENEDESMUS OPOLIENSIS	106.	106.2	1.48	-	-
SCENEDESMUS ABUNDANS	76.	76.5	1.06	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	55.	55.2	0.77	-	-
OOCYSTIS PUSILLA	42.	42.5	0.59	-	-
SCENEDESMUS QUADRICAUDA	38.	38.2	0.53	-	-
SCENEDESMUS DIMORPHUS	25.	25.5	0.35	-	-
ANKISTRODESMUS SPIRALIS	17.	17.0	0.24	-	-
TOTAL NON-FILAMENTOUS	497.	497.2	6.92	-	-
TOTAL CHLOROPHYTA	497.	497.2	6.92	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	3771.	3770.6	52.44	-	-
ANABAENA FLOS-AQUAE	467.	467.5	6.50	-	-
OSCILLATORIA TENUIS	143.	142.8	1.99	-	-
TOTAL FILAMENTOUS	4381.	4380.9	60.93	-	-
TOTAL CYANOPHYTA	4381.	4380.9	60.93	-	-
TOTAL PHYTOPLANKTON	7190.	7190.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	28				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: CEL11   STATION: 2   COLLECTION DATE: 22-JUL-81   SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) 6	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
MELOSIRA GRANULATA	544.	544.0	7.34	-	-
STEPHANODISCUS INVISITATUS	136.	136.0	1.84	-	-
SKELETONEMA POTAMOS	119.	119.0	1.61	-	-
MELOSIRA AMBIGUA	51.	51.0	0.69	-	-
STEPHANODISCUS NIAGARAE	51.	51.0	0.69	-	-
TOTAL CENTRALES	901.	901.0	12.16	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	255.	255.0	3.44	-	-
NITZSCHIA ACICULARIS	136.	136.0	1.84	-	-
NAVICULA TRIPUNCTATA	68.	68.0	0.92	-	-
NAVICULA SPP.	68.	68.0	0.92	-	-
NITZSCHIA SPP.	51.	51.0	0.69	-	-
NITZSCHIA LINEARIS	51.	51.0	0.69	-	-
GOMPHONEMA PARVULUM	34.	34.0	0.46	-	-
NITZSCHIA PSEUDOFONTICOLA	34.	34.0	0.46	-	-
NITZSCHIA DISSIPATA	17.	17.0	0.23	-	-
NITZSCHIA FRUSTULUM	17.	17.0	0.23	-	-
TOTAL PENNALES	731.	731.0	9.86	-	-
TOTAL BACILLARIOPHYTA	1632.	1632.0	22.02	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ABUNDANS	225.	225.2	3.04	-	-
SCENEDESMUS QUADRICAUDA	89.	89.2	1.20	-	-
ANKISTRODESMUS FALCATUS	85.	85.0	1.15	-	-
SCENEDESMUS ARCUATUS	85.	85.0	1.15	-	-
SCENEDESMUS OPOLIENSIS	55.	55.2	0.75	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	51.	51.0	0.69	-	-
TOTAL NON-FILAMENTOUS	591.	590.7	7.97	-	-
TOTAL CHLOROPHYTA	591.	590.7	7.97	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	3890.	3889.6	52.48	-	-
ANABAENA FLOS-AQUAE	753.	753.1	10.16	-	-
OSCILLATORIA TENUIS	262.	261.8	3.53	-	-
ANABAENOPSIS	114.	113.9	1.54	-	-
TOTAL FILAMENTOUS	5018.	5018.3	67.71	-	-
TOTAL CYANOPHYTA	5018.	5018.3	67.71	-	-
EUGLENOPHYTA					
EUGLENA SPP.	34.	34.0	0.46	-	-
EUGLENA MINUTA	17.	17.0	0.23	-	-
TRACHELOMONAS TAMBOWIKA	17.	17.0	0.23	-	-
TOTAL EUGLENOPHYTA	68.	68.0	0.92	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	102.	102.0	1.38	-	-
TOTAL CRYPTOPHYTA	102.	102.0	1.38	-	-
TOTAL PHYTOPLANKTON	7411.	7411.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	29				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
MELOSIRA GRANULATA	323.	323.0	4.54	-	-
STEPHANODISCUS INVISITATUS	170.	170.0	2.39	-	-
MELOSIRA DISTANS	85.	85.0	1.20	-	-
SKELETONEMA POTAMOS	85.	85.0	1.20	-	-
CYCLOTELLA MENEGHINIANA	51.	51.0	0.72	-	-
STEPHANODISCUS NIAGARAE	51.	51.0	0.72	-	-
ATTHEYA ZACHARIASI	17.	17.0	0.24	-	-
TOTAL CENTRALES	782.	782.0	11.00	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	408.	408.0	5.74	-	-
NITZSCHIA ACTINASTROIDES	170.	170.0	2.39	-	-
NAVICULA TRIPUNCTATA	119.	119.0	1.67	-	-
NITZSCHIA ACICULARIS	68.	68.0	0.96	-	-
SURIRELLA OVATA	17.	17.0	0.24	-	-
TOTAL PENNALES	782.	782.0	11.00	-	-
TOTAL BACILLARIOPHYTA	1564.	1564.0	22.00	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
COELASTRUM CAMBRICUM	340.	340.0	4.78	-	-
ANKISTRODESMUS FALCATUS	85.	85.0	1.20	-	-
SCENEDESMUS OPOLIENSIS	81.	80.7	1.14	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	59.	59.5	0.84	-	-
SCENEDESMUS ABUNDANS	59.	59.5	0.84	-	-
SCENEDESMUS DIMORPHUS	38.	38.2	0.54	-	-
OOCYSTIS PUSILLA	34.	34.0	0.48	-	-
SCENEDESMUS QUADRICAUDA	25.	25.5	0.36	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TETRASTRUM STAUROGENIAEFORME	17.	17.0	0.24	-	-
TOTAL NON-FILAMENTOUS	739.	739.5	10.40	-	-
TOTAL CHLOROPHYTA	739.	739.5	10.40	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	259.	259.2	3.65	-	-
MICROCYSTIS AERUGINOSA	136.	136.0	1.91	-	-
TOTAL NON-FILAMENTOUS	395.	395.2	5.56	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	3609.	3609.1	50.77	-	-
ANABAENA FLOS-AQUAE	558.	557.6	7.84	-	-
OSCILLATORIA TENUIS	192.	192.1	2.70	-	-
TOTAL FILAMENTOUS	4359.	4358.8	61.32	-	-
TOTAL CYANOPHYTA	4754.	4754.0	66.88	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	51.	51.0	0.72	-	-
TOTAL CRYPTOPHYTA	51.	51.0	0.72	-	-
TOTAL PHYTOPLANKTON	7108.	7108.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	27				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 4   COLLECTION DATE: 22-JUL-81   SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
MELOSIRA GRANULATA	408.	408.0	5.53	-	-
STEPHANODISCUS INVISITATUS	238.	238.0	3.23	-	-
SKELETONEMA POTAMOS	204.	204.0	2.77	-	-
STEPHANODISCUS NIAGARAE	102.	102.0	1.38	-	-
CYCLOTELLA MENEGHINIANA	34.	34.0	0.46	-	-
TOTAL CENTRALES	986.	986.0	13.37	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	493.	493.0	6.69	-	-
NITZSCHIA ACICULARIS	170.	170.0	2.31	-	-
NITZSCHIA SPP.	85.	85.0	1.15	-	-
NAVICULA TRIPUNCTATA	68.	68.0	0.92	-	-
NAVICULA LANCEOLATA	34.	34.0	0.46	-	-
NITZSCHIA LINEARIS	34.	34.0	0.46	-	-
NITZSCHIA DISSIPATA	17.	17.0	0.23	-	-
GOMPHONEMA PARVULUM	17.	17.0	0.23	-	-
NAVICULA CRYPTOCEPHALA	17.	17.0	0.23	-	-
TOTAL PENNALES	935.	935.0	12.68	-	-
TOTAL BACILLARIOPHYTA	1921.	1921.0	26.06	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS QUADRICAUDA	170.	170.0	2.31	-	-
SCENEDESMUS ACUMINATUS	127.	127.5	1.73	-	-
SCENEDESMUS OPOLIENSIS	93.	93.5	1.27	-	-
ANKISTRODESMUS FALCATUS	85.	85.0	1.15	-	-
DICTYOSPHAERIUM PULCHELLUM	59.	59.5	0.81	-	-
SCENEDESMUS DIMORPHUS	47.	46.7	0.63	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ABUNDANS	42.	42.5	0.58	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	42.	42.5	0.58	-	-
ANKISTRODESMUS SPIRALIS	34.	34.0	0.46	-	
SCENEDESMUS DENTICULATUS	17.	17.0	0.23	-	
TOTAL NON-FILAMENTOUS	718.	718.2	9.74	-	-
TOTAL CHLOROPHYTA	718.	718.2	9.74	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	3745.	3745.1	50.80	-	-
ANABAENA FLOS-AQUAE	488.	487.9	6.62	-	-
OSCILLATORIA TENUIS	279.	278.8	3.78	-	-
TOTAL FILAMENTOUS	4512.	4511.8	61.20	-	-
TOTAL CYANOPHYTA	4512.	4511.8	61.20	-	-
EUGLENOPHYTA					
EUGLENA SPP.	34.	34.0	0.46	-	-
TRACHELOMONAS HISPIDA	17.	17.0	0.23	-	-
TOTAL EUGLENOPHYTA	51.	51.0	0.69	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	170.	170.0	2.31	-	-
TOTAL CRYPTOPHYTA	170.	170.0	2.31	-	-
TOTAL PHYTOPLANKTON	7372.	7372.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	30				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	153.	153.0	2.22	-	-
SKELETONEMA POTAMOS	119.	119.0	1.73	-	-
STEPHANODISCUS NIAGARAE	51.	51.0	0.74	-	-
CYCLOTELLA MENEGHINIANA	34.	34.0	0.49	-	-
TOTAL CENTRALES	357.	357.0	5.19	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	442.	442.0	6.43	-	-
NITZSCHIA ACTINASTROIDES	170.	170.0	2.47	-	-
NITZSCHIA ACICULARIS	119.	119.0	1.73	-	-
NITZSCHIA SPP.	68.	68.0	0.99	-	-
NAVICULA LANCEOLATA	34.	34.0	0.49	-	-
NAVICULA TRIPUNCTATA	34.	34.0	0.49	-	-
NITZSCHIA LINEARIS	34.	34.0	0.49	-	-
TOTAL PENNALES	901.	901.0	13.10	-	-
TOTAL BACILLARIOPHYTA	1258.	1258.0	18.29	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	204.	204.0	2.97	-	-
SCENEDESMUS ACUMINATUS	98.	97.7	1.42	-	-
ANKISTRODESMUS SPIRALIS	85.	85.0	1.24	-	-
SCENEDESMUS ABUNDANS	55.	55.2	0.80	-	-
SCENEDESMUS DIMORPHUS	55.	55.2	0.80	-	-
SCENEDESMUS OPOLIENSIS	38.	38.2	0.56	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	34.	34.0	0.49	-	-
SCENEDESMUS QUADRICAUDA	25.	25.5	0.37	-	-
SCENEDESMUS LONGUS	17.	17.0	0.25	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 22-JUL-81 SCOPE TYPE: INVERTED

TABLE B-14 (CONT.)

TAXA	REPLICATES (#/ML.) 6	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS DENTICULATUS	17.	17.0	0.25	-	-
TETRASTRUM STAUROGENIAEFORME	17.	17.0	0.25	-	-
TOTAL NON-FILAMENTOUS	646.	646.0	9.39	-	-
TOTAL CHLOROPHYTA	646.	646.0	9.39	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	4128.	4127.6	60.02	-	-
ANABAENA FLOS-AQUAE	479.	479.4	6.97	-	-
OSCILLATORIA TENUIS	297.	297.5	4.33	-	-
TOTAL FILAMENTOUS	4904.	4904.5	71.32	-	-
TOTAL CYANOPHYTA	4904.	4904.5	71.32	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	68.	68.0	0.99	-	-
TOTAL CRYPTOPHYTA	68.	68.0	0.99	-	-
TOTAL PHYTOPLANKTON	6876.	6876.4	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	26				

TABLE B-15

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	159.	158.9	15.75	-	-
MELOSIRA GRANULATA	98.	98.2	9.73	-	-
MELOSIRA AMBIGUA	84.	84.1	8.34	-	-
CYCLOTELLA MENEGHINIANA	37.	37.4	3.71	-	-
STEPHANODISCUS ASTRAEA	5.	4.7	0.46	-	-
TOTAL CENTRALES	383.	383.3	37.99	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	75.	74.8	7.41	-	-
NITZSCHIA ACICULARIS	56.	56.1	5.56	-	-
NAVICULA TRIPUNCTATA	23.	23.4	2.32	-	-
NAVICULA SPP.	23.	23.4	2.32	-	-
NITZSCHIA LINEARIS	14.	14.0	1.39	-	-
MERIDION CIRCULARE	9.	9.3	0.93	-	-
DIATOMA VULGARE	9.	9.3	0.93	-	-
CYMATOPLEURA SOLEA	5.	4.7	0.46	-	-
NITZSCHIA DISSIPATA	5.	4.7	0.46	-	-
GYROSIGMA SCALPROIDES	5.	4.7	0.46	-	-
TOTAL PENNALES	224.	224.4	22.24	-	-
TOTAL BACILLARIOPHYTA	608.	607.7	60.23	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
PEDIASTRUM DUPLEX VAR. RETICULATUM	37.	37.4	3.71	-	-
SCENEDESMUS ABUNDANS	29.	29.2	2.90	-	-
SCENEDESMUS QUADRICAUDA	14.	14.0	1.39	-	-
SCENEDESMUS ACUMINATUS	12.	11.7	1.16	-	-
SCENEDESMUS OPOLIENSIS	12.	11.7	1.16	-	-

TABLE B-15 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	9.	9.3	0.93	-	-
DICTYOSPHAERIUM PULCHELLUM	9.	9.3	0.93	-	-
ANKISTRODESMUS FALCATUS	5.	4.7	0.46	-	-
TOTAL NON-FILAMENTOUS	127.	127.4	12.62	-	-
TOTAL CHLOROPHYTA	127.	127.4	12.62	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	242.	241.7	23.95	-	-
ANABAENA SPP.	23.	22.9	2.27	-	-
TOTAL FILAMENTOUS	265.	264.6	26.22	-	-
TOTAL CYANOPHYTA	265.	264.6	26.22	-	-
PYRRHOPHYTA					
CERATIUM CORNUTUM	5.	4.7	0.46	-	-
TOTAL PYRRHOPHYTA	5.	4.7	0.46	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	5.	4.7	0.46	-	-
TOTAL CRYPTOPHYTA	5.	4.7	0.46	-	-
TOTAL PHYTOPLANKTON	1009.	1009.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	27				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 5-AUG-81 SCOPE TYPE: INVERTED

TABLE B-15 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	210.	210.4	18.11	-	-
MELOSIRA GRANULATA	140.	140.2	12.07	-	-
MELOSIRA AMBIGUA	103.	102.8	8.85	-	-
CYCLOTELLA MENEGHINIANA	61.	60.8	5.23	-	-
MELOSIRA DISTANS	14.	14.0	1.21	-	-
STEPHANODISCUS ASTRAEA	5.	4.7	0.40	-	-
TOTAL CENTRALES	533.	532.9	45.88	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	126.	126.2	10.87	-	-
NITZSCHIA ACICULARIS	70.	70.1	6.04	-	-
NAVICULA CRYPTOCEPHALA	28.	28.0	2.41	-	-
NAVICULA SPP.	23.	23.4	2.01	-	-
NAVICULA TRIPUNCTATA	19.	18.7	1.61	-	-
DIATOMA VULGARE	14.	14.0	1.21	-	-
NITZSCHIA LINEARIS	9.	9.3	0.80	-	-
NITZSCHIA HANTZSCHIANA	9.	9.3	0.80	-	-
NITZSCHIA FRUSTULUM	5.	4.7	0.40	-	-
NAVICULA CAPITATA	5.	4.7	0.40	-	-
NAVICULA DECUSSIS	5.	4.7	0.40	-	-
PLEUROSIGMA SPP.	5.	4.7	0.40	-	-
TOTAL PENNALES	318.	317.9	27.36	-	-
TOTAL BACILLARIOPHYTA	851.	850.8	73.24	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ABUNDANS	39.	38.6	3.32	-	-
DICTYOSPHAERIUM PULCHELLUM	20.	19.9	1.71	-	-

SUMMARY OF TOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCUR CE
PROJECT NO: EL11 STATION: 2 COLLECTION DATE: 5-AUG-81 SCOPE TYPE: INVERTED

TABLE B-15 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	19.	18.7	1.61	-	-
SCENEDESMUS ACUMINATUS	12.	11.7	1.01	-	-
ANKISTRODESMUS FALCATUS	9.	9.3	0.80	-	-
TOTAL NON-FILAMENTOUS	98.	98.2	8.45	-	-
TOTAL CHLOROPHYTA	98.	98.2	8.45	-	-
CYANOPHYTA NON-FILAMENTOUS					
MICROCYSTIS AERUGINOSA	9.	9.3	0.80	-	-
TOTAL NON-FILAMENTOUS	9.	9.3	0.80	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	190.	190.3	16.38	-	-
ANABAENA SPP.	8.	8.4	0.72	-	-
TOTAL FILAMENTOUS	199.	198.7	17.10	-	-
TOTAL CYANOPHYTA	208.	208.0	17.91	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	5.	4.7	0.40	-	-
TOTAL CRYPTOPHYTA	5.	4.7	0.40	-	-
TOTAL PHYTOPLANKTON	1162.	1161.7	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	27				

SUMMARY [illegible] PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 5-AUG-81 SCOPE TYPE: INVERTED

TABLE B-15 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	248.	247.8	21.12	-	-
MELOSIRA GRANULATA	150.	149.6	12.75	-	-
MELOSIRA AMBIGUA	65.	65.4	5.58	-	-
CYCLOTELLA MENEGHINIANA	56.	56.1	4.78	-	-
TOTAL CENTRALES	519.	518.9	44.24	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	103.	102.8	8.77	-	-
NITZSCHIA ACICULARIS	65.	65.4	5.58	-	-
NAVICULA SPP.	37.	37.4	3.19	-	-
NAVICULA CRYPTOCEPHALA	28.	28.[illegible]	2.39	-	-
NITZSCHIA LINEARIS	23.	[illegible]	1.99	-	-
NAVICULA TRIPUNCTATA	9.	[illegible].3	0.80	-	-
DIATOMA VULGARE	9.	9.3	0.80	-	-
ACHNANTHES SPP.	5.	4.7	0.40	-	-
CALONEIS AMPHISBAENA	5.	4.7	0.40	-	-
COCCONEIS SPP.	5.	4.7	0.40	-	-
CYMBELLA SPP.	5.	4.7	0.40	-	-
CYMBELLA MINUTA VAR. SILESIACA	5.	4.7	0.40	-	-
NITZSCHIA FRUSTULUM	5.	4.7	0.40	-	-
GOMPHONEMA PARVULUM	5.	4.7	0.40	-	-
GYROSIGMA SCALPROIDES	5.	4.7	0.40	-	-
TOTAL PENNALES	313.	313.2	26.70	-	-
TOTAL BACILLARIOPHYTA	832.	832.1	70.94	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ABUNDANS	39.	38.6	3.29	-	-

TABLE B-15 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	37.	37.4	3.19	-	-
ANKISTRODESMUS FALCATUS	14.	14.0	1.20	-	-
SCENEDESMUS QUADRICAUDA	12.	11.7	1.00	-	-
SCENEDESMUS OPOLIENSIS	12.	11.7	1.00	-	-
SCENEDESMUS ACUMINATUS	8.	8.2	0.70	-	-
DICTYOSPHAERIUM PULCHELLUM	7.	7.0	0.60	-	-
SCENEDESMUS ARCUATUS	5.	4.7	0.40	-	-
TOTAL NON-FILAMENTOUS	133.	133.2	11.36	-	-
TOTAL CHLOROPHYTA	133.	133.2	11.36	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	181.	181.4	15.46	-	-
ANABAENA SPP.	12.	12.2	1.04	-	-
TOTAL FILAMENTOUS	194.	193.5	16.50	-	-
TOTAL CYANOPHYTA	194.	193.5	16.50	-	-
EUGLENOPHYTA					
EUGLENA SPP.	5.	4.7	0.40	-	-
TOTAL EUGLENOPHYTA	5.	4.7	0.40	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	9.	9.3	0.80	-	-
TOTAL CRYPTOPHYTA	9.	9.3	0.80	-	-
TOTAL PHYTOPLANKTON	1173.	1172.9	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	31				

TABLE B-15 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	262.	261.8	22.08	-	-
MELOSIRA GRANULATA	117.	116.9	9.86	-	-
MELOSIRA AMBIGUA	79.	79.5	6.70	-	-
CYCLOTELLA MENEGHINIANA	33.	32.7	2.76	-	-
STEPHANODISCUS ASTRAEA	9.	9.3	0.79	-	-
TOTAL CENTRALES	500.	500.2	42.19	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	103.	102.8	8.68	-	-
NITZSCHIA ACICULARIS	75.	74.8	6.31	-	-
NAVICULA SPP.	33.	32.7	2.76	-	-
NAVICULA CRYPTOCEPHALA	19.	18.7	1.58	-	-
NITZSCHIA LINEARIS	14.	14.0	1.18	-	-
NAVICULA TRIPUNCTATA	9.	9.3	0.79	-	-
CYMATOPLEURA SOLEA	9.	9.3	0.79	-	-
NITZSCHIA HANTZSCHIANA	9.	9.3	0.79	-	-
SYNEDRA RADIANS	9.	9.3	0.79	-	-
DIATOMA VULGARE	5.	4.7	0.39	-	-
NITZSCHIA DISSIPATA	5.	4.7	0.39	-	-
NAVICULA DECUSSIS	5.	4.7	0.39	-	-
NITZSCHIA FRUSTULUM	5.	4.7	0.39	-	-
CALONEIS BACILLUM	5.	4.7	0.39	-	-
TOTAL PENNALES	304.	303.9	25.63	-	-
TOTAL BACILLARIOPHYTA	804.	804.1	67.82	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	40.	39.7	3.35	-	-

TABLE B-15 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	37.	37.4	3.15	-	-
SCENEDESMUS ABUNDANS	32.	31.6	2.66	-	-
SCENEDESMUS QUADRICAUDA	15.	15.2	1.28	-	-
SCENEDESMUS OPOLIENSIS	12.	11.7	0.99	-	-
SCENEDESMUS DIMORPHUS	11.	10.5	0.89	-	-
ANKISTRODESMUS FALCATUS	9.	9.3	0.79	-	-
SCENEDESMUS ACUMINATUS	8.	8.2	0.69	-	-
TOTAL NON-FILAMENTOUS	164.	163.6	13.80	-	-
TOTAL CHLOROPHYTA	164.	163.6	13.80	-	-
CYANOPHYTA NON-FILAMENTOUS					
MICROCYSTIS AERUGINOSA	14.	14.0	1.18	-	-
TOTAL NON-FILAMENTOUS	14.	14.0	1.18	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	189.	188.9	15.93	-	-
ANABAENA SPP.	10.	10.3	0.87	-	-
TOTAL FILAMENTOUS	199.	199.2	16.80	-	-
TOTAL CYANOPHYTA	213.	213.2	17.98	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	5.	4.7	0.39	-	-
TOTAL CRYPTOPHYTA	5.	4.7	0.39	-	-
TOTAL PHYTOPLANKTON	1186.	1185.6	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	31				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 5-AUG-81 SCOPE TYPE: INVERTED

TABLE B-15 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	290.	289.8	19.92	-	-
MELOSIRA GRANULATA	140.	140.2	9.64	-	-
MELOSIRA AMBIGUA	84.	84.1	5.78	-	-
CYCLOTELLA MENEGHINIANA	70.	70.1	4.82	-	-
MELOSIRA VARIANS	47.	46.7	3.21	-	-
STEPHANODISCUS ASTRAEA	5.	4.7	0.32	-	-
TOTAL CENTRALES	636.	635.8	43.70	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	70.	70.1	4.82	-	-
NITZSCHIA ACICULARIS	42.	42.1	2.89	-	-
DIATOMA VULGARE	19.	18.7	1.29	-	-
NAVICULA TRIPUNCTATA	19.	18.7	1.29	-	-
NITZSCHIA SPP.	19.	18.7	1.29	-	-
GOMPHONEMA PARVULUM	14.	14.0	0.96	-	-
SYNEDRA FASCICULATA	9.	9.3	0.64	-	-
NAVICULA CRYPTOCEPHALA	9.	9.3	0.64	-	-
NAVICULA DECUSSIS	5.	4.7	0.32	-	-
CYMATOPLEURA SOLEA	5.	4.7	0.32	-	-
CYMBELLA SPP.	5.	4.7	0.32	-	-
NITZSCHIA FRUSTULUM	5.	4.7	0.32	-	-
NITZSCHIA LINEARIS	5.	4.7	0.32	-	-
GYROSIGMA SCALPROIDES	5.	4.7	0.32	-	-
CALONEIS AMPHISBAENA	5.	4.7	0.32	-	-
NITZSCHIA HANTZSCHIANA	5.	4.7	0.32	-	-
CALONEIS BACILLUM	5.	4.7	0.32	-	-
SYNEDRA RADIANS	5.	4.7	0.32	-	-
PLEUROSIGMA SPP.	5.	4.7	0.32	-	-
TOTAL PENNALES	252.	252.4	17.35	-	-
TOTAL BACILLARIOPHYTA	888.	888.2	61.05	-	-

TABLE B-15 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS SPIRALIS	70.	70.1	4.82	-	-
ANKISTRODESMUS FALCATUS	56.	56.1	3.86	-	-
SCENEDESMUS ABUNDANS	49.	49.1	3.37	-	-
DICTYOSPHAERIUM PULCHELLUM	23.	23.4	1.61	-	-
SCENEDESMUS QUADRICAUDA	16.	16.4	1.12	-	-
SCENEDESMUS ACUMINATUS	11.	10.5	0.72	-	-
SCENEDESMUS OPOLIENSIS	8.	8.2	0.56	-	-
SCENEDESMUS ARCUATUS	7.	7.0	0.48	-	-
SCENEDESMUS LONGUS	5.	4.7	0.32	-	-
SCENEDESMUS DIMORPHUS	5.	4.7	0.32	-	-
TOTAL NON-FILAMENTOUS	250.	250.1	17.19	-	-
TOTAL CHLOROPHYTA	250.	250.1	17.19	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
MICROCYSTIS AERUGINOSA	19.	18.7	1.29	-	-
TOTAL NON-FILAMENTOUS	19.	18.7	1.29	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	231.	231.4	15.91	-	-
ANABAENA SPP.	24.	24.3	1.67	-	-
TOTAL FILAMENTOUS	256.	255.7	17.58	-	-
TOTAL CYANOPHYTA	274.	274.4	18.86	-	-
EUGLENOPHYTA					
EUGLENA SPP.	28.	28.0	1.93	-	-

SUMMARY ur PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 5-AUG-81 SCOPE TYPE: INVERTED

TABLE B-15 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL EUGLENOPHYTA	28.	28.0	1.93	-	-
PYRRHOPHYTA					
CERATIUM CORNUTUM	5.	4.7	0.32	-	-
TOTAL PYRRHOPHYTA	5.	4.7	0.32	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	9.	9.3	0.64	-	-
TOTAL CRYPTOPHYTA	9.	9.3	0.64	-	-
TOTAL PHYTOPLANKTON	1455.	1454.8	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	41				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 19-AUG-81 SCOPE TYPE: INVERTED

TABLE B-16

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	78056.	78055.6	82.53	-	-
MELOSIRA GRANULATA	2515.	2514.8	2.66	-	-
STEPHANODISCUS INVISITATUS	1838.	1837.7	1.94	-	-
MELOSIRA AMBIGUA	1257.	1257.4	1.33	-	-
CYCLOTELLA MENEGHINIANA	871.	870.5	0.92	-	-
STEPHANODISCUS ASTRAEA	193.	193.4	0.20	-	-
TOTAL CENTRALES	84729.	84729.5	89.59	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1064.	1064.0	1.12	-	-
NITZSCHIA PALEA	967.	967.2	1.02	-	-
NAVICULA SPP.	290.	290.2	0.31	-	-
NAVICULA TRIPUNCTATA	193.	193.4	0.20	-	-
MERIDION CIRCULARE	97.	96.7	0.10	-	-
NAVICULA PUPULA	97.	96.7	0.10	-	-
NAVICULA CUSPIDATA	97.	96.7	0.10	-	-
ACHNANTHES MINUTISSIMA	97.	96.7	0.10	-	-
NITZSCHIA LINEARIS	97.	96.7	0.10	-	-
NAVICULA CRYPTOCEPHALA	97.	96.7	0.10	-	-
TOTAL PENNALES	3095.	3095.1	3.27	-	-
TOTAL BACILLARIOPHYTA	87825.	87824.6	92.86	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	822.	822.1	0.87	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	774.	773.8	0.82	-	-
CRUCIGENIA APICULATA	508.	507.8	0.54	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	290.	290.2	0.31	-	-

TABLE B-16 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS QUADRICAUDA	242.	241.8	0.26	-	-
SCENEDESMUS INTERMEDIUS	193.	193.4	0.20	-	-
ANKISTRODESMUS SPIRALIS	193.	193.4	0.20	-	-
SCENEDESMUS ABUNDANS	169.	169.3	0.18	-	-
SCENEDESMUS OPOLIENSIS	169.	169.3	0.18	-	-
SCENEDESMUS DIMORPHUS	145.	145.1	0.15	-	-
SCENEDESMUS ACUMINATUS	121.	120.9	0.13	-	-
SCENEDESMUS ARCUATUS	97.	96.7	0.10	-	-
ANKISTRODESMUS FALCATUS	97.	96.7	0.10	-	-
OOCYSTIS BORGEI	97.	96.7	0.10	-	-
TOTAL NON-FILAMENTOUS	3917.	3917.3	4.14	-	-
TOTAL CHLOROPHYTA	3917.	3917.3	4.14	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	1548.	1547.6	1.64	-	-
TOTAL NON-FILAMENTOUS	1548.	1547.6	1.64	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	977.	976.9	1.03	-	-
ANABAENA FLOS-AQUAE	116.	116.1	0.12	-	-
TOTAL FILAMENTOUS	1093.	1093.0	1.16	-	-
TOTAL CYANOPHYTA	2641.	2640.5	2.79	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	193.	193.4	0.20	-	-
TOTAL CRYPTOPHYTA	193.	193.4	0.20	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 19-AUG-81 SCOPE TYPE: INVERTED

TABLE B-16 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL PHYTOPLANKTON	94576.	94575.9	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	34				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 19-AUG-81 SCOPE TYPE: INVERTED

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	82408.	82408.1	78.72	-	-
MELOSIRA GRANULATA	2128.	2127.9	2.03	-	-
STEPHANODISCUS INVISITATUS	1548.	1547.6	1.48	-	-
CYCLOTELLA MENEGHINIANA	1161.	1160.7	1.11	-	-
MELOSIRA AMBIGUA	774.	773.8	0.74	-	-
MELOSIRA VARIANS	193.	193.4	0.18	-	-
STEPHANODISCUS ASTRAEA	97.	96.7	0.09	-	-
TOTAL CENTRALES	88308.	88308.2	84.36	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1451.	1450.8	1.39	-	-
NITZSCHIA PALEA	774.	773.8	0.74	-	-
NITZSCHIA SPP.	387.	386.9	0.37	-	-
NAVICULA TRIPUNCTATA	290.	290.2	0.28	-	-
NAVICULA CRYPTOCEPHALA	193.	193.4	0.18	-	-
NAVICULA LANCEOLATA	193.	193.4	0.18	-	-
NITZSCHIA LINEARIS	193.	193.4	0.18	-	-
DIATOMA VULGARE	97.	96.7	0.09	-	-
NITZSCHIA DISSIPATA	97.	96.7	0.09	-	-
NAVICULA ELGINENSIS	97.	96.7	0.09	-	-
NAVICULA HEUFLERI	97.	96.7	0.09	-	-
NITZSCHIA HANTZSCHIANA	97.	96.7	0.09	-	-
SYNEDRA RADIANS	97.	96.7	0.09	-	-
TOTAL PENNALES	4062.	4062.4	3.88	-	-
TOTAL BACILLARIOPHYTA	92371.	92370.6	88.24	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	1016.	1015.6	0.97	-	-

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CRUCIGENIA APICULATA	774.	773.8	0.74	-	-
SCENEDESMUS ACUMINATUS	363.	362.7	0.35	-	-
SCENEDESMUS ABUNDANS	339.	338.5	0.32	-	-
TETRALLANTOS LAGERHEIMII	290.	290.2	0.28	-	-
SCENEDESMUS QUADRICAUDA	218.	217.6	0.21	-	-
SCENEDESMUS OPOLIENSIS	218.	217.6	0.21	-	-
ANKISTRODESMUS SPIRALIS	193.	193.4	0.18	-	-
COELASTRUM SPHAERICUM	193.	193.4	0.18	-	-
ANKISTRODESMUS FALCATUS	193.	193.4	0.18	-	-
CORONASTRUM AESTIVALE	193.	193.4	0.18	-	-
SCENEDESMUS ARCUATUS	145.	145.1	0.14	-	-
SCENEDESMUS DENTICULATUS	97.	96.7	0.09	-	-
SCHROEDERIA SETIGERA	97.	96.7	0.09	-	-
TETRAEDRON CAUDATUM	97.	96.7	0.09	-	-
TOTAL NON-FILAMENTOUS	4425.	4425.1	4.23	-	-
TOTAL CHLOROPHYTA	4425.	4425.1	4.23	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	3724.	3723.8	3.56	-	-
MERISMOPEDIA TENUISSIMA	2225.	2224.6	2.13	-	-
TOTAL NON-FILAMENTOUS	5948.	5948.5	5.68	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	1277.	1276.7	1.22	-	-
ANABAENA FLOS-AQUAE	174.	174.1	0.17	-	-
TOTAL FILAMENTOUS	1451.	1450.6	1.39	-	-
TOTAL CYANOPHYTA	7399.	7399.3	7.07	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	97.	96.7	0.09	-	-

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
LEPOCINCLIS OVUM	97.	96.7	0.09	-	-
TRACHELOMONAS TAMBOWIKA	97.	96.7	0.09	-	-
TOTAL EUGLENOPHYTA	290.	290.2	0.28	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	193.	193.4	0.18	-	-
TOTAL CRYPTOPHYTA	193.	193.4	0.18	-	-
TOTAL PHYTOPLANKTON	104679.	104678.7	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	43				

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	84633.	84632.8	77.73	-	-
STEPHANODISCUS INVISITATUS	2805.	2805.0	2.58	-	-
MELOSIRA GRANULATA	1451.	1450.8	1.33	-	-
CYCLOTELLA MENEGHINIANA	1257.	1257.4	1.15	-	-
MELOSIRA AMBIGUA	58).	580.3	0.53	-	-
STEPHANODISCUS AS.RAEA	290.	290.2	0.27	-	-
STEPHANODISCUS TENUIS	97.	96.7	0.09	-	-
TOTAL CENTRALES	91113.	91113.2	83.68	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1741.	1741.0	1.60	-	-
NITZSCHIA PALEA	1451.	1450.8	1.33	-	-
NITZSCHIA ACTINASTROIDES	677.	677.1	0.62	-	-
DIATOMA VULGARE	193.	193.4	0.18	-	-
NAVICULA PUPULA	193.	193.4	0.18	-	-
NAVICULA LANCEOLATA	193.	193.4	0.18	-	-
NAVICULA HEUFLERI	193.	193.4	0.18	-	-
NAVICULA TRIPUNCTATA	193.	193.4	0.18	-	-
NAVICULA DECUSSIS	97.	96.7	0.09	-	-
NAVICULA CRYPTOCEPHALA	97.	96.7	0.09	-	-
ACHNANTHES MINUTISSIMA	97.	96.7	0.09	-	-
NITZSCHIA FRUSTULUM	97.	96.7	0.09	-	-
NAVICULA CAPITATA	97.	96.7	0.09	-	-
NITZSCHIA DISSIPATA	97.	96.7	0.09	-	-
SURIRELLA OVATA	97.	96.7	0.09	-	-
TOTAL PENNALES	5513.	5513.2	5.06	-	-
TOTAL BACILLARIOPHYTA	96626.	96626.4	88.74	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	1523.	1523.4	1.40	-	-

TABLE B-16 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PEDIASTRUM DUPLEX VAR. RETICULATUM	774.	773.8	0.71	-	-
SCENEDESMUS ACUMINATUS	459.	459.4	0.42	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	435.	435.3	0.40	-	-
SCENEDESMUS ARCUATUS	339.	338.5	0.31	-	-
SCENEDESMUS ABUNDANS	290.	290.2	0.27	-	-
ANKISTRODESMUS FALCATUS	290.	290.2	0.27	-	-
SCENEDESMUS DIMORPHUS	242.	241.8	0.22	-	-
SCENEDESMUS QUADRICAUDA	218.	217.6	0.20	-	-
CRUCIGENIA APICULATA	218.	217.6	0.20	-	-
ANKISTRODESMUS SPIRALIS	193.	193.4	0.18	-	-
SCENEDESMUS OPOLIENSIS	193.	193.4	0.18	-	-
SCENEDESMUS INTERMEDIUS	145.	145.1	0.13	-	-
SCENEDESMUS DENTICULATUS	121.	120.9	0.11	-	-
TOTAL NON-FILAMENTOUS	5441.	5440.7	5.00	-	-
TOTAL CHLOROPHYTA	5441.	5440.7	5.00	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	3095.	3095.1	2.84	-	-
COELOSPHAERIUM NAEGELIANUM	1765.	1765.2	1.62	-	-
TOTAL NON-FILAMENTOUS	4860.	4860.3	4.46	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	1228.	1228.4	1.13	-	-
ANABAENA FLOS-AQUAE	145.	145.1	0.13	-	-
TOTAL FILAMENTOUS	1373.	1373.5	1.26	-	-
TOTAL CYANOPHYTA	6234.	6233.8	5.73	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	97.	96.7	0.09	-	-

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PHACUS NORDSTEDTII	97.	96.7	0.09	-	-
TRACHELOMONAS TAMBOWIKA	97.	96.7	0.09	-	-
TOTAL EUGLENOPHYTA	290.	290.2	0.27	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	290.	290.2	0.27	-	-
TOTAL CRYPTOPHYTA	290.	290.2	0.27	-	-
TOTAL PHYTOPLANKTON	108881.	108881.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	44				

TABLE B-16 (CONT.)

COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	91597.	91596.8	82.31	-	-
MELOSIRA GRANULATA	1934.	1934.5	1.74	-	-
STEPHANODISCUS INVISITATUS	1644.	1644.3	1.48	-	-
CYCLOTELLA MENEGHINIANA	1451.	1450.8	1.30	-	-
MELOSIRA AMBIGUA	580.	580.3	0.52	-	-
STEPHANODISCUS ASTRAEA	290.	290.2	0.26	-	-
STEPHANODISCUS TENUIS	193.	193.4	0.17	-	-
TOTAL CENTRALES	97690.	97690.4	87.78	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	1354.	1354.1	1.22	-	-
NITZSCHIA ACICULARIS	677.	677.1	0.61	-	-
NAVICULA SPP.	387.	386.9	0.35	-	-
NAVICULA TRIPUNCTATA	290.	290.2	0.26	-	-
DIATOMA VULGARE	193.	193.4	0.17	-	-
NITZSCHIA LINEARIS	193.	193.4	0.17	-	-
NITZSCHIA DISSIPATA	193.	193.4	0.17	-	-
NAVICULA ELGINENSIS	97.	96.7	0.09	-	-
NAVICULA DECUSSIS	97.	96.7	0.09	-	-
NAVICULA CRYPTOCEPHALA	97.	96.7	0.09	-	-
SYNEDRA RADIANS	97.	96.7	0.09	-	-
TOTAL PENNALES	3675.	3675.5	3.30	-	-
TOTAL BACILLARIOPHYTA	101366.	101365.9	91.09	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ABUNDANS	532.	532.0	0.48	-	-
ANKISTRODESMUS FALCATUS	484.	483.6	0.43	-	-

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	314.	314.4	0.28	-	-
PANDORINA MORUM	290.	290.2	0.26	-	-
SCENEDESMUS ARCUATUS	218.	217.6	0.20	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	193.	193.4	0.17	-	-
SCENEDESMUS DIMORPHUS	193.	193.4	0.17	-	-
SCENEDESMUS OPOLIENSIS	145.	145.1	0.13	-	-
SCENEDESMUS QUADRICAUDA	121.	120.9	0.11	-	-
SCENEDESMUS INTERMEDIUS	97.	96.7	0.09	-	-
TOTAL NON-FILAMENTOUS	2587.	2587.3	2.32	-	-
TOTAL CHLOROPHYTA	2587.	2587.3	2.32	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	2418.	2418.1	2.17	-	-
MERISMOPEDIA TENUISSIMA	1838.	1837.7	1.65	-	-
MICROCYSTIS AERUGINOSA	387.	386.9	0.35	-	-
TOTAL NON-FILAMENTOUS	4643.	4642.7	4.17	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	1905.	1905.4	1.71	-	-
ANABAENA FLOS-AQUAE	203.	203.1	0.18	-	-
TOTAL FILAMENTOUS	2109.	2108.6	1.89	-	-
TOTAL CYANOPHYTA	6751.	6751.3	6.07	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	193.	193.4	0.17	-	-
PHACUS ORBICULARIS	97.	96.7	0.09	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 19-AUG-81 SCOPE TYPE: INVERTED

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TRACHELOMONAS TAMBOWIKA	97.	96.7	0.09	-	-
TOTAL EUGLENOPHYTA	387.	386.9	0.35	-	-
PYRRHOPHYTA					
GLENODINIUM SPP.	97.	96.7	0.09	-	-
TOTAL PYRRHOPHYTA	97.	96.7	0.09	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	97.	96.7	0.09	-	-
TOTAL CRYPTOPHYTA	97.	96.7	0.09	-	-
TOTAL PHYTOPLANKTON	111285.	111284.9	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	38				

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	81344.	81344.2	78.79	-	-
STEPHANODISCUS INVISITATUS	2418.	2418.1	2.34	-	-
MELOSIRA GRANULATA	1741.	1741.0	1.69	-	-
CYCLOTELLA MENEGHINIANA	1161.	1160.7	1.12	-	-
MELOSIRA AMBIGUA	484.	483.6	0.47	-	-
STEPHANODISCUS ASTRAEA	290.	290.2	0.28	-	-
TOTAL CENTRALES	87438.	87437.7	84.69	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	2031.	2031.2	1.97	-	-
[?]TZSCHIA PALEA	1451.	1450.8	1.41	-	-
NITZSCHIA ACTINASTROIDES	967.	967.2	0.94	-	-
NAVICULA TRIPUNCTATA	387.	386.9	0.37	-	-
NAVICULA SPP.	387.	386.9	0.37	-	-
NAVICULA PUPULA	290.	290.2	0.28	-	-
NITZSCHIA LINEARIS	193.	193.4	0.19	-	-
SURIRELLA OVATA	193.	193.4	0.19	-	-
NAVICULA CUSPIDATA	97.	96.7	0.09	-	-
ACHNANTHES SPP.	97.	96.7	0.09	-	-
NAVICULA LANCEOLATA	97.	96.7	0.09	-	-
NITZSCHIA DISSIPATA	97.	96.7	0.09	-	-
NAVICULA DECUSSIS	97.	96.7	0.09	-	-
TOTAL PENNALES	6384.	6383.7	6.18	-	-
TOTAL BACILLARIOPHYTA	93821.	93821.5	90.87	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
PEDIASTRUM DUPLEX VAR. RETICULATUM	1548.	1547.6	1.50	-	-

TABLE B-16 (CONT.)   COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	387.	386.9	0.37	-	-
SCENEDESMUS ABUNDANS	387.	386.9	0.37	-	-
SCENEDESMUS ACUMINATUS	266.	266.0	0.26	-	-
SCENEDESMUS ARCUATUS	242.	241.8	0.23	-	-
SCENEDESMUS OPOLIENSIS	218.	217.6	0.21	-	-
SCENEDESMUS QUADRICAUDA	193.	193.4	0.19	-	-
CRUCIGENIA APICULATA	193.	193.4	0.19	-	-
SCENEDESMUS DENTICULATUS	145.	145.1	0.14	-	-
SCENEDESMUS DIMORPHUS	97.	96.7	0.09	-	-
TOTAL NON-FILAMENTOUS	3675.	3675.5	3.56	-	-
TOTAL CHLOROPHYTA	3675.	3675.5	3.56	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	1523.	1523.4	1.48	-	-
MERISMOPEDIA TENUISSIMA	1451.	1450.8	1.41	-	-
MICROCYSTIS AERUGINOSA	387.	386.9	0.37	-	-
TOTAL NON-FILAMENTOUS	3361.	3361.1	3.26	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	1596.	1595.9	1.55	-	-
ANABAENA SPIROIDES	203.	203.1	0.20	-	-
ANABAENA FLOS-AQUAE	106.	106.4	0.10	-	-
TOTAL FILAMENTOUS	1905.	1905.4	1.85	-	-
TOTAL CYANOPHYTA	5267.	5266.6	5.10	-	-
EUGLENOPHYTA					
LEPOCINCLIS OVUM	193.	193.4	0.19	-	-

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
EUGLENA POLYMORPHA	97.	96.7	0.09	-	-
PHACUS NORDSTEDTII	97.	96.7	0.09	-	-
TRACHELOMONAS TAMBOWIKA	97.	96.7	0.09	-	-
TOTAL EUGLENOPHYTA	484.	483.6	0.47	-	-
TOTAL PHYTOPLANKTON	103247.	103247.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: INTA COLLECTION DATE: 19-AUG-81 SCOPE TYPE: INVERTED

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	78539.	78539.2	80.92	-	-
STEPHANODISCUS INVISITATUS	1838.	1837.7	1.89	-	-
CYCLOTELLA MENEGHINIANA	1451.	1450.8	1.49	-	-
MELOSIRA AMBIGUA	967.	967.2	1.00	-	-
STEPHANODISCUS ASTRAEA	193.	193.4	0.20	-	-
RHIZOSOLENIA ERIENSIS	97.	96.7	0.10	-	-
TOTAL CENTRALES	83085.	83085.2	85.60	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	967.	967.2	1.00	-	-
NITZSCHIA ACTINASTROIDES	774.	773.8	0.80	-	-
NITZSCHIA ACICULARIS	774.	773.8	0.80	-	-
NITZSCHIA SPP.	387.	386.9	0.40	-	-
NAVICULA LANCEOLATA	193.	193.4	0.20	-	-
NITZSCHIA LINEARIS	193.	193.4	0.20	-	-
NAVICULA TRIPUNCTATA	193.	193.4	0.20	-	-
GOMPHONEMA PARVULUM	193.	193.4	0.20	-	-
NAVICULA HEUFLERI	97.	96.7	0.10	-	-
SURIRELLA OVATA	97.	96.7	0.10	-	-
TOTAL PENNALES	3869.	3868.9	3.99	-	-
TOTAL BACILLARIOPHYTA	86954.	86954.1	89.59	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	1499.	1499.2	1.54	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	774.	773.8	0.80	-	-
CRUCIGENIA APICULATA	411.	411.1	0.42	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	290.	290.2	0.30	-	-

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ABUNDANS	266.	266.0	0.27	-	-
SCENEDESMUS QUADRICAUDA	242.	241.8	0.25	-	-
SCENEDESMUS ACUMINATUS	242.	241.8	0.25	-	-
SCENEDESMUS ARCUATUS	193.	193.4	0.20	-	-
ANKISTRODESMUS FALCATUS	193.	193.4	0.20	-	-
COELASTRUM SPHAERICUM	193.	193.4	0.20	-	-
SCENEDESMUS DIMORPHUS	169.	169.3	0.17	-	-
SCENEDESMUS INTERMEDIUS	121.	120.9	0.12	-	-
SCENEDESMUS OPOLIENSIS	97.	96.7	0.10	-	-
ANKISTRODESMUS SPIRALIS	97.	96.7	0.10	-	-
SCHROEDERIA SETIGERA	97.	96.7	0.10	-	-
TOTAL NON-FILAMENTOUS	4885.	4884.5	5.03	-	-
TOTAL CHLOROPHYTA	4885.	4884.5	5.03	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	3095.	3095.1	3.19	-	-
MICROCYSTIS AERUGINOSA	290.	290.2	0.30	-	-
TOTAL NON-FILAMENTOUS	3385.	3385.3	3.49	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	909.	909.2	0.94	-	-
ANABAENA FLOS-AQUAE	222.	222.5	0.23	-	-
ANABAENA SPIROIDES	126.	125.7	0.13	-	-
TOTAL FILAMENTOUS	1257.	1257.4	1.30	-	-
TOTAL CYANOPHYTA	4643.	4642.7	4.78	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	193.	193.4	0.20	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: INTA COLLECTION DATE: 19-AUG-81 SCOPE TYPE: INVERTED

TABLE B-16 (CONT.) COMPOSITION, DENSITY, AND PERCENT OCCURRENCE TABLE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PHACUS NORDSTEDTII	97.	96.7	0.10	-	-
TRACHELOMONAS TAMBOWIKA	97.	96.7	0.10	-	-
TOTAL EUGLENOPHYTA	387.	386.9	0.40	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	193.	193.4	0.20	-	-
TOTAL CRYPTOPHYTA	193.	193.4	0.20	-	-
TOTAL PHYTOPLANKTON	97062.	97061.7	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	40				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	3927.	3927.0	17.09	-	-
STEPHANODISCUS INVISITATUS	3226.	3225.7	14.04	-	-
MELOSIRA GRANULATA	1589.	1589.5	6.92	-	-
CYCLOTELLA MENEGHINIANA	982.	981.7	4.27	-	-
STEPHANODISCUS NIAGARAE	187.	187.0	0.81	-	-
TOTAL CENTRALES	9911.	9910.9	43.12	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA PALEA	608.	607.7	2.64	-	-
NITZSCHIA ACICULARIS	561.	561.0	2.44	-	-
NAVICULA SALINARUM VAR. INTERMEDIA	93.	93.5	0.41	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.41	-	-
NITZSCHIA LINEARIS	93.	93.5	0.41	-	-
NAVICULA PUPULA	47.	46.7	0.20	-	-
NITZSCHIA ANGUSTATA	47.	46.7	0.20	-	-
CYMBELLA SPP.	47.	46.7	0.20	-	-
NITZSCHIA SPP.	47.	46.7	0.20	-	-
TOTAL PENNALES	1636.	1636.2	7.12	-	-
TOTAL BACILLARIOPHYTA	11547.	11547.1	50.24	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ABUNDANS	584.	584.4	2.54	-	-
ANKISTRODESMUS FALCATUS	561.	561.0	2.44	-	-
ANKISTRODESMUS SPIRALIS	467.	467.5	2.03	-	-
DICTYOSPHAERIUM PULCHELLUM	374.	374.0	1.63	-	-
TETRASTRUM STAUROGENIAEFORME	280.	280.5	1.22	-	-
SCENEDESMUS DIMORPHUS	234.	233.7	1.02	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	187.	187.0	0.81	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	187.	187.0	0.81	-	-
SCENEDESMUS ARCUATUS	140.	140.2	0.61	-	-
STAURASTRUM SPP.	93.	93.5	0.41	-	-
SCENEDESMUS OPOLIENSIS	82.	81.8	0.36	-	-
SCENEDESMUS DENTICULATUS	82.	81.8	0.36	-	-
SCENEDESMUS BERNARDII	70.	70.1	0.31	-	-
TETRAEDRON MINIMUM	47.	46.7	0.20	-	-
OOCYSTIS PUSILLA	47.	46.7	0.20	-	-
TOTAL NON-FILAMENTOUS	3436.	3436.1	14.95	-	-
TOTAL CHLOROPHYTA	3436.	3436.1	14.95	-	-
CHRYSOPHYTA					
DINOBRYON DIVERGENS	93.	93.5	0.41	-	-
TOTAL CHRYSOPHYTA	93.	93.5	0.41	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	1636.	1636.2	7.12	-	-
MERISMOPEDIA TENUISSIMA	1543.	1542.7	6.71	-	-
MICROCYSTIS AERUGINOSA	93.	93.5	0.41	-	-
TOTAL NON-FILAMENTOUS	3272.	3272.5	14.24	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	2174.	2173.9	9.46	-	-
APHANIZOMENON FLOS-AQUAE	1828.	1827.9	7.95	-	-
ANABAENA FLOS-AQUAE	108.	107.5	0.47	-	-
ANABAENA SPP.	56.	56.1	0.24	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL FILAMENTOUS	4165.	4165.4	18.12	-	-
TOTAL CYANOPHYTA	7438.	7437.8	32.36	-	-
PYRRHOPHYTA					
GLENODINIUM QUADRIDENS	47.	46.7	0.20	-	-
TOTAL PYRRHOPHYTA	47.	46.7	0.20	-	-
CRYPTOPHYTA					
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	234.	233.7	1.02	-	-
CRYPTOMONAS OVATA	187.	187.0	0.81	-	-
TOTAL CRYPTOPHYTA	421.	420.7	1.83	-	-
TOTAL PHYTOPLANKTON	22982.	22982.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	40				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	4909.	4908.7	20.72	-	-
STEPHANODISCUS INVISITATUS	3833.	3833.5	16.18	-	-
MELOSIRA GRANULATA	841.	841.5	3.55	-	-
CYCLOTELLA MENEGHINIANA	234.	233.7	0.99	-	-
STEPHANODISCUS NIAGARAE	187.	187.0	0.79	-	-
STEPHANODISCUS TENUIS	93.	93.5	0.39	-	-
TOTAL CENTRALES	10098.	10097.9	42.63	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	421.	420.7	1.78	-	-
NITZSCHIA PALEA	374.	374.0	1.58	-	-
NITZSCHIA SPP.	140.	140.2	0.59	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.39	-	-
NAVICULA PUPULA	93.	93.5	0.39	-	-
NAVICULA DECUSSIS	93.	93.5	0.39	-	-
NAVICULA CRYPTOCEPHALA	47.	46.7	0.20	-	-
NAVICULA CAPITATA	47.	46.7	0.20	-	-
NITZSCHIA TRYBLIONELLA VAR. VICTORIAE	47.	46.7	0.20	-	-
NITZSCHIA FRUSTULUM	47.	46.7	0.20	-	-
TOTAL PENNALES	1402.	1402.5	5.92	-	-
TOTAL BACILLARIOPHYTA	11500.	11500.4	48.55	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
GLOEOACTINIUM LIMNETICUM	1496.	1496.0	6.32	-	-
ANKISTRODESMUS FALCATUS	654.	654.5	2.76	-	-
DICTYOSPHAERIUM PULCHELLUM	561.	561.0	2.37	-	-
SCENEDESMUS ABUNDANS	409.	409.1	1.73	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	374.	374.0	1.58	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 2   COLLECTION DATE: 9-SEP-8'   SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	374.	374.0	1.58	-	-
CRUCIGENIA TETRAPEDIA	234.	233.7	0.99	-	-
SCENEDESMUS DIMORPHUS	210.	210.4	0.89	-	-
CRUCIGENIA APICULATA	187.	187.0	0.79	-	-
MICRACTINIUM PUSILLUM	187.	187.0	0.79	-	-
SCENEDESMUS OPOLIENSIS	152.	151.9	0.64	-	-
SCENEDESMUS ARCUATUS	140.	140.2	0.59	-	-
SCENEDESMUS ACUMINATUS	117.	116.9	0.49	-	-
OOCYSTIS PUSILLA	93.	93.5	0.39	-	-
GOLENKINIA RADIATA	93.	93.5	0.39	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	93.	93.5	0.39	-	-
TETRASTRUM STAUROGENIAEFORME	93.	93.5	0.39	-	-
TOTAL NON-FILAMENTOUS	3974.	3973.7	16.78	-	-
TOTAL CHLOROPHYTA	3974.	3973.7	16.78	-	-
CHRYSOPHYTA					
CENTRITRACTUS BELANOPHORUS	93.	93.5	0.39	-	-
TOTAL CHRYSOPHYTA	93.	93.5	0.39	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	1776.	1776.5	7.50	-	-
COELOSPHAERIUM NAEGELIANUM	1169.	1168.7	4.93	-	-
MICROCYSTIS AERUGINOSA	374.	374.0	1.58	-	-
TOTAL NON-FILAMENTOUS	3319.	3319.2	14.01	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	1557.	1556.8	6.57	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
OSCILLATORIA TENUIS	1080.	1079.9	4.56	-	-
ANABAENA FLOS-AQUAE	108.	107.5	0.45	-	-
TOTAL FILAMENTOUS	2744.	2744.2	11.58	-	-
TOTAL CYANOPHYTA	6063.	6063.4	25.60	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	47.	46.7	0.20	-	-
TOTAL EUGLENOPHYTA	47.	46.7	0.20	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	327.	327.2	1.38	-	-
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	187.	187.0	0.79	-	-
TOTAL CRYPTOPHYTA	514.	514.2	2.17	-	-
TOTAL PHYTOPLANKTON	23688.	23688.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	43				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	5423.	5422.9	25.19	-	-
STEPHANODISCUS INVISITATUS	4441.	4441.2	20.63	-	-
CYCLOTELLA MENEGHINIANA	701.	701.2	3.26	-	-
MELOSIRA GRANULATA	608.	607.7	2.82	-	-
MELOSIRA VARIANS	140.	140.2	0.65	-	-
STEPHANODISCUS NIAGARAE	47.	46.7	0.22	-	-
TOTAL CENTRALES	11360.	11360.1	52.76	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	561.	561.0	2.61	-	-
NITZSCHIA PALEA	327.	327.2	1.52	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.43	-	-
NAVICULA CRYPTOCEPHALA	47.	46.7	0.22	-	-
NITZSCHIA LINEARIS	47.	46.7	0.22	-	-
TOTAL PENNALES	1075.	1075.2	4.99	-	-
TOTAL BACILLARIOPHYTA	12435.	12435.4	57.76	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	748.	748.0	3.47	-	-
ANKISTRODESMUS FALCATUS	654.	654.5	3.04	-	-
ANKISTRODESMUS SPIRALIS	514.	514.2	2.39	-	-
SCENEDESMUS ABUNDANS	386.	385.7	1.79	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	374.	374.0	1.74	-	-
GLOEOACTINIUM LIMNETICUM	280.	280.5	1.30	-	-
MICRACTINIUM PUSILLUM	187.	187.0	0.87	-	-
SCENEDESMUS ACUMINATUS	164.	163.6	0.76	-	-
TETRASTRUM STAUROGENIAEFORME	140.	140.2	0.65	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	140.	140.2	0.65	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CRUCIGENIA APICULATA	93.	93.5	0.43	-	-
SCHROEDERIA SETIGERA	93.	93.5	0.43	-	-
SCENEDESMUS LONGUS	82.	81.8	0.38	-	-
SCENEDESMUS INTERMEDIUS	58.	58.4	0.27	-	-
TOTAL NON-FILAMENTOUS	3635.	3634.8	16.88	-	-
TOTAL CHLOROPHYTA	3635.	3634.8	16.88	-	-
CHRYSOPHYTA					
CENTRITRACTUS BELANOPHORUS	93.	93.5	0.43	-	-
TOTAL CHRYSOPHYTA	93.	93.5	0.43	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	1636.	1636.2	7.60	-	-
MERISMOPEDIA TENUISSIMA	1028.	1028.5	4.78	-	-
MICROCYSTIS AERUGINOSA	234.	233.7	1.09	-	-
TOTAL NON-FILAMENTOUS	2898.	2898.5	13.46	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	617.	617.1	2.87	-	-
OSCILLATORIA TENUIS	388.	388.0	1.80	-	-
ANABAENA SPP.	238.	238.4	1.11	-	-
ANABAENA FLOS-AQUAE	103.	102.8	0.48	-	-
TOTAL FILAMENTOUS	1346.	1346.4	6.25	-	-
TOTAL CYANOPHYTA	4245.	4244.9	19.72	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
EUGLENOPHYTA					
EUGLENA POLYMORPHA	93.	93.5	0.43	-	-
PHACUS NORDSTEDTII	47.	46.7	0.22	-	-
TOTAL EUGLENOPHYTA	140.	140.2	0.65	-	-
PYRRHOPHYTA					
GLENODINIUM QUADRIDENS	93.	93.5	0.43	-	-
TOTAL PYRRHOPHYTA	93.	93.5	0.43	-	-
CRYPTOPHYTA					
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	374.	374.0	1.74	-	-
CRYPTOMONAS OVATA	234.	233.7	1.09	-	-
TOTAL CRYPTOPHYTA	608.	607.7	2.82	-	-
TOTAL PHYTOPLANKTON	21530.	21530.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	38				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 4   COLLECTION DATE: 9-SEP-81   SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	4394.	4394.5	23.38	-	-
STEPHANODISCUS INVISITATUS	2898.	2898.5	15.42	-	-
MELOSIRA GRANULATA	1356.	1355.7	7.21	-	-
CYCLOTELLA MENEGHINIANA	374.	374.0	1.99	-	-
MELOSIRA AMBIGUA	187.	187.0	1.00	-	-
MELOSIRA VARIANS	93.	93.5	0.50	-	-
TOTAL CENTRALES	9303.	9303.2	49.50	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	467.	467.5	2.49	-	-
NITZSCHIA SPP.	187.	187.0	1.00	-	-
NITZSCHIA PALEA	187.	187.0	1.00	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.50	-	-
NAVICULA CRYPTOCEPHALA	47.	46.7	0.25	-	-
NAVICULA CAPITATA	47.	46.7	0.25	-	-
NITZSCHIA LINEARIS	47.	46.7	0.25	-	-
DIATOMA VULGARE	47.	46.7	0.25	-	-
TOTAL PENNALES	1122.	1122.0	5.97	-	-
TOTAL BACILLARIOPHYTA	10425.	10425.1	55.47	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	888.	888.2	4.73	-	-
ANKISTRODESMUS FALCATUS	654.	654.5	3.48	-	-
SCENEDESMUS ABUNDANS	491.	490.9	2.61	-	-
ANKISTRODESMUS SPIRALIS	421.	420.7	2.24	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	374.	374.0	1.99	-	-
PEDIASTRUM BORYANUM	374.	374.0	1.99	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CRUCIGENIA APICULATA	234.	233.7	1.24	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	234.	233.7	1.24	-	-
SCENEDESMUS ACUMINATUS	152.	151.9	0.81	-	-
MICRACTINIUM PUSILLUM	140.	140.2	0.75	-	-
SCENEDESMUS OPOLIENSIS	117.	116.9	0.62	-	-
SCENEDESMUS DIMORPHUS	105.	105.2	0.56	-	-
SCENEDESMUS ARCUATUS	70.	70.1	0.37	-	-
SCENEDESMUS DENTICULATUS	47.	46.7	0.25	-	-
TOTAL NON-FILAMENTOUS	4301.	4301.0	22.89	-	-
TOTAL CHLOROPHYTA	4301.	4301.0	22.89	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	1169.	1168.7	6.22	-	-
MERISMOPEDIA TENUISSIMA	935.	935.0	4.98	-	-
MICROCYSTIS AERUGINOSA	374.	374.0	1.99	-	-
TOTAL NON-FILAMENTOUS	2478.	2477.7	13.18	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	388.	388.0	2.06	-	-
ANABAENA SPP.	201.	201.0	1.07	-	-
OSCILLATORIA TENUIS	196.	196.3	1.04	-	-
ANABAENA FLOS-AQUAE	103.	102.8	0.55	-	-
TOTAL FILAMENTOUS	888.	888.2	4.73	-	-
TOTAL CYANOPHYTA	3366.	3366.0	17.91	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	93.	93.5	0.50	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TABLE B-17 (CONT.)

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL EUGLENOPHYTA	93.	93.5	0.50	-	-
PYRRHOPHYTA					
PERIDINIUM SPP.	47.	46.7	0.25	-	-
TOTAL PYRRHOPHYTA	47.	46.7	0.25	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	327.	327.2	1.74	-	-
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	234.	233.7	1.24	-	-
TOTAL CRYPTOPHYTA	561.	561.0	2.99	-	-
TOTAL PHYTOPLANKTON	18793.	18793.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	4722.	4721.7	21.11	-	-
SKELETONEMA POTAMOS	3693.	3693.2	16.51	-	-
MELOSIRA GRANULATA	888.	888.2	3.97	-	-
CYCLOTELLA MENEGHINIANA	654.	654.5	2.93	-	-
STEPHANODISCUS NIAGARAE	140.	140.2	0.63	-	-
MELOSIRA VARIANS	93.	93.5	0.42	-	-
STEPHANODISCUS TENUIS	93.	93.5	0.42	-	-
TOTAL CENTRALES	10285.	10284.9	45.98	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	748.	748.0	3.34	-	-
NITZSCHIA PALEA	421.	420.7	1.88	-	-
NITZSCHIA HANTZSCHIANA	280.	280.5	1.25	-	-
NAVICULA TRIPUNCTATA	93.	93.5	0.42	-	-
NITZSCHIA DISSIPATA	93.	93.5	0.42	-	-
NAVICULA VIRIDULA	47.	46.7	0.21	-	-
NITZSCHIA FRUSTULUM	47.	46.7	0.21	-	-
NAVICULA CRYPTOCEPHALA	47.	46.7	0.21	-	-
NAVICULA SALINARUM VAR. INTERMEDIA	47.	46.7	0.21	-	-
TOTAL PENNALES	1823.	1823.2	8.15	-	-
TOTAL BACILLARIOPHYTA	12108.	12108.1	54.13	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	1449.	1449.2	6.48	-	-
ANKISTRODESMUS FALCATUS	701.	701.2	3.14	-	-
SCENEDESMUS ABUNDANS	397.	397.4	1.78	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	374.	374.0	1.67	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	280.	280.5	1.25	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	245.	245.4	1.10	-	-
SCENEDESMUS ACUMINATUS	210.	210.4	0.94	-	-
PEDIASTRUM BORYANUM	187.	187.0	0.84	-	-
SCENEDESMUS ARCUATUS	117.	116.9	0.52	-	-
SCENEDESMUS OPOLIENSIS	105.	105.2	0.47	-	-
MICRACTINIUM PUSILLUM	93.	93.5	0.42	-	-
SCENEDESMUS DENTICULATUS	93.	93.5	0.42	-	-
SCENEDESMUS DIMORPHUS	93.	93.5	0.42	-	-
SCENEDESMUS QUADRICAUDA	58.	58.4	0.26	-	-
TOTAL NON-FILAMENTOUS	4406.	4406.1	19.70	-	-
TOTAL CHLOROPHYTA	4406.	4406.1	19.70	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	2805.	2805.0	12.54	-	-
MERISMOPEDIA TENUISSIMA	701.	701.2	3.14	-	-
MICROCYSTIS AERUGINOSA	280.	280.5	1.25	-	-
TOTAL NON-FILAMENTOUS	3787.	3786.7	16.93	-	-
CYANOPHYTA FILAMENTOUS					
ANABAENA SPP.	482.	481.5	2.15	-	-
APHANIZOMENON FLOS-AQUAE	430.	430.1	1.92	-	-
OSCILLATORIA TENUIS	248.	247.8	1.11	-	-
ANABAENA FLOS-AQUAE	112.	112.2	0.50	-	-
TOTAL FILAMENTOUS	1272.	1271.6	5.69	-	-
TOTAL CYANOPHYTA	5058.	5058.3	22.61	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	140.	140.2	0.63	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 9-SEP-81 SCOPE TYPE: INVERTED

TABLE B-17 (CONT.)

IEL11
IOWAELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
EUGLENA ACUS	93.	93.5	0.42	-	-
TOTAL EUGLENOPHYTA	234.	233.7	1.05	-	-
CRYPTOPHYTA					
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	561.	561.0	2.51	-	-
TOTAL CRYPTOPHYTA	561.	561.0	2.51	-	-
TOTAL PHYTOPLANKTON	22367.	22367.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	40				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
SKELETONEMA POTAMOS	63579.	63579.3	38.10	-	-
STEPHANODISCUS INVISITATUS	23998.	23998.1	14.38	-	-
CYCLOTELLA MENEGHINIANA	7792.	7791.6	4.67	-	-
MELOSIRA GRANULATA	1870.	1870.0	1.12	-	-
MELOSIRA AMBIGUA	935.	935.0	0.56	-	-
STEPHANODISCUS TENUIS	623.	623.3	0.37	-	-
STEPHANODISCUS NIAGARAE	623.	623.3	0.37	-	-
RHIZOSOLENIA ERIENSIS	312.	311.7	0.19	-	-
TOTAL CENTRALES	99732.	99732.3	59.76	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	2805.	2805.0	1.68	-	-
NITZSCHIA PALEA	935.	935.0	0.56	-	-
NITZSCHIA LINEARIS	623.	623.3	0.37	-	-
DIATOMA VULGARE	312.	311.7	0.19	-	-
NITZSCHIA HANTZSCHIANA	312.	311.7	0.19	-	-
TOTAL PENNALES	4987.	4986.6	2.99	-	-
TOTAL BACILLARIOPHYTA	104719.	104718.9	62.75	-	-
CHLOROPHYTA NON-FILAMENTOUS					
PEDIASTRUM DUPLEX VAR. RETICULATUM	7480.	7479.9	4.48	-	-
DICTYOSPHAERIUM PULCHELLUM	7480.	7479.9	4.48	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	1480.	1480.4	0.89	-	-
TETRASTRUM STAUROGENIAEFORME	1402.	1402.5	0.84	-	-
PEDIASTRUM BORYANUM	1247.	1246.7	0.75	-	-
SCENEDESMUS ACUMINATUS	1169.	1168.7	0.70	-	-
CRUCIGENIA APICULATA	1091.	1090.8	0.65	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 1   COLLECTION DATE: 22-SEP-81   SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
MICRACTINIUM PUSILLUM	935.	935.0	0.56	-	-
ANKISTRODESMUS SPIRALIS	935.	935.0	0.56	-	-
SCENEDESMUS ABUNDANS	857.	857.1	0.51	-	-
SCENEDESMUS ARCUATUS	779.	779.2	0.47	-	-
ANKISTRODESMUS FALCATUS	623.	623.3	0.37	-	-
SCENEDESMUS OPOLIENSIS	467.	467.5	0.28	-	-
CLOSTERIOPSIS LONGISSIMA VAR. TROPICA	312.	311.7	0.19	-	-
GOLENKINIA RADIATA	312.	311.7	0.19	-	-
LAGERHEIMIA QUADRISETA	312.	311.7	0.19	-	-
TETRASTRUM HETEROCANTHUM	312.	311.7	0.19	-	-
TOTAL NON-FILAMENTOUS	27193.	27192.6	16.29	-	-
TOTAL CHLOROPHYTA	27193.	27192.6	16.29	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	23375.	23374.8	14.01	-	-
MERISMOPEDIA TENUISSIMA	3117.	3116.6	1.87	-	-
MICROCYSTIS AERUGINOSA	2493.	2493.3	1.49	-	-
MERISMOPEDIA SPP.	1247.	1246.7	0.75	-	-
TOTAL NON-FILAMENTOUS	30231.	30231.4	18.12	-	-
CYANOPHYTA					
FILAMENTOUS					
ANABAENA SPP.	810.	810.3	0.49	-	-
APHANIZOMENON FLOS-AQUAE	748.	748.0	0.45	-	-
ANABAENA FLOS-AQUAE	374.	374.0	0.22	-	-
TOTAL FILAMENTOUS	1932.	1932.3	1.16	-	-
TOTAL CYANOPHYTA	32164.	32163.7	19.27	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	623.	623.3	0.37	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL EUGLENOPHYTA	623.	623.3	0.37	-	-
PYRRHOPHYTA					
CERATIUM CORNUTUM	312.	311.7	0.19	-	-
TOTAL PYRRHOPHYTA	312.	311.7	0.19	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	1247.	1246.7	0.75	-	-
RHODOMONAS MINUTA VAR. NANNOPLANCTICA	623.	623.3	0.37	-	-
TOTAL CRYPTOPHYTA	1870.	1870.0	1.12	-	-
TOTAL PHYTOPLANKTON	166880.	166880.2	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	41				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	107212.	107212.2	42.01	-	-
STEPHANODISCUS INVISITATUS	48931.	48931.2	19.17	-	-
CYCLOTELLA MENEGHINIANA	10597.	10596.6	4.15	-	-
MELOSIRA GRANULATA	4987.	4986.6	1.95	-	-
MELOSIRA AMBIGUA	1558.	1558.3	0.61	-	-
STEPHANODISCUS NIAGARAE	312.	311.7	0.12	-	-
TOTAL CENTRALES	173597.	173596.6	68.01	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	4052.	4051.6	1.59	-	-
NITZSCHIA PALEA	1247.	1246.7	0.49	-	-
NITZSCHIA SPP.	935.	935.0	0.37	-	-
NAVICULA TRIPUNCTATA	312.	311.7	0.12	-	-
NITZSCHIA FRUSTULUM	312.	311.7	0.12	-	-
NAVICULA SPP.	312.	311.7	0.12	-	-
GOMPHONEMA PARVULUM	312.	311.7	0.12	-	-
TOTAL PENNALES	7480.	7479.9	2.93	-	-
TOTAL BACILLARIOPHYTA	181076.	181076.5	70.94	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
PEDIASTRUM DUPLEX VAR. RETICULATUM	4987.	4986.6	1.95	-	-
DICTYOSPHAERIUM PULCHELLUM	4987.	4986.6	1.95	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	2026.	2025.8	0.79	-	-
SCENEDESMUS ABUNDANS	2026.	2025.8	0.79	-	-
CRUCIGENIA APICULATA	1247.	1246.7	0.49	-	-
CRUCIGENIA TETRAPEDIA	1247.	1246.7	0.49	-	-
ANKISTRODESMUS SPIRALIS	1247.	1246.7	0.49	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PEDIASTRUM BORYANUM	1247.	1246.7	0.49	-	-
ANKISTRODESMUS FALCATUS	1247.	1246.7	0.49	-	-
SCENEDESMUS ACUMINATUS	1091.	1090.8	0.43	-	-
TETRASTRUM STAUROGENIAEFORME	701.	701.2	0.27	-	-
SCENEDESMUS LONGUS	623.	623.3	0.24	-	-
SCENEDESMUS INTERMEDIUS	545.	545.4	0.21	-	-
SCENEDESMUS DIMORPHUS	390.	389.6	0.15	-	-
KIRCHNERIELLA LUNARIS	312.	311.7	0.12	-	-
SCHROEDERIA SETIGERA	312.	311.7	0.12	-	-
TOTAL NON-FILAMENTOUS	24232.	24231.8	9.49	-	-
TOTAL CHLOROPHYTA	24232.	24231.8	9.49	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	38958.	38957.9	15.26	-	-
MERISMOPEDIA TENUISSIMA	1870.	1870.0	0.73	-	-
MICROCYSTIS AERUGINOSA	1870.	1870.0	0.73	-	-
TOTAL NON-FILAMENTOUS	42698.	42697.9	16.73	-	-
CYANOPHYTA FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	3023.	3023.1	1.18	-	-
OSCILLATORIA TENUIS	1621.	1620.7	0.63	-	-
ANABAENA FLOS-AQUAE	997.	997.3	0.39	-	-
ANABAENA SPP.	654.	654.5	0.26	-	-
TOTAL FILAMENTOUS	6296.	6295.6	2.47	-	-
TOTAL CYANOPHYTA	48993.	48993.5	19.20	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	312.	311.7	0.12	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 2   COLLECTION DATE: 22-SEP-81   SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL EUGLENOPHYTA	312.	311.7	0.12	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	623.	623.3	0.24	-	-
TOTAL CRYPTOPHYTA	623.	623.3	0.24	-	-
TOTAL PHYTOPLANKTON	255237.	255236.8	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	38				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	90071.	90070.7	32.84	-	-
STEPHANODISCUS INVISITATUS	53606.	53606.1	19.55	-	-
CYCLOTELLA MENEGHINIANA	16207.	16206.5	5.91	-	-
MELOSIRA GRANULATA	6545.	6544.9	2.39	-	-
MELOSIRA AMBIGUA	1870.	1870.0	0.68	-	-
STEPHANODISCUS NIAGARAE	623.	623.3	0.23	-	-
MELOSIRA VARIANS	623.	623.3	0.23	-	-
TOTAL CENTRALES	169545.	169544.9	61.82	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	5922.	5921.6	2.16	-	-
NITZSCHIA PALEA	3740.	3740.0	1.36	-	-
NITZSCHIA SPP.	1558.	1558.3	0.57	-	-
NITZSCHIA HANTZSCHIANA	623.	623.3	0.23	-	-
NAVICULA CRYPTOCEPHALA	312.	311.7	0.11	-	-
NITZSCHIA FRUSTULUM	312.	311.7	0.11	-	-
NAVICULA SALINARUM VAR. INTERMEDIA	312.	311.7	0.11	-	-
DIATOMA VULGARE	312.	311.7	0.11	-	-
NAVICULA CAPITATA	312.	311.7	0.11	-	-
TOTAL PENNALES	13402.	13401.5	4.89	-	-
TOTAL BACILLARIOPHYTA	182946.	182946.5	66.71	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	9817.	9817.4	3.58	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	4987.	4986.6	1.82	-	-
MICRACTINIUM PUSILLUM	3272.	3272.5	1.19	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	3117.	3116.6	1.14	-	-

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	2182.	2181.6	0.80	-	-
SCENEDESMUS ABUNDANS	2026.	2025.8	0.74	-	-
CRUCIGENIA APICULATA	1870.	1870.0	0.68	-	-
SCENEDESMUS ACUMINATUS	1091.	1090.8	0.40	-	-
SCENEDESMUS OPOLIENSIS	701.	701.2	0.26	-	-
ANKISTRODESMUS SPIRALIS	623.	623.3	0.23	-	-
SCENEDESMUS INTERMEDIUS	467.	467.5	0.17	-	-
TOTAL NON-FILAMENTOUS	30153.	30153.4	10.99	-	-
TOTAL CHLOROPHYTA	30153.	30153.4	10.99	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	44256.	44256.2	16.14	-	-
MERISMOPEDIA TENUISSIMA	6857.	6856.6	2.50	-	-
MICROCYSTIS AERUGINOSA	1247.	1246.7	0.45	-	-
TOTAL NON-FILAMENTOUS	52359.	52359.5	19.09	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	4519.	4519.1	1.65	-	-
APHANIZOMENON FLOS-AQUAE	2556.	2555.6	0.93	-	-
ANABAENA FLOS-AQUAE	1278.	1277.8	0.47	-	-
ANABAENA SPP.	436.	436.3	0.16	-	-
TOTAL FILAMENTOUS	8789.	8788.9	3.20	-	-
TOTAL CYANOPHYTA	61148.	61148.4	22.30	-	-
TOTAL PHYTOPLANKTON	274248.	274248.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	34				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	83837.	83837.5	30.90	-	-
STEPHANODISCUS INVISITATUS	63891.	63891.0	23.55	-	-
CYCLOTELLA MENEGHINIANA	13402.	13401.5	4.94	-	-
MELOSIRA GRANULATA	5610.	5609.9	2.07	-	-
MELOSIRA AMBIGUA	2182.	2181.6	0.80	-	-
STEPHANODISCUS NIAGARAE	623.	623.3	0.23	-	-
TOTAL CENTRALES	169545.	169544.9	62.49	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	8103.	8103.3	2.99	-	-
NITZSCHIA PALEA	3740.	3740.0	1.38	-	-
NITZSCHIA HANTZSCHIANA	623.	623.3	0.23	-	-
NAVICULA CRYPTOCEPHALA	312.	311.7	0.11	-	-
NITZSCHIA LINEARIS	312.	311.7	0.11	-	-
NAVICULA DECUSSIS	312.	311.7	0.11	-	-
GOMPHONEMA PARVULUM	312.	311.7	0.11	-	-
TOTAL PENNALES	13713.	13713.2	5.05	-	-
TOTAL BACILLARIOPHYTA	183258.	183258.1	67.55	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	11064.	11064.1	4.08	-	-
CRUCIGENIA APICULATA	3428.	3428.3	1.26	-	-
ANKISTRODESMUS FALCATUS	3117.	3116.6	1.15	-	-
SCENEDESMUS ABUNDANS	2883.	2882.9	1.06	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	2805.	2805.0	1.03	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	2493.	2493.3	0.92	-	-
SCENEDESMUS ACUMINATUS	1636.	1636.2	0.60	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CRUCIGENIA TETRAPEDIA	1558.	1558.3	0.57	-	-
SCENEDESMUS ARCUATUS	1402.	1402.5	0.52	-	-
ANKISTRODESMUS SPIRALIS	1247.	1246.7	0.46	-	-
SCENEDESMUS OPOLIENSIS	779.	779.2	0.29	-	-
CLOSTERIOPSIS LONGISSIMA VAR. TROPICA	623.	623.3	0.23	-	-
SCHROEDERIA SETIGERA	623.	623.3	0.23	-	-
TETRASTRUM STAUROGENIAEFORME	623.	623.3	0.23	-	-
SCENEDESMUS LONGUS	545.	545.4	0.20	-	-
SCENEDESMUS QUADRICAUDA	390.	389.6	0.14	-	-
TETRASTRUM HETEROCANTHUM	312.	311.7	0.11	-	-
TOTAL NON-FILAMENTOUS	35530.	35529.6	13.10	-	-
TOTAL CHLOROPHYTA	35530.	35529.6	13.10	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	31166.	31166.3	11.49	-	-
MERISMOPEDIA TENUISSIMA	7792.	7791.6	2.87	-	-
MICROCYSTIS AERUGINOSA	3428.	3428.3	1.26	-	-
TOTAL NON-FILAMENTOUS	42386.	42386.2	15.62	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	3491.	3490.6	1.29	-	-
OSCILLATORIA TENUIS	3023.	3023.1	1.11	-	-
ANABAENA SPP.	2618.	2618.0	0.96	-	-
ANABAENA FLOS-AQUAE	997.	997.3	0.37	-	-
TOTAL FILAMENTOUS	10129.	10129.1	3.73	-	-
TOTAL CYANOPHYTA	52515.	52515.3	19.36	-	-
TOTAL PHYTOPLANKTON	271303.	271303.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	68878.	68877.6	29.98	-	-
STEPHANODISCUS INVISITATUS	56723.	56722.8	24.69	-	-
CYCLOTELLA MENEGHINIANA	7168.	7168.3	3.12	-	-
MELOSIRA GRANULATA	4987.	4986.6	2.17	-	-
MELOSIRA AMBIGUA	1247.	1246.7	0.54	-	-
MELOSIRA VARIANS	623.	623.3	0.27	-	-
STEPHANODISCUS NIAGARAE	623.	623.3	0.27	-	-
STEPHANODISCUS TENUIS	312.	311.7	0.14	-	-
TOTAL CENTRALES	140560.	140560.2	61.18	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	12155.	12154.9	5.29	-	-
NITZSCHIA PALEA	4987.	4986.6	2.17	-	-
NITZSCHIA SPP.	1247.	1246.7	0.54	-	-
NAVICULA TRIPUNCTATA	623.	623.3	0.27	-	-
NAVICULA SALINARUM VAR. INTERMEDIA	312.	311.7	0.14	-	-
NAVICULA DECUSSIS	312.	311.7	0.14	-	-
NITZSCHIA LINEARIS	312.	311.7	0.14	-	-
GYROSIGMA SCALPROIDES	312.	311.7	0.14	-	-
NITZSCHIA PSEUDOFONTICOLA	312.	311.7	0.14	-	-
TOTAL PENNALES	20570.	20569.8	8.95	-	-
TOTAL BACILLARIOPHYTA	161130.	161130.0	70.13	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
PEDIASTRUM DUPLEX VAR. RETICULATUM	11220.	11219.9	4.88	-	-
DICTYOSPHAERIUM PULCHELLUM	9038.	9038.2	3.93	-	-
ANKISTRODESMUS FALCATUS	3428.	3428.3	1.49	-	-

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CRUCIGENIA APICULATA	2805.	2805.0	1.22	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	2026.	2025.8	0.88	-	-
SCENEDESMUS ABUNDANS	1714.	1714.1	0.75	-	-
TETRASTRUM STAUROGENIAEFORME	1247.	1246.7	0.54	-	-
SCENEDESMUS OPOLIENSIS	1013.	1012.9	0.44	-	-
SCENEDESMUS ACUMINATUS	1013.	1012.9	0.44	-	-
ANKISTRODESMUS SPIRALIS	935.	935.0	0.41	-	-
SCHROEDERIA SETIGERA	935.	935.0	0.41	-	-
SCENEDESMUS ARCUATUS	857.	857.1	0.37	-	-
SCENEDESMUS LONGUS	701.	701.2	0.31	-	-
CRUCIGENIA QUADRATA	623.	623.3	0.27	-	-
SCENEDESMUS DENTICULATUS	467.	467.5	0.20	-	-
SCENEDESMUS INTERMEDIUS	312.	311.7	0.14	-	-
TOTAL NON-FILAMENTOUS	38335.	38334.6	16.68	-	-
TOTAL CHLOROPHYTA	38335.	38334.6	16.68	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	17141.	17141.5	7.46	-	-
MERISMOPEDIA TENUISSIMA	4363.	4363.3	1.90	-	-
MICROCYSTIS AERUGINOSA	935.	935.0	0.41	-	-
TOTAL NON-FILAMENTOUS	22440.	22439.8	9.77	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	3272.	3272.5	1.42	-	-
APHANIZOMENON FLOS-AQUAE	2244.	2244.0	0.98	-	-
ANABAENA FLOS-AQUAE	1402.	1402.5	0.61	-	-
TOTAL FILAMENTOUS	6919.	6918.9	3.01	-	-
TOTAL CYANOPHYTA	29359.	29358.7	12.78	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 22-SEP-81 SCOPE TYPE: INVERTED

TABLE B-18 (CONT.)

IEL11
IOWA ELECTRIC
PHYTOPLANKTON
SPECIES COMPOSITION

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
EUGLENOPHYTA					
EUGLENA POLYMORPHA	623.	623.3	0.27	-	-
EUGLENA ACUS	312.	311.7	0.14	-	-
TOTAL EUGLENOPHYTA	935.	935.0	0.41	-	-
TOTAL PHYTOPLANKTON	229758.	229758.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	41				

TABLE B-19

IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	8851.	8851.2	22.80	-	-
STEPHANODISCUS TENUIS	7667.	7666.9	19.75	-	-
STEPHANODISCUS INVISITATUS	2369.	2368.6	6.10	-	-
CYCLOTELLA MENEGHINIANA	1060.	1059.7	2.73	-	-
MELOSIRA AMBIGUA	873.	872.7	2.25	-	-
STEPHANODISCUS NIAGARAE	748.	748.0	1.93	-	-
TOTAL CENTRALES	21567.	21567.1	55.56	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	3054.	3054.3	7.87	-	-
NITZSCHIA PALEA	499.	498.7	1.28	-	-
NITZSCHIA LINEARIS	125.	124.7	0.32	-	-
NAVICULA DECUSSIS	125.	124.7	0.32	-	-
NAVICULA CITRUS	125.	124.7	0.32	-	-
NAVICULA HEUFLERI	62.	62.3	0.16	-	-
NAVICULA TRIPUNCTATA	62.	62.3	0.16	-	-
GYROSIGMA SCALPROIDES	62.	62.3	0.16	-	-
NAVICULA CRYPTOCEPHALA	62.	62.3	0.16	-	-
NAVICULA CUSPIDATA	62.	62.3	0.16	-	-
TOTAL PENNALES	4239.	4238.6	10.92	-	-
TOTAL BACILLARIOPHYTA	25806.	25805.7	66.48	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	826.	825.9	2.13	-	-
SCENEDESMUS ACUMINATUS	654.	654.[illegible]	1.69	-	-
ANKISTRODESMUS SPIRALIS	623.	623.[illegible]	1.61	-	-
ANKISTRODESMUS FALCATUS	561.	561.0	1.45	-	-

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PEDIASTRUM DUPLEX VAR. RETICULATUM	499.	498.7	1.28	-	-
PEDIASTRUM BORYANUM	499.	498.7	1.28	-	-
SCENEDESMUS ABUNDANS	358.	358.4	0.92	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	280.	280.5	0.72	-	-
COELASTRUM CAMBRICUM	249.	249.3	0.64	-	-
CRUCIGENIA TETRAPEDIA	187.	187.0	0.48	-	-
SCENEDESMUS OPOLIENSIS	156.	155.8	0.40	-	-
SCENEDESMUS INTERMEDIUS	156.	155.8	0.40	-	-
SCENEDESMUS DIMORPHUS	140.	140.2	0.36	-	-
CLOSTERIOPSIS LONGISSIMA VAR. TROPICA	62.	62.3	0.16	-	-
SCENEDESMUS BERNARDII	62.	62.3	0.16	-	-
TETRASTRUM STAUROGENIAEFORME	62.	62.3	0.16	-	-
TOTAL NON-FILAMENTOUS	5376.	5376.2	13.85	-	-
TOTAL CHLOROPHYTA	5376.	5376.2	13.85	-	-
CHRYSOPHYTA					
DINOBRYON DIVERGENS	436.	436.3	1.12	-	-
TOTAL CHRYSOPHYTA	436.	436.3	1.12	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	4893.	4893.1	12.61	-	-
MICROCYSTIS AERUGINOSA	249.	249.3	0.64	-	-
TOTAL NON-FILAMENTOUS	5142.	5142.4	13.25	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1010.	1009.8	2.60	-	-
APHANIZOMENON FLOS-AQUAE	841.	841.5	2.17	-	-

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANABAENA FLOS-AQUAE	81.	81.0	0.21	-	-
TOTAL FILAMENTOUS	1932.	1932.3	4.98	-	-
TOTAL CYANOPHYTA	7075.	7074.8	18.23	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	125.	124.7	0.32	-	-
TOTAL CRYPTOPHYTA	125.	124.7	0.32	-	-
TOTAL PHYTOPLANKTON	38818.	38817.7	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) 1	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	11781.	11780.9	31.57	-	-
STEPHANODISCUS TENUIS	7293.	7292.9	19.54	-	-
STEPHANODISCUS INVISITATUS	4239.	4238.6	11.36	-	-
MELOSIRA GRANULATA	686.	685.7	1.84	-	-
CYCLOTELLA MENEGHINIANA	312.	311.7	0.84	-	-
STEPHANODISCUS NIAGARAE	249.	249.3	0.67	-	-
TOTAL CENTRALES	24559.	24559.1	65.81	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	2867.	2867.3	7.68	-	-
NITZSCHIA PALEA	374.	374.0	1.00	-	-
ASTERIONELLA FORMOSA	249.	249.3	0.67	-	-
NITZSCHIA ACTINASTROIDES	249.	249.3	0.67	-	-
NAVICULA LANCEOLATA	187.	187.0	0.50	-	-
NITZSCHIA LINEARIS	125.	124.7	0.33	-	-
NAVICULA DECUSSIS	125.	124.7	0.33	-	-
NAVICULA CITRUS	62.	62.3	0.17	-	-
NAVICULA CRYPTOCEPHALA	62.	62.3	0.17	-	-
NITZSCHIA DISSIPATA	62.	62.3	0.17	-	-
TOTAL PENNALES	4363.	4363.3	11.69	-	-
TOTAL BACILLARIOPHYTA	28922.	28922.4	77.50	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	935.	935.0	2.51	-	-
ANKISTRODESMUS SPIRALIS	810.	810.3	2.17	-	-
SCENEDESMUS ABUNDANS	717.	716.8	1.92	-	-
PEDIASTRUM BORYANUM	499.	498.7	1.34	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 6-OCT-81 SCOPE TYPE: INVERTED

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	CONF LIMIT
SCENEDESMUS INTERMEDIUS	452.	451.9	1.21	-	-
DICTYOSPHAERIUM PULCHELLUM	312.	311.7	0.84	-	-
SCENEDESMUS LONGUS	296.	296.1	0.79	-	-
COELASTRUM CAMBRICUM	249.	249.3	0.67	-	-
SCENEDESMUS ACUMINATUS	234.	233.7	0.63	-	-
LAGERHEIMIA QUADRISETA	187.	187.0	0.50	-	-
SCENEDESMUS OPOLIENSIS	156.	155.8	0.42	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	125.	124.7	0.33	-	-
SCENEDESMUS DIMORPHUS	109.	109.1	0.29	-	-
CRUCIGENIA QUADRATA	62.	62.3	0.17	-	-
TETRAEDRON MINIMUM	62.	62.3	0.17	-	-
TOTAL NON-FILAMENTOUS	5205.	5204.8	13.95	-	-
TOTAL CHLOROPHYTA	5205.	5204.8	13.95	-	-
CYANOPHYTA NON-FILAMENTOUS					
MERISMOPEDIA TENUISSIMA	374.	374.0	1.00	-	-
TOTAL NON-FILAMENTOUS	374.	374.0	1.00	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1689.	1689.2	4.53	-	-
APHANIZOMENON FLOS-AQUAE	530.	529.8	1.42	-	-
ANABAENA FLOS-AQUAE	162.	162.1	0.43	-	-
TOTAL FILAMENTOUS	2381.	2381.1	6.38	-	-
TOTAL CYANOPHYTA	2755.	2755.1	7.38	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	436.	436.3	1.17	-	-
TOTAL CRYPTOPHYTA	436.	436.3	1.17	-	-
TOTAL PHYTOPLANKTON	37319.	37318.6	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	36				

SUMMARY C. PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 6-OCT-81 SCOPE TYPE: INVERTED

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
SKELETONEMA POTAMOS	10223.	10222.6	24.24	-	-
STEPHANODISCUS TENUIS	5735.	5734.6	13.60	-	-
STEPHANODISCUS INVISITATUS	3989.	3989.3	9.46	-	-
CYCLOTELLA MENEGHINIANA	623.	623.3	1.48	-	-
STEPHANODISCUS NIAGARAE	499.	498.7	1.18	-	-
MELOSIRA GRANULATA	249.	249.3	0.59	-	-
MELOSIRA VARIANS	187.	187.0	0.44	-	-
TOTAL CENTRALES	21505.	21504.8	50.99	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	3678.	3677.6	8.72	-	-
ASTERIONELLA FORMOSA	499.	498.7	1.18	-	-
NITZSCHIA PALEA	312.	311.7	0.74	-	-
NITZSCHIA ACTINASTROIDES	187.	187.0	0.44	-	-
NAVICULA CITRUS	187.	187.0	0.44	-	-
NITZSCHIA LINEARIS	125.	124.7	0.30	-	-
SURIRELLA OVATA	125.	124.7	0.30	-	-
NAVICULA LANCEOLATA	125.	124.7	0.30	-	-
ACHNANTHES LANCEOLATA	62.	62.3	0.15	-	-
NAVICULA DECUSSIS	62.	62.3	0.15	-	-
NITZSCHIA HANTZSCHIANA	62.	62.3	0.15	-	-
NAVICULA VIRIDULA	62.	62.3	0.15	-	-
TOTAL PENNALES	5485.	5485.3	13.01	-	-
TOTAL BACILLARIOPHYTA	26990.	26990.1	64.00	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	1309.	1309.0	3.10	-	-

TABLE B-19 (CONT.)

IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ABUNDANS	1091.	1090.8	2.59	-	-
ANKISTRODESMUS SPIRALIS	873.	872.7	2.07	-	-
DICTYOSPHAERIUM PULCHELLUM	873.	872.7	2.07	-	-
SCENEDESMUS INTERMEDIUS	358.	358.4	0.85	-	-
SCENEDESMUS ACUMINATUS	280.	280.5	0.67	-	-
TETRASTRUM STAUROGENIAEFORME	187.	187.0	0.44	-	-
SCENEDESMUS DIMORPHUS	140.	140.2	0.33	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	125.	124.7	0.30	-	-
SCENEDESMUS ARCUATUS	125.	124.7	0.30	-	-
CRUCIGENIA QUADRATA	125.	124.7	0.30	-	-
LAGERHEIMIA QUADRISETA	62.	62.3	0.15	-	-
TOTAL NON-FILAMENTOUS	5548.	5547.6	13.15	-	-
TOTAL CHLOROPHYTA	5548.	5547.6	13.15	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	6233.	6233.3	14.78	-	-
APHANOCAPSA DELICATISSIMA	748.	748.0	1.77	-	-
TOTAL NON-FILAMENTOUS	6981.	6981.3	16.55	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1571.	1570.8	3.72	-	-
APHANIZOMENON FLOS-AQUAE	698.	698.1	1.66	-	-
ANABAENA FLOS-AQUAE	262.	261.8	0.62	-	-
TOTAL FILAMENTOUS	2531.	2530.7	6.00	-	-
TOTAL CYANOPHYTA	9512.	9512.0	22.55	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	125.	124.7	0.30	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 6-OCT-81 SCOPE TYPE: INVERTED

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	125.	124.7	0.30	-	-
TOTAL PHYTOPLANKTON	42174.	42174.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	8914.	8913.6	29.24	-	-
SKELETONEMA POTAMOS	7418.	7417.6	24.34	-	-
STEPHANODISCUS INVISITATUS	2119.	2119.3	6.95	-	-
CYCLOTELLA MENEGHINIANA	187.	187.0	0.61	-	-
STEPHANODISCUS NIAGARAE	187.	187.0	0.61	-	-
RHIZOSOLENIA ERIENSIS	62.	62.3	0.20	-	-
TOTAL CENTRALES	18867.	18886.8	61.96	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1496.	1496.0	4.91	-	-
NITZSCHIA PALEA	125.	124.7	0.41	-	-
NITZSCHIA ACTINASTROIDES	125.	124.7	0.41	-	-
CYMATOPLEURA SOLEA	62.	62.3	0.20	-	-
DIATOMA VULGARE	62.	62.3	0.20	-	-
NAVICULA RADIOSA	62.	62.3	0.20	-	-
TOTAL PENNALES	1932.	1932.3	6.34	-	-
TOTAL BACILLARIOPHYTA	20819.	20819.1	68.30	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
COELASTRUM CAMBRICUM	499.	498.7	1.64	-	-
SCENEDESMUS ABUNDANS	467.	467.5	1.53	-	-
ANKISTRODESMUS SPIRALIS	374.	374.0	1.23	-	-
ANKISTRODESMUS FALCATUS	312.	311.7	1.02	-	-
DICTYOSPHAERIUM PULCHELLUM	312.	311.7	1.02	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	249.	249.3	0.82	-	-
SCENEDESMUS ACUMINATUS	218.	218.2	0.72	-	-
SCENEDESMUS OPOLIENSIS	93.	93.5	0.31	-	-

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS DENTICULATUS	78.	77.9	0.26	-	-
SCENEDESMUS DIMORPHUS	78.	77.9	0.26	-	-
LAGERHEIMIA QUADRISETA	62.	62.3	0.20	-	-
TOTAL NON-FILAMENTOUS	2743.	2742.6	9.00	-	-
TOTAL CHLOROPHYTA	2743.	2742.6	9.00	-	-
CHRYSOPHYTA					
DINOBRYON DIVERGENS	187.	187.0	0.61	-	-
TOTAL CHRYSOPHYTA	187.	187.0	0.61	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	3896.	3895.8	12.78	-	-
MERISMOPEDIA ELEGANS	997.	997.3	3.27	-	-
TOTAL NON-FILAMENTOUS	4893.	4893.1	16.05	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1209.	1209.3	3.97	-	-
APHANIZOMENON FLOS-AQUAE	343.	342.8	1.12	-	-
ANABAENA FLOS-AQUAE	162.	162.1	0.53	-	-
TOTAL FILAMENTOUS	1714.	1714.1	5.62	-	-
TOTAL CYANOPHYTA	6607.	6607.3	21.68	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	125.	124.7	0.41	-	-

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	125.	124.7	0.41	-	-
TOTAL PHYTOPLANKTON	30481.	30480.7	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	30				

SUMMARY Or PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 6-OCT-81 SCOPE TYPE: INVERTED

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
SKELETONEMA POTAMOS	7854.	7853.9	24.27	-	-
STEPHANODISCUS TENUIS	6046.	6046.3	18.68	-	-
STEPHANODISCUS INVISITATUS	2867.	2867.3	8.86	-	-
MELOSIRA GRANULATA	810.	810.3	2.50	-	-
MELOSIRA AMBIGUA	499.	498.7	1.54	-	-
CYCLOTELLA MENEGHINIANA	312.	311.7	0.96	-	-
STEPHANODISCUS NIAGARAE	125.	124.7	0.39	-	-
TOTAL CENTRALES	18513.	18512.8	57.20	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	1995.	1994.6	6.16	-	-
NITZSCHIA PALEA	374.	374.0	1.16	-	-
NITZSCHIA LINEARIS	312.	311.7	0.96	-	-
NAVICULA CRYPTOCEPHALA	187.	187.0	0.58	-	-
NITZSCHIA HANTZSCHIANA	125.	124.7	0.39	-	-
NAVICULA RADIOSA	125.	124.7	0.39	-	-
NAVICULA DECUSSIS	125.	124.7	0.39	-	-
CYMATOPLEURA SOLEA	62.	62.3	0.19	-	-
GYROSIGMA SCALPROIDES	62.	62.3	0.19	-	-
PLEUROSIGMA SPP.	62.	62.3	0.19	-	-
TOTAL PENNALES	3428.	3428.3	10.59	-	-
TOTAL BACILLARIOPHYTA	21941.	21941.1	67.79	-	-
CHLOROPHYTA NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	436.	436.3	1.35	-	-
SCENEDESMUS ABUNDANS	405.	405.2	1.25	-	-
SCENEDESMUS ACUMINATUS	358.	358.4	1.11	-	-

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS INTERMEDIUS	327.	327.2	1.01	-	-
COELASTRUM CAMBRICUM	249.	249.3	0.77	-	-
PEDIASTRUM BORYANUM	249.	249.3	0.77	-	-
SCENEDESMUS DIMORPHUS	203.	202.6	0.63	-	-
ANKISTRODESMUS SPIRALIS	187.	187.0	0.58	-	-
SCENEDESMUS OPOLIENSIS	156.	155.8	0.48	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	125.	124.7	0.39	-	-
DICTYOSPHAERIUM PULCHELLUM	125.	124.7	0.39	-	-
SCENEDESMUS DENTICULATUS	62.	62.3	0.19	-	-
GOLENKINIA RADIATA	62.	62.3	0.19	-	-
TOTAL NON-FILAMENTOUS	2945.	2945.2	9.10	-	-
TOTAL CHLOROPHYTA	2945.	2945.2	9.10	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	4675.	4675.0	14.44	-	-
MERISMOPEDIA TENUISSIMA	997.	997.3	3.08	-	-
TOTAL NON-FILAMENTOUS	5672.	5672.3	17.53	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1091.	1090.8	3.37	-	-
APHANIZOMENON FLOS-AQUAE	274.	274.3	0.85	-	-
ANABAENA FLOS-AQUAE	193.	193.2	0.60	-	-
TOTAL FILAMENTOUS	1558.	1558.3	4.81	-	-
TOTAL CYANOPHYTA	7231.	7230.6	22.34	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	62.	62.3	0.19	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 6-OCT-81 SCOPE TYPE: INVERTED

TABLE B-19 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL EUGLENOPHYTA	62.	62.3	0.19	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	187.	187.0	0.58	-	-
TOTAL CRYPTOPHYTA	187.	187.0	0.58	-	-
TOTAL PHYTOPLANKTON	32366.	32366.2	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 21-OCT-81 SCOPE TYPE: INVERTED

TABLE B-20 IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	9777.	9777.3	37.02	-	-
STEPHANODISCUS INVISITATUS	3313.	3312.5	12.54	-	-
STEPHANODISCUS NIAGARAE	748.	748.0	2.83	-	-
CYCLOTELLA MENEGHINIANA	427.	427.4	1.62	-	-
SKELETONEMA POTAMOS	427.	427.4	1.62	-	-
TOTAL CENTRALES	14693.	14692.7	55.63	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1122.	1122.0	4.25	-	-
NITZSCHIA PALEA	481.	480.9	1.82	-	-
NAVICULA CRYPTOCEPHALA	267.	267.1	1.01	-	-
ASTERIONELLA FORMOSA	214.	213.7	0.81	-	-
NAVICULA DECUSSIS	160.	160.3	0.61	-	-
SYNEDRA ULNA	160.	160.3	0.61	-	-
NITZSCHIA LINEARIS	160.	160.3	0.61	-	-
SURIRELLA OVATA	107.	106.9	0.40	-	-
DIATOMA VULGARE	107.	106.9	0.40	-	-
NAVICULA CITRUS	107.	106.9	0.40	-	-
NITZSCHIA DISSIPATA	53.	53.4	0.20	-	-
NAVICULA LANCEOLATA	53.	53.4	0.20	-	-
NAVICULA PUPULA	53.	53.4	0.20	-	-
NAVICULA VIRIDULA	53.	53.4	0.20	-	-
TOTAL PENNALES	3099.	3098.8	11.73	-	-
TOTAL BACILLARIOPHYTA	17792.	17791.5	67.37	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	721.	721.3	2.73	-	-

TABLE B-20 (CONT.)

IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	641.	641.1	2.43	-	-
ANKISTRODESMUS SPIRALIS	321.	320.6	1.21	-	-
SCENEDESMUS ABUNDANS	280.	280.5	1.06	-	-
DICTYOSPHAERIUM PULCHELLUM	160.	160.3	0.61	-	-
SCENEDESMUS DIMORPHUS	147.	146.9	0.56	-	-
SCENEDESMUS LONGUS	120.	120.2	0.46	-	-
SCENEDESMUS OPOLIENSIS	80.	80.1	0.30	-	-
ELAKATOTHRIX VIRIDIS	67.	66.8	0.25	-	-
LAGERHEIMIA QUADRISETA	53.	53.4	0.20	-	-
LAGERHEIMIA CILIATA	53.	53.4	0.20	-	-
TETRASTRUM STAUROGENIAEFORME	53.	53.4	0.20	-	-
TOTAL NON-FILAMENTOUS	2698.	2698.1	10.22	-	-
TOTAL CHLOROPHYTA	2698.	2698.1	10.22	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	2030.	2030.3	7.69	-	-
MERISMOPEDIA TENUISSIMA	1603.	1602.8	6.07	-	-
TOTAL NON-FILAMENTOUS	3633.	3633.1	13.76	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1988.	1987.5	7.53	-	-
ANABAENA FLOS-AQUAE	112.	112.2	0.42	-	-
APHANIZOMENON FLOS-AQUAE	80.	80.1	0.30	-	-
TOTAL FILAMENTOUS	2180.	2179.9	8.25	-	-
TOTAL CYANOPHYTA	5813.	5813.0	22.01	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	107.	106.9	0.40	-	-

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	107.	106.9	0.40	-	-
TOTAL PHYTOPLANKTON	26409.	26409.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 21-OCT-81 SCOPE TYPE: INVERTED

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	9083.	9082.8	35.01	-	-
STEPHANODISCUS INVISITATUS	6732.	6731.9	25.95	-	-
STEPHANODISCUS NIAGARAE	481.	480.9	1.85	-	-
CYCLOTELLA MENEGHINIANA	321.	320.6	1.24	-	-
SKELETONEMA POTAMOS	321.	320.6	1.24	-	-
MELOSIRA VARIANS	107.	106.9	0.41	-	-
TOTAL CENTRALES	17044.	17043.5	65.70	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1015.	1015.1	3.91	-	-
NITZSCHIA PALEA	481.	480.9	1.85	-	-
ASTERIONELLA FORMOSA	427.	427.4	1.65	-	-
NITZSCHIA LINEARIS	160.	160.3	0.62	-	-
NAVICULA RADIOSA	160.	160.3	0.62	-	-
NITZSCHIA SIGMOIDEA	107.	106.9	0.41	-	-
NAVICULA LANCEOLATA	107.	106.9	0.41	-	-
NAVICULA CRYPTOCEPHALA	107.	106.9	0.41	-	-
NAVICULA CITRUS	53.	53.4	0.21	-	-
CYMATOPLEURA SOLEA	53.	53.4	0.21	-	-
NAVICULA DECUSSIS	53.	53.4	0.21	-	-
NAVICULA HEUFLERI	53.	53.4	0.21	-	-
TOTAL PENNALES	2778.	2778.3	10.71	-	-
TOTAL BACILLARIOPHYTA	19822.	19821.8	76.41	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	521.	520.9	2.01	-	-
ANKISTRODESMUS FALCATUS	321.	320.6	1.24	-	-

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ABUNDANS	280.	280.5	1.08	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	214.	213.7	0.82	-	-
ANKISTRODESMUS SPIRALIS	160.	160.3	0.62	-	-
DICTYOSPHAERIUM PULCHELLUM	160.	160.3	0.62	-	-
CRUCIGENIA APICULATA	107.	106.9	0.41	-	-
OOCYSTIS GLOEOCYSTIFORMIS	107.	106.9	0.41	-	-
SCENEDESMUS OPOLIENSIS	80.	80.1	0.31	-	-
SCENEDESMUS LONGUS	80.	80.1	0.31	-	-
KIRCHNERIELLA LUNARIS	67.	66.8	0.26	-	-
CLOSTERIOPSIS LONGISSIMA VAR. TROPICA	53.	53.4	0.21	-	-
TOTAL NON-FILAMENTOUS	2150.	2150.5	8.29	-	-
TOTAL CHLOROPHYTA	2150.	2150.5	8.29	-	-
CHRYSOPHYTA					
DINOBRYON SOCIALE	321.	320.6	1.24	-	-
TOTAL CHRYSOPHYTA	321.	320.6	1.24	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	1336.	1335.7	5.15	-	-
MICROCYSTIS AERUGINOSA	107.	106.9	0.41	-	-
TOTAL NON-FILAMENTOUS	1443.	1442.6	5.56	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1667.	1667.0	6.43	-	-
ANABAENA FLOS-AQUAE	379.	379.3	1.46	-	-
TOTAL FILAMENTOUS	2046.	2046.3	7.89	-	-

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CYANOPHYTA	3489.	3488.9	13.45	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	107.	106.9	0.41	-	-
TOTAL EUGLENOPHYTA	107.	106.9	0.41	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	53.	53.4	0.21	-	-
TOTAL CRYPTOPHYTA	53.	53.4	0.21	-	-
TOTAL PHYTOPLANKTON	25942.	25942.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

SUMMARY OF [illegible]TOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCUR[illegible]CE
PROJECT NO: [illegible]L11 STATION: 3 COLLECTION DATE: 21-OCT-81 SCOPE TYPE: INVERTED

TABLE B-20 (CONT.)

IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	9564.	9563.6	34.16	-	-
STEPHANODISCUS INVISITATUS	4541.	4541.4	16.22	-	-
CYCLOTELLA MENEGHINIANA	695.	694.6	2.48	-	-
STEPHANODISCUS NIAGARAE	641.	641.1	2.29	-	-
SKELETONEMA POTAMOS	588.	587.7	2.10	-	
MELOSIRA VARIANS	267.	267.1	0.95	-	-
TOTAL CENTRALES	16296.	16295.5	58.21	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1336.	1335.7	4.77	-	-
NITZSCHIA PALEA	801.	801.4	2.86	-	-
ASTERIONELLA FORMOSA	267.	267.1	0.95	-	-
NAVICULA LANCEOLATA	214.	213.7	0.76	-	-
NITZSCHIA LINEARIS	160.	160.3	0.57	-	-
NITZSCHIA DISSIPATA	107.	106.9	0.38	-	-
NAVICULA CRYPTOCEPHALA	107.	106.9	0.38	-	-
GYROSIGMA SCALPROIDES	107.	106.9	0.38	-	-
NAVICULA DECUSSIS	53.	53.4	0.19	-	-
NAVICULA CITRUS	53.	53.4	0.19	-	-
NAVICULA VIRIDULA	53.	53.4	0.19	-	-
NITZSCHIA FRUSTULUM	53.	53.4	0.19	-	-
NAVICULA RADIOSA	53.	53.4	0.19	-	-
NITZSCHIA SIGMOIDEA	53.	53.4	0.19	-	-
TOTAL PENNALES	3419.	3419.4	12.21	-	-
TOTAL BACILLARIOPHYTA	19715.	19714.9	70.42	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	695.	694.6	2.48	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 21-OCT-81 SCOPE TYPE: INVERTED

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	427.	427.4	1.53	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	427.	427.4	1.53	-	-
ANKISTRODESMUS SPIRALIS	321.	320.6	1.15	-	-
DICTYOSPHAERIUM PULCHELLUM	267.	267.1	0.95	-	-
SCENEDESMUS ABUNDANS	240.	240.4	0.86	-	-
COELASTRUM SPHAERICUM	214.	213.7	0.76	-	-
SCENEDESMUS OPOLIENSIS	134.	133.6	0.48	-	-
LAGERHEIMIA CILIATA	53.	53.4	0.19	-	-
TOTAL NON-FILAMENTOUS	2778.	2778.3	9.92	-	-
TOTAL CHLOROPHYTA	2778.	2778.3	9.92	-	-
CHRYSOPHYTA					
CODONOSIGA	267.	267.1	0.95	-	-
TOTAL CHRYSOPHYTA	267.	267.1	0.95	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	1710.	1709.7	6.11	-	-
MERISMOPEDIA TENUISSIMA	855.	854.8	3.05	-	-
TOTAL NON-FILAMENTOUS	2565.	2564.5	9.16	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	2153.	2153.1	7.69	-	-
APHANIZOMENON FLOS-AQUAE	171.	171.0	0.61	-	-
ANABAENA FLOS-AQUAE	134.	133.6	0.48	-	-
TOTAL FILAMENTOUS	2458.	2457.7	8.78	-	-

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CYANOPHYTA	5022.	5022.2	17.94	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	107.	106.9	0.38	-	-
TOTAL EUGLENOPHYTA	107.	106.9	0.38	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	107.	106.9	0.38	-	-
TOTAL CRYPTOPHYTA	107.	106.9	0.38	-	-
TOTAL PHYTOPLANKTON	27996.	27996.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

SUMMARY ... PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 21-OCT-81 SCOPE TYPE: INVERTED

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS TENUIS	10846.	10845.9	39.3[illegible]	-	-
STEPHANODISCUS INVISITATUS	3580.	3579.7	12.99	-	-
SKELETONEMA POTAMOS	801.	801.4	2.91	-	-
STEPHANODISCUS NIAGARAE	534.	534.3	1.94	-	-
CYCLOTELLA MENEGHINIANA	321.	320.6	1.16	-	-
MELOSIRA AMBIGUA	214.	213.7	0.78	-	-
TOTAL CENTRALES	16296.	16295.5	59.14	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	1977.	1976.8	7.17	-	-
NITZSCHIA PALEA	695.	694.6	2.52	-	-
ASTERIONELLA FORMOSA	321.	320.6	1.16	-	-
NAVICULA CRYPTOCEPHALA	267.	267.1	0.97	-	-
NAVICULA LANCEOLATA	160.	160.3	0.58	-	-
NITZSCHIA LINEARIS	160.	160.3	0.58	-	-
NAVICULA DECUSSIS	107.	106.9	0.39	-	-
SYNEDRA ULNA	107.	106.9	0.39	-	-
GYROSIGMA SCALPROIDES	53.	53.4	0.19	-	-
NITZSCHIA DISSIPATA	53.	53.4	0.19	-	-
NAVICULA CITRUS	53.	53.4	0.19	-	-
DIATOMA VULGARE	53.	53.4	0.19	-	-
SURIRELLA ANGUSTA	53.	53.4	0.19	-	-
NAVICULA VIRIDULA	53.	53.4	0.19	-	-
TOTAL PENNALES	4114.	4114.0	14.93	-	-
TOTAL BACILLARIOPHYTA	20410.	20409.5	74.07	-	-
CHLOROPHYTA NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	748.	748.0	2.71	-	-

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	427.	427.4	1.55	-	-
SCENEDESMUS ABUNDANS	347.	347.3	1.26	-	-
DICTYOSPHAERIUM PULCHELLUM	214.	213.7	0.78	-	-
SCENEDESMUS OPOLIENSIS	187.	187.0	0.68	-	-
ANKISTRODESMUS SPIRALIS	160.	160.3	0.58	-	-
SCENEDESMUS DIMORPHUS	120.	120.2	0.44	-	-
KIRCHNERIELLA LUNARIS	107.	106.9	0.39	-	-
SCENEDESMUS QUADRICAUDA	80.	80.1	0.29	-	-
SCENEDESMUS LONGUS	80.	80.1	0.29	-	-
LAGERHEIMIA CILIATA	53.	53.4	0.19	-	-
TOTAL NON-FILAMENTOUS	2524.	2524.5	9.16	-	-
TOTAL CHLOROPHYTA	2524.	2524.5	9.16	-	-
CHRYSOPHYTA					
CODONOSIGA	855.	854.8	3.10	-	-
DINOBRYON SOCIALE	160.	160.3	0.58	-	-
TOTAL CHRYSOPHYTA	1015.	1015.1	3.68	-	-
CYANOPHYTA NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	855.	854.8	3.10	-	-
MICROCYSTIS AERUGINOSA	160.	160.3	0.58	-	-
TOTAL NON-FILAMENTOUS	1015.	1015.1	3.68	-	-
CYANOPHYTA FILAMENTOUS					
OSCILLATORIA TENUIS	1950.	1950.1	7.08	-	-
APHANIZOMENON FLOS-AQUAE	305.	304.5	1.11	-	-
ANABAENA FLOS-AQUAE	176.	176.3	0.64	-	-

TABLE B-20 (CONT.)

IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL FILAMENTOUS	2431.	2431.0	8.82	-	-
TOTAL CYANOPHYTA	3446.	3446.1	12.51	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	53.	53.4	0.19	-	-
TOTAL EUGLENOPHYTA	53.	53.4	0.19	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	107.	106.9	0.39	-	-
TOTAL CRYPTOPHYTA	107.	106.9	0.39	-	-
TOTAL PHYTOPLANKTON	27555.	27555.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	40				

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS TENUIS	10258.	10258.2	40.12	-	-
STEPHANODISCUS INVISITATUS	4167.	4167.4	16.30	-	-
CYCLOTELLA MENEGHINIANA	962.	961.7	3.76	-	-
STEPHANODISCUS NIAGARAE	641.	641.1	2.51	-	-
SKELETONEMA POTAMOS	427.	427.4	1.67	-	-
MELOSIRA GRANULATA	160.	160.3	0.63	-	-
TOTAL CENTRALES	16616.	16616.1	64.99	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	962.	961.7	3.76	-	-
NITZSCHIA PALEA	534.	534.3	2.09	-	-
NAVICULA CRYPTOCEPHALA	160.	160.3	0.63	-	-
FRUSTULIA RHOMBOIDES	107.	106.9	0.42	-	-
NAVICULA RADIOSA	107.	106.9	0.42	-	-
SYNEDRA ULNA	107.	106.9	0.42	-	-
NAVICULA LANCEOLATA	107.	106.9	0.42	-	-
NAVICULA DECUSSIS	53.	53.4	0.21	-	-
NAVICULA VIRIDULA	53.	53.4	0.21	-	-
NITZSCHIA ANGUSTATA	53.	53.4	0.21	-	-
NITZSCHIA LINEARIS	53.	53.4	0.21	-	-
GYROSIGMA SCALPROIDES	53.	53.4	0.21	-	-
NITZSCHIA HANTZSCHIANA	53.	53.4	0.21	-	-
SYNEDRA RADIANS	53.	53.4	0.21	-	-
NAVICULA CITRUS	53.	53.4	0.21	-	-
TOTAL PENNALES	2511.	2511.1	9.82	-	-
TOTAL BACILLARIOPHYTA	19127.	19127.2	74.81	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	588.	587.7	2.30	-	-

SUMMARY of PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 21-OCT-81 SCOPE TYPE: INVERTED

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	467.	467.5	1.83	-	-
PEDIASTRUM DUPLEX VAR. RETICULATUM	427.	427.4	1.67	-	-
SCENEDESMUS ABUNDANS	227.	227.1	0.89	-	-
ANKISTRODESMUS SPIRALIS	214.	213.7	0.84	-	-
TETRASTRUM STAUROGENIAEFORME	214.	213.7	0.84	-	-
SCENEDESMUS OPOLIENSIS	187.	187.0	0.73	-	-
DICTYOSPHAERIUM PULCHELLUM	160.	160.3	0.63	-	-
SCENEDESMUS LONGUS	134.	133.6	0.52	-	-
CRUCIGENIA APICULATA	107.	106.9	0.42	-	-
SCENEDESMUS DIMORPHUS	80.	80.1	0.31	-	-
SCENEDESMUS QUADRICAUDA	67.	66.8	0.26	-	-
SCENEDESMUS BERNARDII	53.	53.4	0.21	-	-
TOTAL NON-FILAMENTOUS	2925.	2925.2	11.44	-	-
TOTAL CHLOROPHYTA	2925.	2925.2	11.44	-	-
CYANOPHYTA					
NON-FILAMENTOUS					
COELOSPHAERIUM NAEGELIANUM	2030.	2030.3	7.94	-	-
MICROCYSTIS AERUGINOSA	107.	106.9	0.42	-	-
TOTAL NON-FILAMENTOUS	2137.	2137.1	8.36	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	1207.	1207.5	4.72	-	-
ANABAENA FLOS-AQUAE	118.	117.5	0.46	-	-
TOTAL FILAMENTOUS	1325.	1325.0	5.18	-	-
TOTAL CYANOPHYTA	3462.	3462.1	13.54	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	53.	53.4	0.21	-	-

TABLE B-20 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CRYPTOPHYTA	53.	53.4	0.21	-	-
TOTAL PHYTOPLANKTON	25568.	25568.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

TABLE B-21

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	8568.	8567.9	42.73	-	-
STEPHANODISCUS TENUIS	4488.	4488.0	22.38	-	-
MELOSIRA GRANULATA	306.	306.0	1.53	-	-
CYCLOTELLA MENEGHINIANA	136.	136.0	0.68	-	-
STEPHANODISCUS NIAGARAE	102.	102.0	0.51	-	-
STEPHANODISCUS SPP.	68.	68.0	0.34	-	-
SKELETONEMA POTAMOS	68.	68.0	0.34	-	-
TOTAL CENTRALES	13736.	13735.9	68.50	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	1700.	1700.0	8.48	-	-
NITZSCHIA LINEARIS	816.	816.0	4.07	-	-
NITZSCHIA PALEA	646.	646.0	3.22	-	-
ASTERIONELLA FORMOSA	136.	136.0	0.68	-	-
GOMPHONEMA PARVULUM	102.	102.0	0.51	-	-
DIATOMA VULGARE	102.	102.0	0.51	-	-
NAVICULA TRIPUNCTATA	102.	102.0	0.51	-	-
SYNEDRA ULNA	68.	68.0	0.34	-	-
NAVICULA DECUSSIS	68.	68.0	0.34	-	-
NITZSCHIA DISSIPATA	68.	68.0	0.34	-	-
GOMPHONEMA ANGUSTATUM	34.	34.0	0.17	-	-
NAVICULA SPP.	34.	34.0	0.17	-	-
NAVICULA PUPULA	34.	34.0	0.17	-	-
NAVICULA RADIOSA	34.	34.0	0.17	-	-
TOTAL PENNALES	3944.	3944.0	19.67	-	-
TOTAL BACILLARIOPHYTA	17680.	17679.8	88.17	-	-
CHLOROPHYTA NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	484.	484.5	2.42	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 4-NOV-8[illegible] SCOPE TYPE: INVERTED

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
DICTYOSPHAERIUM PULCHELLUM	459.	459.0	2.29	-	-
ANKISTRODESMUS FALCATUS	272.	272.0	1.36	-	-
SCENEDESMUS OPOLIENSIS	127.	127.5	0.64	-	-
SCENEDESMUS DENTICULATUS	85.	85.0	0.42	-	-
SCENEDESMUS ABUNDANS	76.	76.5	0.38	-	-
ANKISTRODESMUS SPIRALIS	68.	68.0	0.34	-	-
SCENEDESMUS DIMORPHUS	51.	51.0	0.25	-	-
TOTAL NON-FILAMENTOUS	1623.	1623.5	8.10	-	-
TOTAL CHLOROPHYTA	1623.	1623.5	8.10	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	629.	629.0	3.14	-	-
APHANIZOMENON FLOS-AQUAE	51.	51.0	0.25	-	-
TOTAL FILAMENTOUS	680.	680.0	3.39	-	-
TOTAL CYANOPHYTA	680.	680.0	3.39	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	34.	34.0	0.17	-	-
TOTAL EUGLENOPHYTA	34.	34.0	0.17	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	34.	34.0	0.17	-	-
TOTAL CRYPTOPHYTA	34.	34.0	0.17	-	-
TOTAL PHYTOPLANKTON	20051.	20051.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	6664.	6663.9	35.20	-	-
STEPHANODISCUS TENUIS	5746.	5745.9	30.35	-	-
MELOSIRA GRANULATA	510.	510.0	2.69	-	-
STEPHANODISCUS NIAGARAE	306.	306.0	1.62	-	-
MELOSIRA VARIANS	102.	102.0	0.54	-	-
CYCLOTELLA MENEGHINIANA	68.	68.0	0.36	-	-
TOTAL CENTRALES	13396.	13395.9	70.76	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	1360.	1360.0	7.18	-	-
NITZSCHIA LINEARIS	612.	612.0	3.23	-	-
NITZSCHIA PALEA	306.	306.0	1.62	-	-
ASTERIONELLA FORMOSA	102.	102.0	0.54	-	-
GOMPHONEMA PARVULUM	68.	68.0	0.36	-	-
DIATOMA VULGARE	68.	68.0	0.36	-	-
NAVICULA TRIPUNCTATA	68.	68.0	0.36	-	-
NAVICULA SPP.	68.	68.0	0.36	-	-
NAVICULA CRYPTOCEPHALA	68.	68.0	0.36	-	-
NAVICULA CAPITATA	34.	34.0	0.18	-	-
NAVICULA HEUFLERI	34.	34.0	0.18	-	-
NITZSCHIA DISSIPATA	34.	34.0	0.18	-	-
NAVICULA DECUSSIS	34.	34.0	0.18	-	-
SURIRELLA SPP.	34.	34.0	0.18	-	-
TOTAL PENNALES	2890.	2890.0	15.27	-	-
TOTAL BACILLARIOPHYTA	16286.	16285.8	86.03	-	-
CHLOROPHYTA NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	765.	765.0	4.04	-	-

SUMMARY O[illegible]HYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCC[illegible]ENCE
PROJECT N[illegible]IEL11 STATION: 2 COLLECTION DATE: 4-NOV-8[illegible] SCOPE TYPE: INVERTED

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	280.	280.5	1.48	-	-
PEDIASTRUM BORYANUM	272.	272.0	1.44	-	-
ANKISTRODESMUS FALCATUS	170.	170.0	0.90	-	-
COELASTRUM CAMBRICUM	136.	136.0	0.72	-	-
SCENEDESMUS DENTICULATUS	119.	119.0	0.63	-	-
SCENEDESMUS OPOLIENSIS	110.	110.5	0.58	-	-
LAGERHEIMIA QUADRISETA	68.	68.0	0.36	-	-
ANKISTRODESMUS SPIRALIS	68.	68.0	0.36	-	-
SCENEDESMUS ABUNDANS	68.	68.0	0.36	-	-
SCENEDESMUS INTERMEDIUS	51.	51.0	0.27	-	-
SCENEDESMUS QUADRICAUDA	34.	34.0	0.18	-	-
TOTAL NON-FILAMENTOUS	2142.	2142.0	11.31	-	-
TOTAL CHLOROPHYTA	2142.	2142.0	11.31	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	296.	295.8	1.56	-	-
ANABAENA FLOS-AQUAE	71.	71.4	0.38	-	-
TOTAL FILAMENTOUS	367.	367.2	1.94	-	-
TOTAL CYANOPHYTA	367.	367.2	1.94	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	136.	136.0	0.72	-	-
TOTAL CRYPTOPHYTA	136.	136.0	0.72	-	-
TOTAL PHYTOPLANKTON	18931.	18931.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	35				

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	7140.	7139.9	40.09	-	-
STEPHANODISCUS TENUIS	3740.	3740.0	21.00	-	-
MELOSIRA GRANULATA	408.	408.0	2.29	-	-
STEPHANODISCUS NIAGARAE	374.	374.0	2.10	-	-
CYCLOTELLA MENEGHINIANA	102.	102.0	0.57	-	-
MELOSIRA VARIANS	68.	68.0	0.38	-	-
SKELETONEMA POTAMOS	68.	68.0	0.38	-	-
TOTAL CENTRALES	11900.	11899.9	66.82	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1054.	1054.0	5.92	-	-
NITZSCHIA PALEA	544.	544.0	3.05	-	-
NITZSCHIA LINEARIS	510.	510.0	2.86	-	-
GOMPHONEMA PARVULUM	340.	340.0	1.91	-	-
NAVICULA SPP.	102.	102.0	0.57	-	-
DIATOMA VULGARE	68.	68.0	0.38	-	-
NAVICULA PUPULA	68.	68.0	0.38	-	-
NAVICULA TRIPUNCTATA	68.	68.0	0.38	-	-
ASTERIONELLA FORMOSA	68.	68.0	0.38	-	-
NAVICULA DECUSSIS	68.	68.0	0.38	-	-
NAVICULA CUSPIDATA	34.	34.0	0.19	-	-
NAVICULA RADIOSA	34.	34.0	0.19	-	-
NITZSCHIA DISSIPATA	34.	34.0	0.19	-	-
NAVICULA CRYPTOCEPHALA	34.	34.0	0.19	-	-
SYNEDRA ULNA	34.	34.0	0.19	-	-
TOTAL PENNALES	3060.	3060.0	17.18	-	-
TOTAL BACILLARIOPHYTA	14960.	14959.8	84.00	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	578.	578.0	3.25	-	-

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PEDIASTRUM DUPLEX VAR. RETICULATUM	408.	408.0	2.29	-	-
SCENEDESMUS ACUMINATUS	391.	391.0	2.20	-	-
DICTYOSPHAERIUM PULCHELLUM	272.	272.0	1.53	-	-
SCENEDESMUS OPOLIENSIS	246.	246.5	1.38	-	-
ANKISTRODESMUS SPIRALIS	204.	204.0	1.15	-	-
SCENEDESMUS ABUNDANS	161.	161.5	0.91	-	-
PEDIASTRUM TETRAS	136.	136.0	0.76	-	-
SCENEDESMUS DENTICULATUS	102.	102.0	0.57	-	-
LAGERHEIMIA CILIATA	34.	34.0	0.19	-	-
TOTAL NON-FILAMENTOUS	2533.	2533.0	14.22	-	-
TOTAL CHLOROPHYTA	2533.	2533.0	14.22	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	78.	78.2	0.44	-	-
TOTAL FILAMENTOUS	78.	78.2	0.44	-	-
TOTAL CYANOPHYTA	78.	78.2	0.44	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	68.	68.0	0.38	-	-
EUGLENA SPP.	34.	34.0	0.19	-	-
TOTAL EUGLENOPHYTA	102.	102.0	0.57	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	136.	136.0	0.76	-	-
TOTAL CRYPTOPHYTA	136.	136.0	0.76	-	-
TOTAL PHYTOPLANKTON	17809.	17809.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	36				

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	7752.	7751.9	39.95	-	-
STEPHANODISCUS TENUIS	5236.	5235.9	26.98	-	-
MELOSIRA GRANULATA	612.	612.0	3.15	-	-
STEPHANODISCUS NIAGARAE	238.	238.0	1.23	-	-
SKELETONEMA POTAMOS	136.	136.0	0.70	-	-
CYCLOTELLA MENEGHINIANA	68.	68.0	0.35	-	-
TOTAL CENTRALES	14042.	14041.9	72.37	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1326.	1326.0	6.83	-	-
NITZSCHIA LINEARIS	578.	578.0	2.98	-	-
NITZSCHIA PALEA	442.	442.0	2.28	-	-
GOMPHONEMA PARVULUM	102.	102.0	0.53	-	-
DIATOMA VULGARE	68.	68.0	0.35	-	-
SYNEDRA RADIANS	68.	68.0	0.35	-	-
ASTERIONELLA FORMOSA	68.	68.0	0.35	-	-
NAVICULA CRYPTOCEPHALA	68.	68.0	0.35	-	-
NAVICULA SPP.	68.	68.0	0.35	-	-
NAVICULA TRIPUNCTATA	34.	34.0	0.18	-	-
NAVICULA DECUSSIS	34.	34.0	0.18	-	-
NITZSCHIA DISSIPATA	34.	34.0	0.18	-	-
NAVICULA LANCEOLATA	34.	34.0	0.18	-	-
NAVICULA PUPULA	34.	34.0	0.18	-	-
NAVICULA RADIOSA	34.	34.0	0.18	-	-
SYNEDRA ULNA	34.	34.0	0.18	-	-
TOTAL PENNALES	3026.	3026.0	15.59	-	-
TOTAL BACILLARIOPHYTA	17068.	17067.8	87.96	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	816.	816.0	4.21	-	-

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	365.	365.5	1.88	-	-
ANKISTRODESMUS FALCATUS	204.	204.0	1.05	-	-
SCENEDESMUS DENTICULATUS	110.	110.5	0.57	-	-
ANKISTRODESMUS SPIRALIS	68.	68.0	0.35	-	-
SCENEDESMUS DIMORPHUS	51.	51.0	0.26	-	-
SCENEDESMUS QUADRICAUDA	42.	42.5	0.22	-	-
SCENEDESMUS OPOLIENSIS	42.	42.5	0.22	-	-
SCENEDESMUS ABUNDANS	34.	34.0	0.18	-	-
LAGERHEIMIA QUADRISETA	34.	34.0	0.18	-	-
TOTAL NON-FILAMENTOUS	1768.	1768.0	9.11	-	-
TOTAL CHLOROPHYTA	1768.	1768.0	9.11	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	456.	455.6	2.35	-	-
APHANIZOMENON FLOS-AQUAE	44.	44.2	0.23	-	-
TOTAL FILAMENTOUS	500.	499.8	2.58	-	-
TOTAL CYANOPHYTA	500.	499.8	2.58	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	68.	68.0	0.35	-	-
TOTAL CRYPTOPHYTA	68.	68.0	0.35	-	-
TOTAL PHYTOPLANKTON	19404.	19403.6	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	35				

SUMMARY ?HYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCC :NCE
PROJECT NO: IEL11 STATION: 5 COLLECTION DATE: 4-NOV-81 SCOPE TYPE: INVERTED

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	6052.	6051.9	32.11	-	-
STEPHANODISCUS TENUIS	3162.	3162.0	16.77	-	-
MELOSIRA GRANULATA	408.	408.0	2.16	-	-
MELOSIRA AMBIGUA	170.	170.0	0.90	-	-
STEPHANODISCUS NIAGARAE	170.	170.0	0.90	-	-
CYCLOTELLA MENEGHINIANA	102.	102.0	0.54	-	-
MELOSIRA VARIANS	68.	68.0	0.36	-	-
TOTAL CENTRALES	10132.	10131.9	53.75	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1496.	1496.0	7.94	-	-
NITZSCHIA LINEARIS	952.	952.0	5.05	-	-
NITZSCHIA PALEA	510.	510.0	2.71	-	-
GOMPHONEMA PARVULUM	306.	306.0	1.62	-	-
ASTERIONELLA FORMOSA	272.	272.0	1.44	-	-
DIATOMA VULGARE	136.	136.0	0.72	-	-
NITZSCHIA DISSIPATA	102.	102.0	0.54	-	-
NAVICULA CRYPTOCEPHALA	102.	102.0	0.54	-	-
NAVICULA LANCEOLATA	68.	68.0	0.36	-	-
SYNEDRA ULNA	68.	68.0	0.36	-	-
SYNEDRA RADIANS	68.	68.0	0.36	-	-
NITZSCHIA HANTZSCHIANA	68.	68.0	0.36	-	-
MERIDION CIRCULARE	34.	34.0	0.18	-	-
NAVICULA DECUSSIS	34.	34.0	0.18	-	-
NITZSCHIA TRYBLIONELLA VAR. VICTORIAE	34.	34.0	0.18	-	-
NITZSCHIA COMMUNIS	34.	34.0	0.18	-	-
NITZSCHIA SIGMOIDEA	34.	34.0	0.18	-	-
NITZSCHIA FRUSTULUM	34.	34.0	0.18	-	-
GOMPHONEMA SPP.	34.	34.0	0.18	-	-
PLEUROSIGMA SPP.	34.	34.0	0.18	-	-
TOTAL PENNALES	4420.	4420.0	23.45	-	-

TABLE B-21 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL BACILLARIOPHYTA	14552.	14551.9	77.20	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	1207.	1207.0	6.40	-	-
SCENEDESMUS ACUMINATUS	527.	527.0	2.80	-	-
ANKISTRODESMUS FALCATUS	510.	510.0	2.71	-	-
PEDIASTRUM BORYANUM	272.	272.0	1.44	-	-
COELASTRUM CAMBRICUM	272.	272.0	1.44	-	-
SCENEDESMUS DENTICULATUS	221.	221.0	1.17	-	-
SCENEDESMUS OPOLIENSIS	178.	178.5	0.95	-	-
ANKISTRODESMUS SPIRALIS	68.	68.0	0.36	-	-
SCENEDESMUS BIJUGA	68.	68.0	0.36	-	-
SCENEDESMUS ARCUATUS	59.	59.5	0.32	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	34.	34.0	0.18	-	-
TOTAL NON-FILAMENTOUS	3417.	3417.0	18.13	-	-
TOTAL CHLOROPHYTA	3417.	3417.0	18.13	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	646.	646.0	3.43	-	-
ANABAENA FLOS-AQUAE	75.	74.8	0.40	-	-
APHANIZOMENON FLOS-AQUAE	58.	57.8	0.31	-	-
TOTAL FILAMENTOUS	779.	778.6	4.13	-	-
TOTAL CYANOPHYTA	779.	778.6	4.13	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	102.	102.0	0.54	-	-
TOTAL CRYPTOPHYTA	102.	102.0	0.54	-	-
TOTAL PHYTOPLANKTON	18849.	18849.4	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	42				

SUMMARY . PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCL .NCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 17-NOV-81 SCOPE TYPE: INVERTED

TABLE B-22

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	20694.	20694.5	54.83	-	-
STEPHANODISCUS TENUIS	7168.	7168.3	18.99	-	-
CYCLOTELLA MENEGHINIANA	623.	623.3	1.65	-	-
MELOSIRA GRANULATA	374.	374.0	0.99	-	-
SKELETONEMA POTAMOS	187.	187.0	0.50	-	-
STEPHANODISCUS NIAGARAE	125.	124.7	0.33	-	-
MELOSIRA VARIANS	125.	124.7	0.33	-	-
TOTAL CENTRALES	29296.	29296.4	77.62	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1496.	1496.0	3.96	-	-
NITZSCHIA LINEARIS	499.	498.7	1.32	-	-
NITZSCHIA HANTZSCHIANA	312.	311.7	0.83	-	-
NITZSCHIA PALEA	249.	249.3	0.66	-	-
NAVICULA CRYPTOCEPHALA	249.	249.3	0.66	-	-
DIATOMA VULGARE	187.	187.0	0.50	-	-
ASTERIONELLA FORMOSA	187.	187.0	0.50	-	-
NITZSCHIA DISSIPATA	125.	124.7	0.33	-	-
NAVICULA LANCEOLATA	125.	124.7	0.33	-	-
SYNEDRA ULNA	125.	124.7	0.33	-	-
SYNEDRA RADIANS	125.	124.7	0.33	-	-
NAVICULA SPP.	125.	124.7	0.33	-	-
NAVICULA DECUSSIS	62.	62.3	0.17	-	-
NAVICULA CUSPIDATA	62.	62.3	0.17	-	-
NAVICULA PUPULA	62.	62.3	0.17	-	-
NITZSCHIA FRUSTULUM	62.	62.3	0.17	-	-
NAVICULA MUTICA	62.	62.3	0.17	-	-
NITZSCHIA ANGUSTATA	62.	62.3	0.17	-	-
TOTAL PENNALES	4176.	4176.3	11.06	-	-
TOTAL BACILLARIOPHYTA	33473.	33472.7	88.68	-	-

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHLOROPHYTA					
NON-FILAMENTOUS					
COELASTRUM CAMBRICUM	997.	997.3	2.64	-	-
SCENEDESMUS ACUMINATUS	779.	779.2	2.06	-	-
ANKISTRODESMUS FALCATUS	499.	498.7	1.32	-	-
DICTYOSPHAERIUM PULCHELLUM	280.	280.5	0.74	-	-
SCENEDESMUS ABUNDANS	171.	171.4	0.45	-	-
COELASTRUM SPHAERICUM	156.	155.8	0.41	-	-
SCENEDESMUS OPOLIENSIS	156.	155.8	0.41	-	-
SCENEDESMUS DENTICULATUS	140.	140.2	0.37	-	-
SCENEDESMUS INTERMEDIUS	93.	93.5	0.25	-	-
SCENEDESMUS LONGUS	78.	77.9	0.21	-	-
TOTAL NON-FILAMENTOUS	3350.	3350.4	8.88	-	-
TOTAL CHLOROPHYTA	3350.	3350.4	8.88	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	393.	392.7	1.04	-	-
APHANIZOMENON FLOS-AQUAE	212.	211.9	0.56	-	-
ANABAENA FLOS-AQUAE	193.	193.2	0.51	-	-
TOTAL FILAMENTOUS	798.	797.9	2.11	-	-
TOTAL CYANOPHYTA	798.	797.9	2.11	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	125.	124.7	0.33	-	-
TOTAL EUGLENOPHYTA	125.	124.7	0.33	-	-
TOTAL PHYTOPLANKTON	37746.	37745.6	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	39				

SUMMARY PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCC :ENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 17-NOV-81 SCOPE ??PE: INVERTED

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	18388.	18388.1	50.30	-	-
STEPHANODISCUS TENUIS	7667.	7666.9	20.97	-	-
STEPHANODISCUS NIAGARAE	312.	311.7	0.85	-	-
CYCLOTELLA MENEGHINIANA	187.	187.0	0.51	-	-
MELOSIRA GRANULATA	187.	187.0	0.51	-	-
MELOSIRA VARIANS	125.	124.7	0.34	-	-
TOTAL CENTRALES	26865.	26865.4	73.49	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1247.	1246.7	3.41	-	-
ASTERIONELLA FORMOSA	1122.	1122.0	3.07	-	-
NITZSCHIA PALEA	561.	561.0	1.53	-	-
NAVICULA SPP.	249.	249.3	0.68	-	-
GOMPHONEMA PARVULUM	187.	187.0	0.51	-	-
DIATOMA VULGARE	187.	187.0	0.51	-	-
NAVICULA LANCEOLATA	187.	187.0	0.51	-	-
NAVICULA CRYPTOCEPHALA	125.	124.7	0.34	-	-
SURIRELLA OVATA	125.	124.7	0.34	-	-
SYNEDRA ULNA	125.	124.7	0.34	-	-
NITZSCHIA DISSIPATA	62.	62.3	0.17	-	-
NAVICULA CAPITATA	62.	62.3	0.17	-	-
NAVICULA DECUSSIS	62.	62.3	0.17	-	-
SYNEDRA RADIANS	62.	62.3	0.17	-	-
NITZSCHIA TRYBLIONELLA VAR. VICTORIAE	62.	62.3	0.17	-	-
TOTAL PENNALES	4426.	4425.6	12.11	-	-
TOTAL BACILLARIOPHYTA	31291.	31291.0	85.59	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	935.	935.0	2.56	-	-

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	701.	701.2	1.92	-	-
DICTYOSPHAERIUM PULCHELLUM	545.	545.4	1.49	-	-
PEDIASTRUM BORYANUM	499.	498.7	1.36	-	-
COELASTRUM CAMBRICUM	499.	498.7	1.36	-	-
SCENEDESMUS OPOLIENSIS	343.	342.8	0.94	-	-
SCENEDESMUS ABUNDANS	187.	187.0	0.51	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	156.	155.8	0.43	-	-
ANKISTRODESMUS SPIRALIS	125.	124.7	0.34	-	-
SCENEDESMUS DENTICULATUS	125.	124.7	0.34	-	-
SCENEDESMUS DIMORPHUS	78.	77.9	0.21	-	-
SCENEDESMUS QUADRICAUDA	62.	62.3	0.17	-	-
TOTAL NON-FILAMENTOUS	4254.	4254.2	11.64	-	-
TOTAL CHLOROPHYTA	4254.	4254.2	11.64	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	654.	654.5	1.79	-	-
APHANIZOMENON FLOS-AQUAE	171.	171.4	0.47	-	-
TOTAL FILAMENTOUS	826.	825.9	2.26	-	-
TOTAL CYANOPHYTA	826.	825.9	2.26	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	62.	62.3	0.17	-	-
TOTAL EUGLENOPHYTA	62.	62.3	0.17	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	125.	124.7	0.34	-	-
TOTAL CRYPTOPHYTA	125.	124.7	0.34	-	-
TOTAL PHYTOPLANKTON	36558.	36558.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	21442.	21442.4	50.93	-	-
STEPHANODISCUS TENUIS	8789.	8788.9	20.88	-	-
MELOSIRA GRANULATA	312.	311.7	0.74	-	-
SKELETONEMA POTAMOS	312.	311.7	0.74	-	-
CYCLOTELLA MENEGHINIANA	187.	187.0	0.44	-	-
STEPHANODISCUS NIAGARAE	187.	187.0	0.44	-	-
TOTAL CENTRALES	31229.	31228.7	74.18	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	1745.	1745.3	4.15	-	-
ASTERIONELLA FORMOSA	935.	935.0	2.22	-	-
NITZSCHIA SPP.	312.	311.7	0.74	-	-
NAVICULA SPP.	249.	249.3	0.59	-	-
NITZSCHIA PALEA	249.	249.3	0.59	-	-
NITZSCHIA LINEARIS	187.	187.0	0.44	-	-
NAVICULA LANCEOLATA	187.	187.0	0.44	-	-
NAVICULA CRYPTOCEPHALA	125.	124.7	0.30	-	-
NAVICULA DECUSSIS	125.	124.7	0.30	-	-
NITZSCHIA HANTZSCHIANA	125.	124.7	0.30	-	-
NAVICULA CUSPIDATA	62.	62.3	0.15	-	-
NITZSCHIA DISSIPATA	62.	62.3	0.15	-	-
NITZSCHIA PSEUDOFONTICOLA	62.	62.3	0.15	-	-
NITZSCHIA ANGUSTATA	62.	62.3	0.15	-	-
TOTAL PENNALES	4488.	4488.0	10.66	-	-
TOTAL BACILLARIOPHYTA	35717.	35716.6	84.84	-	-
CHLOROPHYTA NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	1215.	1215.5	2.89	-	-

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	1091.	1090.8	2.59	-	-
ANKISTRODESMUS FALCATUS	686.	685.7	1.63	-	-
SCENEDESMUS OPOLIENSIS	577.	576.6	1.37	-	-
PEDIASTRUM BORYANUM	499.	498.7	1.18	-	-
ANKISTRODESMUS SPIRALIS	312.	311.7	0.74	-	-
SCENEDESMUS ABUNDANS	171.	171.4	0.41	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	125.	124.7	0.30	-	-
SCENEDESMUS DENTICULATUS	93.	93.5	0.22	-	-
SCENEDESMUS LONGUS	62.	62.3	0.15	-	-
TOTAL NON-FILAMENTOUS	4831.	4830.8	11.47	-	-
TOTAL CHLOROPHYTA	4831.	4830.8	11.47	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	885.	885.1	2.10	-	-
APHANIZOMENON FLOS-AQUAE	199.	199.5	0.47	-	-
ANABAENA FLOS-AQUAE	93.	93.5	0.22	-	-
TOTAL FILAMENTOUS	1178.	1178.1	2.80	-	-
TOTAL CYANOPHYTA	1178.	1178.1	2.80	-	-
EUGLENOPHYTA					
EUGLENA POLYMORPHA	62.	62.3	0.15	-	-
PHACUS SPP.	62.	62.3	0.15	-	-
TOTAL EUGLENOPHYTA	125.	124.7	0.30	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	249.	249.3	0.59	-	-
TOTAL CRYPTOPHYTA	249.	249.3	0.59	-	-
TOTAL PHYTOPLANKTON	42100.	42099.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	36				

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	19697.	19697.1	58.40	-	-
STEPHANODISCUS TENUIS	5548.	5547.6	16.45	-	-
SKELETONEMA POTAMOS	748.	748.0	2.22	-	-
CYCLOTELLA MENEGHINIANA	187.	187.0	0.55	-	-
STEPHANODISCUS NIAGARAE	125.	124.7	0.37	-	-
TOTAL CENTRALES	26304.	26304.4	78.00	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	1371.	1371.3	4.07	-	-
ASTERIONELLA FORMOSA	810.	810.3	2.40	-	-
NITZSCHIA LINEARIS	374.	374.0	1.11	-	-
NITZSCHIA PSEUDOFONTICULA	312.	311.7	0.92	-	-
NITZSCHIA HANTZSCHIANA	249.	249.3	0.74	-	-
NITZSCHIA PALEA	249.	249.3	0.74	-	-
NITZSCHIA DISSIPATA	125.	124.7	0.37	-	-
NAVICULA RADIOSA	125.	124.7	0.37	-	-
NAVICULA TRIPUNCTATA	125.	124.7	0.37	-	-
NITZSCHIA ANGUSTATA	62.	62.3	0.18	-	-
NAVICULA DECUSSIS	62.	62.3	0.18	-	-
DIATOMA VULGARE	62.	62.3	0.18	-	-
GOMPHONEMA PARVULUM	62.	62.3	0.18	-	-
SURIRELLA OVATA	62.	62.3	0.18	-	-
SYNEDRA ULNA	62.	62.3	0.18	-	-
TOTAL PENNALES	4114.	4114.0	12.20	-	-
TOTAL BACILLARIOPHYTA	30418.	30418.4	90.20	-	-
CHLOROPHYTA NON-FILAMENTOUS					
PEDIASTRUM BORYANUM	499.	498.7	1.48	-	-

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	405.	405.2	1.20	-	-
ANKISTRODESMUS FALCATUS	374.	374.0	1.11	-	-
DICTYOSPHAERIUM PULCHELLUM	374.	374.0	1.11	-	-
ANKISTRODESMUS SPIRALIS	187.	187.0	0.55	-	-
SCENEDESMUS OPOLIENSIS	171.	171.4	0.51	-	-
SCENEDESMUS ABUNDANS	140.	140.2	0.42	-	-
COELASTRUM CAMBRICUM	125.	124.7	0.37	-	-
SCENEDESMUS INTERMEDIUS	78.	77.9	0.23	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	62.	62.3	0.18	-	-
TOTAL NON-FILAMENTOUS	2415.	2415.4	7.16	-	-
TOTAL CHLOROPHYTA	2415.	2415.4	7.16	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	636.	635.8	1.89	-	-
APHANIZOMENON FLOS-AQUAE	69.	68.6	0.20	-	-
TOTAL FILAMENTOUS	704.	704.4	2.09	-	-
TOTAL CYANOPHYTA	704.	704.4	2.09	-	-
EUGLENOPHYTA					
EUGLENA SPP.	125.	124.7	0.37	-	-
EUGLENA POLYMORPHA	62.	62.3	0.18	-	-
TOTAL EUGLENOPHYTA	187.	187.0	0.55	-	-
TOTAL PHYTOPLANKTON	33725.	33725.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	34				

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	19198.	19198.5	50.88	-	-
STEPHANODISCUS TENUIS	6981.	6981.3	18.50	-	-
MELOSIRA GRANULATA	748.	748.0	1.98	-	-
CYCLOTELLA MENEGHINIANA	374.	374.0	0.99	-	-
STEPHANODISCUS NIAGARAE	312.	311.7	0.83	-	-
SKELETONEMA POTAMOS	249.	249.3	0.66	-	-
MELOSIRA VARIANS	62.	62.3	0.17	-	-
TOTAL CENTRALES	27925.	27925.0	74.01	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1309.	1309.0	3.47	-	-
ASTERIONELLA FORMOSA	997.	997.3	2.64	-	-
GOMPHONEMA PARVULUM	436.	436.3	1.16	-	-
NITZSCHIA LINEARIS	436.	436.3	1.16	-	-
NITZSCHIA PALEA	312.	311.7	0.83	-	-
DIATOMA VULGARE	187.	187.0	0.50	-	-
NAVICULA CRYPTOCEPHALA	187.	187.0	0.50	-	-
NAVICULA DECUSSIS	125.	124.7	0.33	-	-
NAVICULA LANCEOLATA	125.	124.7	0.33	-	-
NITZSCHIA DISSIPATA	125.	124.7	0.33	-	-
NAVICULA TRIPUNCTATA	125.	124.7	0.33	-	-
NAVICULA EXIGUA	62.	62.3	0.17	-	-
NITZSCHIA SIGMOIDEA	62.	62.3	0.17	-	-
NITZSCHIA PSEUDOFONTICOLA	62.	62.3	0.17	-	-
SURIRELLA OVATA	62.	62.3	0.17	-	-
PLEUROSIGMA SPP.	62.	62.3	0.17	-	-
TOTAL PENNALES	4675.	4675.0	12.39	-	-
TOTAL BACILLARIOPHYTA	32600.	32600.0	86.40	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	1184.	1184.3	3.14	-	-

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	795.	794.7	2.11	-	-
DICTYOSPHAERIUM PULCHELLUM	654.	654.5	1.73	-	-
SCENEDESMUS OPOLIENSIS	530.	529.8	1.40	-	-
ANKISTRODESMUS SPIRALIS	312.	311.7	0.83	-	-
SCENEDESMUS ABUNDANS	171.	171.4	0.45	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	156.	155.8	0.41	-	-
SCENEDESMUS DENTICULATUS	140.	140.2	0.37	-	-
SCENEDESMUS BIJUGA	93.	93.5	0.25	-	-
LAGERHEIMIA QUADRISETA	62.	62.3	0.17	-	-
SCENEDESMUS ARCUATUS	62.	62.3	0.17	-	-
SCENEDESMUS INTERMEDIUS	62.	62.3	0.17	-	-
TOTAL NON-FILAMENTOUS	4223.	4223.0	11.19	-	-
TOTAL CHLOROPHYTA	4223.	4223.0	11.19	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	617.	617.1	1.64	-	-
APHANIZOMENON FLOS-AQUAE	168.	168.3	0.45	-	-
TOTAL FILAMENTOUS	785.	785.4	2.08	-	-
TOTAL CYANOPHYTA	785.	785.4	2.08	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	125.	124.7	0.33	-	-
TOTAL CRYPTOPHYTA	125.	124.7	0.33	-	-
TOTAL PHYTOPLANKTON	37733.	37733.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	38				

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	21941.	21941.1	62.56	-	-
STEPHANODISCUS TENUIS	6109.	6108.6	17.42	-	-
SKELETONEMA POTAMOS	187.	187.0	0.53	-	-
STEPHANODISCUS NIAGARAE	125.	124.7	0.36	-	-
TOTAL CENTRALES	28361.	28361.4	80.86	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	1060.	1059.7	3.02	-	-
ASTERIONELLA FORMOSA	997.	997.3	2.84	-	-
NITZSCHIA LINEARIS	499.	498.7	1.42	-	-
NITZSCHIA DISSIPATA	249.	249.3	0.71	-	-
SYNEDRA ULNA	187.	187.0	0.53	-	-
NAVICULA CRYPTOCEPHALA	187.	187.0	0.53	-	-
NAVICULA LANCEOLATA	125.	124.7	0.36	-	-
DIATOMA VULGARE	125.	124.7	0.36	-	-
NITZSCHIA PALEA	125.	124.7	0.36	-	-
NAVICULA MUTICA	62.	62.3	0.18	-	-
GYROSIGMA SPP.	62.	62.3	0.18	-	-
NAVICULA DECUSSIS	62.	62.3	0.18	-	-
SURIRELLA OVATA	62.	62.3	0.18	-	-
SYNEDRA RADIANS	62.	62.3	0.18	-	-
NAVICULA PUPULA	62.	62.3	0.18	-	-
PLEUROSIGMA SPP.	62.	62.3	0.18	-	-
TOTAL PENNALES	3989.	3989.3	11.37	-	-
TOTAL BACILLARIOPHYTA	32351.	32350.7	92.23	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	592.	592.2	1.69	-	-

TABLE B-22 (CONT.)

IOWA ELECTRIC - IEL11H
PHYTOPLANKTON ABUNDANCE

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	312.	311.7	0.89	-	-
DICTYOSPHAERIUM PULCHELLUM	265.	264.9	0.76	-	-
COELASTRUM CAMBRICUM	249.	249.3	0.71	-	-
SCENEDESMUS OPOLIENSIS	171.	171.4	0.49	-	-
SCENEDESMUS ABUNDANS	156.	155.8	0.44	-	-
ANKISTRODESMUS SPIRALIS	125.	124.7	0.36	-	-
SCENEDESMUS DENTICULATUS	78.	77.9	0.22	-	-
SCENEDESMUS LONGUS	78.	77.9	0.22	-	-
TOTAL NON-FILAMENTOUS	2026.	2025.8	5.78	-	-
TOTAL CHLOROPHYTA	2026.	2025.8	5.78	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	486.	486.2	1.39	-	-
APHANIZOMENON FLOS-AQUAE	87.	87.3	0.25	-	-
ANABAENA FLOS-AQUAE	62.	62.3	0.18	-	-
TOTAL FILAMENTOUS	636.	635.8	1.81	-	-
TOTAL CYANOPHYTA	636.	635.8	1.81	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	62.	62.3	0.18	-	-
TOTAL CRYPTOPHYTA	62.	62.3	0.18	-	-
TOTAL PHYTOPLANKTON	35075.	35074.6	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	33				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 2-DEC-81 SCOPE TYPE: INVERTED

TABLE B-23

IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	14623.	14623.3	66.68	-	-
STEPHANODISCUS TENUIS	1571.	1570.8	7.16	-	-
STEPHANODISCUS NIAGARAE	37.	37.4	0.17	-	-
CYCLOTELLA MENEGHINIANA	37.	37.4	0.17	-	-
TOTAL CENTRALES	16269.	16268.8	74.19	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	785.	785.4	3.58	-	-
DIATOMA VULGARE	374.	374.0	1.71	-	-
NAVICULA SPP.	374.	374.0	1.71	-	-
NITZSCHIA PALEA	299.	299.2	1.36	-	-
NITZSCHIA LINEARIS	262.	261.8	1.19	-	-
SYNEDRA ULNA	224.	224.4	1.02	-	-
ASTERIONELLA FORMOSA	187.	187.0	0.85	-	-
NAVICULA TRIPUNCTATA	112.	112.2	0.51	-	-
NITZSCHIA HANTZSCHIANA	112.	112.2	0.51	-	-
SURIRELLA OVATA	112.	112.2	0.51	-	-
GOMPHONEMA PARVULUM	75.	74.8	0.34	-	-
MERIDION CIRCULARE	37.	37.4	0.17	-	-
NAVICULA CRYPTOCEPHALA	37.	37.4	0.17	-	-
NITZSCHIA PSEUDOFONTICOLA	37.	37.4	0.17	-	-
GYROSIGMA SCALPROIDES	37.	37.4	0.17	-	-
NITZSCHIA TRYBLIONELLA VAR. VICTORIAE	37.	37.4	0.17	-	-
CALONEIS BACILLUM	37.	37.4	0.17	-	-
PLEUROSIGMA SPP.	37.	37.4	0.17	-	-
TOTAL PENNALES	3179.	3179.0	14.50	-	-
TOTAL BACILLARIOPHYTA	19448.	19447.8	88.68	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	580.	579.7	2.64	-	-

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 2-DEC-81 SCOPE TYPE: INVERTED

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
DICTYOSPHAERIUM PULCHELLUM	542.	542.3	2.47	-	-
ANKISTRODESMUS FALCATUS	411.	411.4	1.88	-	-
COELASTRUM SPHAERICUM	150.	149.6	0.68	-	-
SCENEDESMUS OPOLIENSIS	84.	84.1	0.38	-	-
SCENEDESMUS BERNARDII	84.	84.1	0.38	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	75.	74.8	0.34	-	-
ANKISTRODESMUS SPIRALIS	75.	74.8	0.34	-	-
SCENEDESMUS DIMORPHUS	75.	74.8	0.34	-	-
CRUCIGENIA QUADRATA	75.	74.8	0.34	-	-
SCENEDESMUS ABUNDANS	47.	46.7	0.21	-	-
SCENEDESMUS DENTICULATUS	37.	37.4	0.17	-	-
TOTAL NON-FILAMENTOUS	2235.	2234.6	10.19	-	-
TOTAL CHLOROPHYTA	2235.	2234.6	10.19	-	-
CHRYSOPHYTA					
DINOBRYON DIVERGENS	112.	112.2	0.51	-	-
TOTAL CHRYSOPHYTA	112.	112.2	0.51	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA SPP.	79.	78.5	0.36	-	-
APHANIZOMENON FLOS-AQUAE	56.	56.1	0.26	-	-
TOTAL FILAMENTOUS	135.	134.6	0.61	-	-
TOTAL CYANOPHYTA	135.	134.6	0.61	-	-
TOTAL PHYTOPLANKTON	21929.	21929.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	37				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 2-DEC-81 SCOPE TYPE: INVERTED

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	13202.	13202.1	73.05	-	-
STEPHANODISCUS TENUIS	1047.	1047.2	5.79	-	-
STEPHANODISCUS NIAGARAE	75.	74.8	0.41	-	-
TOTAL CENTRALES	14324.	14324.1	79.26	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	449.	448.8	2.48	-	-
NITZSCHIA LINEARIS	411.	411.4	2.28	-	-
ASTERIONELLA FORMOSA	299.	299.2	1.66	-	-
NITZSCHIA HANTZSCHIANA	299.	299.2	1.66	-	-
NAVICULA SPP.	187.	187.0	1.03	-	-
NAVICULA CRYPTOCEPHALA	187.	187.0	1.03	-	-
DIATOMA VULGARE	150.	149.6	0.83	-	-
NITZSCHIA PALEA	112.	112.2	0.62	-	-
SYNEDRA ULNA	112.	112.2	0.62	-	-
NAVICULA TRIPUNCTATA	75.	74.8	0.41	-	-
NITZSCHIA DISSIPATA	75.	74.8	0.41	-	-
GOMPHONEMA PARVULUM	75.	74.8	0.41	-	-
SURIRELLA OVATA	37.	37.4	0.21	-	-
TOTAL PENNALES	2468.	2468.4	13.66	-	-
TOTAL BACILLARIOPHYTA	16792.	16792.4	92.91	-	-
CHLOROPHYTA NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	383.	383.3	2.12	-	-
ANKISTRODESMUS FALCATUS	224.	224.4	1.24	-	-
DICTYOSPHAERIUM PULCHELLUM	206.	205.7	1.14	-	-
SCENEDESMUS DENTICULATUS	93.	93.5	0.52	-	-

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ABUNDANS	84.	84.1	0.47	-	-
COELASTRUM SPHAERICUM	75.	74.8	0.41	-	-
CRUCIGENIA QUADRATA	56.	56.1	0.31	-	-
SCENEDESMUS DIMORPHUS	47.	46.7	0.26	-	-
SCENEDESMUS OPOLIENSIS	37.	37.4	0.21	-	-
TOTAL NON-FILAMENTOUS	1206.	1206.1	6.67	-	-
TOTAL CHLOROPHYTA	1206.	1206.1	6.67	-	-
CHRYSOPHYTA					
DINOBRYON DIVERGENS	75.	74.8	0.41	-	-
TOTAL CHRYSOPHYTA	75.	74.8	0.41	-	-
TOTAL PHYTOPLANKTON	18073.	18073.4	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	26				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 2-DEC-81 SCOPE TYPE: INVERTED

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	12155.	12154.9	74.07	-	-
STEPHANODISCUS TENUIS	823.	822.8	5.01	-	-
MELOSIRA AMBIGUA	112.	112.2	0.68	-	-
TOTAL CENTRALES	13090.	13089.9	79.77	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA ACICULARIS	374.	374.0	2.28	-	-
NITZSCHIA LINEARIS	374.	374.0	2.28	-	-
NITZSCHIA HANTZSCHIANA	224.	224.4	1.37	-	-
TABELLARIA FLOCCULOSA	150.	149.6	0.91	-	-
ASTERIONELLA FORMOSA	150.	149.6	0.91	-	-
NAVICULA SPP.	150.	149.6	0.91	-	-
DIATOMA VULGARE	112.	112.2	0.68	-	-
NAVICULA TRIPUNCTATA	112.	112.2	0.68	-	-
NAVICULA CRYPTOCEPHALA	75.	74.8	0.46	-	-
NITZSCHIA DISSIPATA	75.	74.8	0.46	-	-
SYNEDRA ULNA	75.	74.8	0.46	-	-
NITZSCHIA PALEA	75.	74.8	0.46	-	-
CALONEIS BACILLUM	75.	74.8	0.46	-	-
NAVICULA CAPITATA	37.	37.4	0.23	-	-
NITZSCHIA PSEUDOFONTICOLA	**37.**	**37.4**	**0.23**	**-**	**-**
GOMPHONEMA PARVULUM	**37.**	**37.4**	**0.23**	**-**	**-**
NITZSCHIA COMMUNIS	37.	37.4	0.23	-	-
NITZSCHIA FRUSTULUM	37.	37.4	0.23	-	-
PLEUROSIGMA SPP.	37.	37.4	0.23	-	-
TOTAL PENNALES	2244.	2244.0	13.68	-	-
TOTAL BACILLARIOPHYTA	15334.	15333.8	93.45	-	-
CHLOROPHYTA NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	337.	336.6	2.05	-	-

TABLE B-23 (CONT.)   IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	290.	289.8	1.77	-	-
ANKISTRODESMUS FALCATUS	150.	149.6	0.91	-	-
COELASTRUM SPHAERICUM	112.	112.2	0.68	-	-
SCENEDESMUS ABUNDANS	56.	56.1	0.34	-	-
SCENEDESMUS DIMORPHUS	47.	46.7	0.28	-	-
SCENEDESMUS OPOLIENSIS	47.	46.7	0.28	-	-
SCENEDESMUS DENTICULATUS	37.	37.4	0.23	-	-
TOTAL NON-FILAMENTOUS	1075.	1075.2	6.55	-	-
TOTAL CHLOROPHYTA	1075.	1075.2	6.55	-	-
TOTAL PHYTOPLANKTON	16409.	16409.1	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	30				

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	13838.	13837.9	69.47	-	-
STEPHANODISCUS TENUIS	1459.	1458.6	7.32	-	-
STEPHANODISCUS NIAGARAE	37.	37.4	0.19	-	-
CYCLOTELLA MENEGHINIANA	37.	37.4	0.19	-	-
TOTAL CENTRALES	15371.	15371.2	77.17	-	-
BACILLARIOPHYTA PENNALES					
NITZSCHIA LINEARIS	486.	486.2	2.44	-	-
NITZSCHIA HANTZSCHIANA	411.	411.4	2.07	-	-
ASTERIONELLA FORMOSA	337.	336.6	1.69	-	-
NITZSCHIA ACICULARIS	337.	336.6	1.69	-	-
NAVICULA SPP.	262.	261.8	1.31	-	-
DIATOMA VULGARE	150.	149.6	0.75	-	-
SYNEDRA ULNA	150.	149.6	0.75	-	-
NAVICULA CRYPTOCEPHALA	112.	112.2	0.56	-	-
NITZSCHIA PSEUDOFONTICOLA	75.	74.8	0.38	-	-
NAVICULA TRIPUNCTATA	75.	74.8	0.38	-	-
NITZSCHIA PALEA	75.	74.8	0.38	-	-
GOMPHONEMA PARVULUM	37.	37.4	0.19	-	-
CYMBELLA TUMIDA	37.	37.4	0.19	-	-
SURIRELLA OVATA	37.	37.4	0.19	-	-
ACHNANTHES LANCEOLATA	37.	37.4	0.19	-	-
PLEUROSIGMA SPP.	37.	37.4	0.19	-	-
TOTAL PENNALES	2655.	2655.4	13.33	-	-
TOTAL BACILLARIOPHYTA	18027.	18026.6	90.50	-	-
CHLOROPHYTA NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	673.	673.2	3.38	-	-

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	505.	504.9	2.53*	-	-
ANKISTRODESMUS FALCATUS	150.	149.6	0.75	-	-
SCENEDESMUS ABUNDANS	93.	93.5	0.47	-	-
SCENEDESMUS DIMORPHUS	75.	74.8	0.38	-	-
SCENEDESMUS OPOLIENSIS	75.	74.8	0.38	-	-
SCENEDESMUS DENTICULATUS	56.	56.1	0.28	-	-
ACTINASTRUM HANTZSCHII VAR. FLUVIATILE	56.	56.1	0.28	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	0.19	-	-
TOTAL NON-FILAMENTOUS	1720.	1720.4	8.64	-	-
TOTAL CHLOROPHYTA	1720.	1720.4	8.64	-	-
CHRYSOPHYTA					
DINOBRYON SOCIALE	75.	74.8	0.38	-	-
TOTAL CHRYSOPHYTA	75.	74.8	0.38	-	-
CYANOPHYTA					
FILAMENTOUS					
APHANIZOMENON FLOS-AQUAE	52.	52.4	0.26	-	-
OSCILLATORIA TENUIS	45.	44.9	0.23	-	-
TOTAL FILAMENTOUS	97.	97.2	0.49	-	-
TOTAL CYANOPHYTA	97.	97.2	0.49	-	-
TOTAL PHYTOPLANKTON	19919.	19919.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 5   COLLECTION DATE: 2-DEC-81   SCOPE TYPE: INVERTED

TABLE B-23 (CONT.)   IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	12791.	12790.7	72.30	-	-
STEPHANODISCUS TENUIS	1122.	1122.0	6.34	-	-
SKELETONEMA POTAMOS	112.	112.2	0.63	-	-
MELOSIRA GRANULATA	75.	74.8	0.42	-	-
TOTAL CENTRALES	14100.	14099.7	79.70	-	-
BACILLARIOPHYTA					
PENNALES					
NITZSCHIA ACICULARIS	524.	523.6	2.96	-	-
NITZSCHIA LINEARIS	299.	299.2	1.69	-	-
NITZSCHIA HANTZSCHIANA	262.	261.8	1.48	-	-
DIATOMA VULGARE	224.	224.4	1.27	-	-
SYNEDRA ULNA	187.	187.0	1.06	-	-
NITZSCHIA PALEA	150.	149.6	0.85	-	-
NAVICULA SPP.	150.	149.6	0.85	-	-
ASTERIONELLA FORMOSA	112.	112.2	0.63	-	-
NAVICULA CRYPTOCEPHALA	75.	74.8	0.42	-	-
GOMPHONEMA PARVULUM	75.	74.8	0.42	-	-
NAVICULA TRIPUNCTATA	37.	37.4	0.21	-	-
CALONEIS BACILLUM	37.	37.4	0.21	-	-
NITZSCHIA TRYBLIONELLA VAR. VICTORIAE	37.	37.4	0.21	-	-
NITZSCHIA PSEUDOFONTICOLA	37.	37.4	0.21	-	-
ACHNANTHES LANCEOLATA	37.	37.4	0.21	-	-
SURIRELLA OVATA	37.	37.4	0.21	-	-
NITZSCHIA DISSIPATA	37.	37.4	0.21	-	-
TOTAL PENNALES	2319.	2318.8	13.11	-	-
TOTAL BACILLARIOPHYTA	16418.	16418.4	92.81	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	309.	308.5	1.74	-	-

TABLE B-23 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS FALCATUS	262.	261.8	1.48	-	-
DICTYOSPHAERIUM PULCHELLUM	187.	187.0	1.06	-	-
SCENEDESMUS DENTICULATUS	93.	93.5	0.53	-	-
SCENEDESMUS OPOLIENSIS	84.	84.1	0.48	-	-
SCENEDESMUS DIMORPHUS	75.	74.8	0.42	-	-
COELASTRUM SPHAERICUM	75.	74.8	0.42	-	-
SCENEDESMUS ABUNDANS	56.	56.1	0.32	-	-
CRUCIGENIA QUADRATA	37.	37.4	0.21	-	-
TOTAL NON-FILAMENTOUS	1178.	1178.1	6.66	-	-
TOTAL CHLOROPHYTA	1178.	1178.1	6.66	-	-
CHRYSOPHYTA					
DINOBRYON DIVERGENS	37.	37.4	0.21	-	-
TOTAL CHRYSOPHYTA	37.	37.4	0.21	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA TENUIS	56.	56.1	0.32	-	-
TOTAL FILAMENTOUS	56.	56.1	0.32	-	-
TOTAL CYANOPHYTA	56.	56.1	0.32	-	-
TOTAL PHYTOPLANKTON	17690.	17690.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11   STATION: 1   COLLECTION DATE: 15-DEC-81   SCOPE TYPE: INVERTED

TABLE B-24   IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	6208.	6208.3	80.68	-	-
STEPHANODISCUS TENUIS	337.	336.6	4.37	-	-
TOTAL CENTRALES	6545.	6544.9	85.05	-	-
BACILLARIOPHYTA					
PENNALES					
ASTERIONELLA FORMOSA	150.	149.6	1.94	-	-
NITZSCHIA ACICULARIS	112.	112.2	1.46	-	-
NITZSCHIA LINEARIS	93.	93.5	1.22	-	-
DIATOMA VULGARE	93.	93.5	1.22	-	-
NAVICULA SPP.	56.	56.1	0.73	-	-
NAVICULA CRYPTOCEPHALA	56.	56.1	0.73	-	-
NITZSCHIA PALEA	56.	56.1	0.73	-	-
NITZSCHIA SIGMOIDEA	37.	37.4	0.49	-	-
ACHNANTHES LANCEOLATA	37.	37.4	0.49	-	-
GOMPHONEMA PARVULUM	37.	37.4	0.49	-	-
NAVICULA TRIPUNCTATA	37.	37.4	0.49	-	-
NITZSCHIA HANTZSCHIANA	37.	37.4	0.49	-	-
NAVICULA VIRIDULA	19.	18.7	0.24	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.24	-	-
NITZSCHIA PSEUDOFONTICOLA	19.	18.7	0.24	-	-
TOTAL PENNALES	860.	860.2	11.18	-	-
TOTAL BACILLARIOPHYTA	7405.	7405.1	96.23	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	75.	74.8	0.97	-	-
SCENEDESMUS ACUMINATUS	51.	51.4	0.67	-	-
ANKISTRODESMUS FALCATUS	37.	37.4	0.49	-	-

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANKISTRODESMUS SPIRALIS	37.	37.4	0.49	-	-
SCENEDESMUS QUADRICAUDA	23.	23.4	0.30	-	-
SCENEDESMUS ABUNDANS	19.	18.7	0.24	-	-
TOTAL NON-FILAMENTOUS	243.	243.1	3.16	-	-
TOTAL CHLOROPHYTA	243.	243.1	3.16	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA SPP.	28.	28.0	0.36	-	-
TOTAL FILAMENTOUS	28.	28.0	0.36	-	-
TOTAL CYANOPHYTA	28.	28.0	0.36	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	19.	18.7	0.24	-	-
TOTAL CRYPTOPHYTA	19.	18.7	0.24	-	-
TOTAL PHYTOPLANKTON	7695.	7695.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	25				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 15-[illegible] [illegible] SCOPE TYPE: INVERTED

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	5890.	5890.4	78.85	-	-
STEPHANODISCUS TENUIS	187.	187.0	2.50	-	-
TOTAL CENTRALES	6077.	6077.4	81.35	-	-
BACILLARIOPHYTA					
PENNALES					
DIATOMA VULGARE	131.	130.9	1.75	-	-
NITZSCHIA LINEARIS	112.	112.2	1.50	-	-
NITZSCHIA SIGMOIDEA	93.	93.5	1.25	-	-
ASTERIONELLA FORMOSA	93.	93.5	1.25	-	-
NAVICULA SPP.	93.	93.5	1.25	-	-
NITZSCHIA ACICULARIS	75.	74.8	1.00	-	-
NITZSCHIA PALEA	75.	74.8	1.00	-	-
GOMPHONEMA PARVULUM	37.	37.4	0.50	-	-
NAVICULA CRYPTOCEPHALA	37.	37.4	0.50	-	-
NITZSCHIA PSEUDOFONTICOLA	37.	37.4	0.50	-	-
NITZSCHIA HANTZSCHIANA	37.	37.4	0.50	-	-
NAVICULA TRIPUNCTATA	37.	37.4	0.50	-	-
NAVICULA CAPITATA	19.	18.7	0.25	-	-
NAVICULA CUSPIDATA	19.	18.7	0.25	-	-
NAVICULA LANCEOLATA	19.	18.7	0.25	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.25	-	-
NAVICULA CITRUS	19.	18.7	0.25	-	-
GYROSIGMA SCALPROIDES	19.	18.7	0.25	-	-
SURIRELLA OVATA	19.	18.7	0.25	-	-
SURIRELLA SPP.	19.	18.7	0.25	-	-
SYNEDRA RADIANS	19.	18.7	0.25	-	-
PLEUROSIGMA SPP.	19.	18.7	0.25	-	-
TOTAL PENNALES	1047.	1047.2	14.02	-	-
TOTAL BACILLARIOPHYTA	7125.	7124.6	95.37	-	-

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHLOROPHYTA					
NON-FILAMENTOUS					
SCENEDESMUS ACUMINATUS	103.	102.8	1.38	-	-
ANKISTRODESMUS FALCATUS	56.	56.1	0.75	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	0.50	-	-
DICTYOSPHAERIUM PULCHELLUM	37.	37.4	0.50	-	-
COELASTRUM SPHAERICUM	37.	37.4	0.50	-	-
SCENEDESMUS ABUNDANS	33.	32.7	0.44	-	-
SCENEDESMUS QUADRICAUDA	23.	23.4	0.31	-	-
TETRAEDRON SPP.	19.	18.7	0.25	-	-
TOTAL NON-FILAMENTOUS	346.	345.9	4.63	-	-
TOTAL CHLOROPHYTA	346.	345.9	4.63	-	-
TOTAL PHYTOPLANKTON	7471.	7470.6	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 15-DEC-81 SCOPE TYPE: INVERTED

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA CENTRALES					
STEPHANODISCUS INVISITATUS	6377.	6376.6	76.12	-	-
STEPHANODISCUS TENUIS	337.	336.6	4.02	-	-
MELOSIRA GRANULATA	37.	37.4	0.45	-	-
STEPHANODISCUS NIAGARAE	19.	18.7	0.22	-	-
TOTAL CENTRALES	6769.	6769.3	80.80	-	-
BACILLARIOPHYTA PENNALES					
DIATOMA VULGARE	187.	187.0	2.23	-	-
NITZSCHIA ACICULARIS	168.	168.3	2.01	-	-
ASTERIONELLA FORMOSA	93.	93.5	1.12	-	-
GOMPHONEMA PARVULUM	93.	93.5	1.12	-	-
NITZSCHIA LINEARIS	75.	74.8	0.89	-	-
NITZSCHIA HANTZSCHIANA	75.	74.8	0.89	-	-
NAVICULA CRYPTOCEPHALA	56.	56.1	0.67	-	-
NITZSCHIA SIGMOIDEA	37.	37.4	0.45	-	-
NAVICULA SPP.	37.	37.4	0.45	-	-
NITZSCHIA PALEA	37.	37.4	0.45	-	-
SURIRELLA OVATA	37.	37.4	0.45	-	-
NITZSCHIA DISSIPATA	37.	37.4	0.45	-	-
NAVICULA LANCEOLATA	37.	37.4	0.45	-	-
NAVICULA VIRIDULA	37.	37.4	0.45	-	-
NITZSCHIA FRUSTULUM	19.	18.7	0.22	-	-
NITZSCHIA COMMUNIS	19.	18.7	0.22	-	-
NITZSCHIA PSEUDOFONTICOLA	19.	18.7	0.22	-	-
NAVICULA CITRUS	19.	18.7	0.22	-	-
NAVICULA CAPITATA	19.	18.7	0.22	-	-
SYNEDRA RADIANS	19.	18.7	0.22	-	-
SYNEDRA ULNA	19.	18.7	0.22	-	-
TOTAL PENNALES	1122.	1122.0	13.39	-	-
TOTAL BACILLARIOPHYTA	7891.	7891.3	94.20	-	-

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	150.	149.6	1.79	-	-
DICTYOSPHAERIUM PULCHELLUM	117.	116.9	1.40	-	-
SCENEDESMUS ACUMINATUS	65.	65.4	0.78	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	0.45	-	-
SCENEDESMUS ABUNDANS	33.	32.7	0.39	-	-
TOTAL NON-FILAMENTOUS	402.	402.0	4.80	-	-
TOTAL CHLOROPHYTA	402.	402.0	4.80	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA SPP.	47.	46.7	0.56	-	-
TOTAL FILAMENTOUS	47.	46.7	0.56	-	-
TOTAL CYANOPHYTA	47.	46.7	0.56	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	37.	37.4	0.45	-	-
TOTAL CRYPTOPHYTA	37.	37.4	0.45	-	-
TOTAL PHYTOPLANKTON	8378.	8377.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

SUMMARY OF PHYTOPLANKTON COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 15-DEC-81 SCOPE TYPE: INVERTED

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

T A X A	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	6825.	6825.4	75.80	-	-
STEPHANODISCUS TENUIS	467.	467.5	5.19	-	-
MELOSIRA GRANULATA	56.	56.1	0.62	-	-
TOTAL CENTRALES	7349.	7349.0	81.62	-	-
BACILLARIOPHYTA					
PENNALES					
ASTERIONELLA FORMOSA	262.	261.8	2.91	-	-
NITZSCHIA LINEARIS	168.	168.3	1.87	-	-
DIATOMA VULGARE	150.	149.6	1.66	-	-
NAVICULA CRYPTOCEPHALA	93.	93.5	1.04	-	-
NAVICULA TRIPUNCTATA	75.	74.8	0.83	-	-
NITZSCHIA ACICULARIS	56.	56.1	0.62	-	-
NITZSCHIA HANTZSCHIANA	56.	56.1	0.62	-	-
NITZSCHIA PSEUDOFONTICOLA	56.	56.1	0.62	-	-
NAVICULA LANCEOLATA	37.	37.4	0.42	-	-
ACHNANTHES LANCEOLATA	37.	37.4	0.42	-	-
NITZSCHIA DISSIPATA	37.	37.4	0.42	-	-
NAVICULA SPP.	37.	37.4	0.42	-	-
NITZSCHIA COMMUNIS	37.	37.4	0.42	-	-
GOMPHONEMA PARVULUM	37.	37.4	0.42	-	-
CALONEIS SPP.	19.	18.7	0.21	-	-
NITZSCHIA PALEA	19.	18.7	0.21	-	-
PLEUROSIGMA SPP.	19.	18.7	0.21	-	-
TOTAL PENNALES	1197.	1196.8	13.29	-	-
TOTAL BACILLARIOPHYTA	8546.	8545.8	94.91	-	-
CHLOROPHYTA					
NON-FILAMENTOUS					
DICTYOSPHAERIUM PULCHELLUM	136.	135.6	1.51	-	-

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SCENEDESMUS ACUMINATUS	103.	102.8	1.14	-	-
ANKISTRODESMUS FALCATUS	93.	93.5	1.04	-	-
ANKISTRODESMUS SPIRALIS	37.	37.4	0.42	-	-
SCENEDESMUS OPOLIENSIS	28.	28.0	0.31	-	-
SCENEDESMUS ABUNDANS	23.	23.4	0.26	-	-
SCENEDESMUS QUADRICAUDA	19.	18.7	0.21	-	-
TETRAEDRON SPP.	19.	18.7	0.21	-	-
TOTAL NON-FILAMENTOUS	458.	458.1	5.09	-	-
TOTAL CHLOROPHYTA	458.	458.1	5.09	-	-
TOTAL PHYTOPLANKTON	9004.	9004.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	28				

TABLE B-24 (CONT.)   IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
BACILLARIOPHYTA					
CENTRALES					
STEPHANODISCUS INVISITATUS	6508.	6507.5	77.90	-	-
STEPHANODISCUS TENUIS	262.	261.8	3.13	-	-
STEPHANODISCUS NIAGARAE	19.	18.7	0.22	-	-
TOTAL CENTRALES	6788.	6788.0	81.26	-	-
BACILLARIOPHYTA					
PENNALES					
DIATOMA VULGARE	224.	224.4	2.69	-	-
ASTERIONELLA FORMOSA	187.	187.0	2.24	-	-
NITZSCHIA LINEARIS	131.	130.9	1.57	-	-
NITZSCHIA SPP.	56.	56.1	0.67	-	-
NAVICULA CRYPTOCEPHALA	56.	56.1	0.67	-	-
GOMPHONEMA PARVULUM	37.	37.4	0.45	-	-
MERIDION CIRCULARE	37.	37.4	0.45	-	-
SYNEDRA RADIANS	37.	37.4	0.45	-	-
NITZSCHIA PSEUDOFONTICOLA	37.	37.4	0.45	-	-
NITZSCHIA HANTZSCHIANA	37.	37.4	0.45	-	-
ACHNANTHES LANCEOLATA	19.	18.7	0.22	-	-
NAVICULA VIRIDULA	19.	18.7	0.22	-	-
NITZSCHIA DISSIPATA	19.	18.7	0.22	-	-
NITZSCHIA FRUSTULUM	19.	18.7	0.22	-	-
NAVICULA CAPITATA	19.	18.7	0.22	-	-
NITZSCHIA SIGMOIDEA	19.	18.7	0.22	-	-
NAVICULA LANCEOLATA	19.	18.7	0.22	-	-
CYMBELLA SPP.	19.	18.7	0.22	-	-
NAVICULA CITRUS	19.	18.7	0.22	-	-
SURIRELLA OVATA	19.	18.7	0.22	-	-
GYROSIGMA SCALPROIDES	19.	18.7	0.22	-	-
PLEUROSIGMA SPP.	19.	18.7	0.22	-	-
TOTAL PENNALES	1066.	1065.9	12.76	-	-
TOTAL BACILLARIOPHYTA	7854.	7853.9	94.02	-	-

TABLE B-24 (CONT.) IOWA ELECTRIC PHYTOPLANKTON IEL11

TAXA	REPLICATES (#/ML.) A	MEAN (#/ML.)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHLOROPHYTA					
NON-FILAMENTOUS					
ANKISTRODESMUS FALCATUS	131.	130.9	1.57	-	-
ANKISTRODESMUS SPIRALIS	93.	93.5	1.12	-	-
SCENEDESMUS ACUMINATUS	84.	84.1	1.01	-	-
DICTYOSPHAERIUM PULCHELLUM	65.	65.4	0.78	-	-
SCENEDESMUS QUADRICAUDA	47.	46.7	0.56	-	-
TOTAL NON-FILAMENTOUS	421.	420.7	5.04	-	-
TOTAL CHLOROPHYTA	421.	420.7	5.04	-	-
CYANOPHYTA					
FILAMENTOUS					
OSCILLATORIA SPP.	41.	41.1	0.49	-	
TOTAL FILAMENTOUS	41.	41.1	0.49	-	-
TOTAL CYANOPHYTA	41.	41.1	0.49	-	-
CRYPTOPHYTA					
CRYPTOMONAS OVATA	37.	37.4	0.45	-	-
TOTAL CRYPTOPHYTA	37.	37.4	0.45	-	-
TOTAL PHYTOPLANKTON	8353.	8353.2	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	32				

TABLE B-25 IDENTIFICATION AND ABUNDANCE OF PERIPHYTIC ALGAE COLLECTED FROM ARTIFICIAL SUBSTRATES IN THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, 20 MAY 1981

Taxa	Location 2 Units/cm^2	Location 2 %	Location 3 Units/cm^2	Location 3 %
Achnanthes clevei	0	0.00	2,686	0.08
Achnanthes hauckiana	0	0.00	2,686	0.08
Achnanthes lanceolata	2,946	0.26	29,551	0.93
Achnanthes lanceolata v. dubia	0	0.00	2,686	0.08
Achnanthes linearis	0	0.00	1,343	0.04
Achnanthes minutissima	2,209	0.20	55,072	1.74
Achnanthes spp.	1,473	0.13	0	0.00
Amphora perpusilla	0	0.00	8,059	0.25
Amphora veneta	736	0.07	0	0.00
Cocconeis placentula	0	0.00	12,089	0.38
Cocconeis placentula v. lineata	0	0.00	6,716	0.21
Cyclotella atomus	2,209	0.20	10,746	0.34
Cyclotella glomerata	13,991	1.25	2,686	0.08
Cyclotella kutzingiana	40,502	3.62	47,013	1.48
Cyclotella meneghiniana	9,573	0.86	41,640	1.31
Cyclotella pseudostelligera	8,837	0.79	13,432	0.42
Cyclotella stelligera	736	0.07	0	0.00
Cyclotella spp.	72,166	6.45	147,755	4.67
Cymbella affinis	0	0.00	2,686	0.08
Cymbella minuta	736	0.07	45,670	1.44
Diatoma vulgare	9,573	0.86	10,746	0.34
Fragilaria brevistriata	736	0.07	0	0.00
Fragilaria vaucheriae	2,946	0.26	0	0.00
Gomphonema olivaceum	399,125	35.66	239,094	7.55
Gomphonema olivaceum v. calcarea	736	0.07	0	0.00
Gomphonema parvulum	8,100	0.72	495,650	15.65
Gomphonema subclavatum	2,946	0.26	0	0.00
Gomphonema tenellum	0	0.00	8,059	0.25
Melosira granulata v. angustissima	736	0.07	1,343	0.04
Melosira varians	5,891	0.53	6,716	0.21
Navicula accomoda	0	0.00	5,373	0.17
Navicula arvensis	0	0.00	1,343	0.04
Navicula capitata	0	0.00	1,343	0.04
Navicula capitata v. hungarica	4,418	0.39	8,059	0.25
Navicula cryptocephala	15,464	1.38	65,818	2.08
Navicula cryptocephala v. veneta	24,301	2.17	151,784	4.79
Navicula fluens	0	0.00	6,716	0.21
Navicula menisculus v. upsaliensis	736	0.07	68,504	2.16

TABLE B-25 (CONT.)

Taxa	Location 2 Units/cm^2	Location 2 %	Location 3 Units/cm^2	Location 3 %
Navicula minima	2,946	0.26	103,428	3.27
Navicula miniscula	736	0.07	0	0.00
Navicula minisculoides	0	0.00	5,373	0.17
Navicula notha	5,155	0.46	13,432	0.42
Navicula pelliculosa	27,983	2.50	362,671	11.45
Navicula pupula	1,473	0.13	0	0.00
Navicula radiosa v. *tenella*	0	0.00	2,686	0.08
Navicula rhynchocephala	2,946	0.26	4,030	0.13
Navicula rhynchocephala v. *amphiceros*	7,364	0.66	8,059	0.25
Navicula rhynchocephala v. *germanii*	0	0.00	6,716	0.21
Navicula secreta v. *apiculata*	5,891	0.53	8,059	0.25
Navicula submuralis	0	0.00	2,686	0.08
Navicula tripunctata	60,384	5.39	157,157	4.96
Navicula tripunctata v. *schizonemoides*	0	0.00	1,343	0.04
Navicula spp.	0	0.00	9,403	0.30
Nitzschia acicularis	15,464	1.38	17,462	0.55
Nitzschia acicularoides	4,418	0.39	0	0.00
Nitzschia amphibia	0	0.00	8,059	0.25
Nitzschia capitellata	2,209	0.20	0	0.00
Nitzschia dissipata	27,247	2.43	298,196	9.42
Nitzschia filiformis	11,782	1.05	0	0.00
Nitzschia fonticola	0	0.00	9,403	0.30
Nitzschia frustulum	4,418	0.39	10,746	0.34
Nitzschia frustulum v. *perminuta*	1,473	0.13	0	0.00
Nitzschia hungarica	0	0.00	2,686	0.08
Nitzschia lauenbergiana	11,782	1.05	0	0.00
Nitzschia linearis	2,946	0.26	1,343	0.04
Nitzschia longissima	2,209	0.20	0	0.00
Nitzschia palea	30,928	2.76	304,912	9.63
Nitzschia subcapitellata	2,209	0.20	5,373	0.17
Nitzschia tropica	736	0.07	0	0.00
Nitzschia tryblionella	1,473	0.13	0	0.00
Nitzschia spp.	2,209	0.20	0	0.00
Rhoicosphenia curvata	0	0.00	33,581	1.06
Stephanodiscus astracea v. *minutula*	94,995	8.49	132,979	4.20
Stephanodiscus invisitatus	15,464	1.38	21,492	0.68
Stephanodiscus minutus	13,255	1.18	8,059	0.25
Stephanodiscus tenuis	8,837	0.79	2,686	0.08
Stephanodiscus spp.	0	0.00	1,343	0.04
Surirella angustata	2,946	0.26	4,030	0.13
Surirella ovata	8,837	0.79	12,089	0.38
Surirella spiralis	1,473	0.13	0	0.00
Synedra delicatissima	0	0.00	2,686	0.08

TABLE B-25 (CONT.)

Taxa	Location 2		Location 3	
	Units/cm^2	%	Units/cm^2	%
Synedra filiformis v. *exilis*	2,209	0.20	5,373	0.17
Synedra rumpens v. *fragilaroides*	0	0.00	2,686	0.08
Synedra ulna	6,628	0.59	8,059	0.25
Synedra spp.	1,473	0.13	2,686	0.08
Thalassiosira pseudonana	16,937	1.51	13,432	0.42
Unidentified centric	5,891	0.53	0	0.00
Total Bacillariophyta	1,050,830	93.89	3,097,468	97.82
Ankistrodesmus falcatus	818	0.07	2,624	0.08
Chlamydomonas spp.	545	0.05	1,458	0.05
Micractinium pusillum	273	0.02	1,166	0.04
Oocystis borgei	0	0.00	292	0.01
Pediastrum boryanum	1,091	0.10	0	0.00
Scenedesmus acuminatus	0	0.00	292	0.01
Scenedesmus bijuga	818	0.07	583	0.02
Scenedesmus dimorphus	5,180	0.46	4,666	0.15
Scenedesmus quadricauda	818	0.07	2,041	0.06
Unidentified coccoid greens	10,906	0.97	26,535	0.84
Total Chlorophyta	20,449	1.83	39,657	1.25
Anabaena spp.				
Aphanocapsa spp.	545	0.05	875	0.03
Lyngbya diguetti	13,087	1.17	3,791	0.12
Lyngbya spp.	23,992	2.14	8,165	0.26
Unidentified coccoid blue-greens	7,089	0.63	14,871	0.47
Total Cyanophyta	44,713	3.99	27,702	0.87
Euglena gracilis	1,091	0.10	292	0.01
Euglena spp.	273	0.02	0	0.00
Trachelomonas volvocina	545	0.05	0	0.00
Total Euglenophyta	1,909	0.17	292	0.01
Cryptomonas spp.	1,363	0.12	1,458	0.05
Total Cryptophyta	1,363	0.12	1,458	0.05
TOTAL PERIPHYTON	1,119,264		3,166,577	

TABLE B-26 IDENTIFICATION AND ABUNDANCE OF PERIPHYTIC ALGAE COLLECTED FROM ARTIFICIAL SUBSTRATES IN THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, 18 AUGUST 1981

Taxa	Location 2 Units/cm^2	Location 2 %	Location 3 Units/cm^2	Location 3 %
Achnanthes hungarica	0	0.00	6,716	0.57
Achnanthes lanceolata	1,199	0.25	0	0.00
Achnanthes minutissima	959	0.20	0	0.00
Achnanthes spp.	0	0.00	420	0.04
Amphora perpusilla	240	0.05	5,459	0.46
Amphora veneta	480	0.10	840	0.07
Cocconeis placentula	480	0.10	420	0.04
Cyclotella atomus	2,638	0.56	10,494	0.89
Cyclotella kutzingiana	1,439	0.30	2,938	0.25
Cyclotella meneghiniana	12,473	2.63	18,889	1.60
Cyclotella pseudostelligera	6,236	1.31	7,136	0.60
Cyclotella spp.	1,439	0.30	2,938	0.25
Cymbella minuta	0	0.00	420	0.04
Fragilaria construens	0	0.00	4,198	0.36
Fragilaria construens v. venter	0	0.00	420	0.04
Fragilaria pinnata	720	0.15	0	0.00
Fragilaria vaucheriae	240	0.05	0	0.00
Gomphonema gracile	1,439	0.30	0	0.00
Gomphonema intricatum v. pumila	3,358	0.71	840	0.07
Gomphonema olivaceum	480	0.10	2,519	0.21
Gomphonema parvulum	135,762	28.57	115,014	9.73
Gyrosigma obtusatum	480	0.10	840	0.07
Hantzschia amphioxys	240	0.05	0	0.00
Melosira granulata	959	0.20	2,099	0.18
Melosira granulata v. angustissima	480	0.10	2,099	0.18
Melosira varians	480	0.10	1,259	0.11
Navicula capitata	240	0.15	420	0.04
Navicula capitata v. hungarica	0	0.00	1,259	0.11
Navicula cryptocephala	720	0.15	0	0.00
Navicula cuspidata	240	0.05	0	0.00
Navicula decussis	240	0.05	840	0.07
Navicula fluens	4,797	1.01	9,654	0.82
Navicula heufleri v. leptocephala	720	0.15	0	0.00
Navicula menisculus v. upsaliensis	1,199	0.25	840	0.07
Navicula minima	0	0.00	840	0.07
Navicula mutica v. intermedia	240	0.15	0	0.00
Navicula pelliculosa	68,121	14.34	419,758	35.50

TABLE B-26 (CONT.)

Taxa	Location 2 Units/cm^2	Location 2 %	Location 3 Units/cm^2	Location 3 %
Navicula rhynchocephala v. amphiceros	1,919	0.40	840	0.07
Navicula rhynchocephala v. germanii	240	0.05	420	0.04
Navicula symmetrica	720	0.15	0	0.00
Navicula tripunctata	1,199	0.25	2,099	0.18
Navicula tripunctata v. schizonemoides	2,159	0.45	6,296	0.53
Navicula spp.	240	0.05	0	0.00
Neidium affine	240	0.05	0	0.00
Nitzschia acicularis	4,557	0.96	9,235	0.78
Nitzschia acicularoides	1,439	0.30	3,358	0.28
Nitzschia amphibia	1,199	0.25	840	0.07
Nitzschia angustata	0	0.00	840	0.07
Nitzschia capitellata	1,199	0.25	8,395	0.71
Nitzschia clausii	0	0.00	840	0.07
Nitzschia commutata	480	0.10	0	0.00
Nitzschia dissipata	1,439	0.30	3,778	0.32
Nitzschia fonticola	959	0.20	3,358	0.28
Nitzschia frustulum	1,199	0.25	420	0.04
Nitzschia frustulum v. perpusilla	480	0.10	1,259	0.11
Nitzschia gandersheimiensis	0	0.00	1,679	0.14
Nitzschia lauenbergiana	480	0.10	0	0.00
Nitzschia linearis	2,638	0.56	1,259	0.11
Nitzschia longissima	480	0.10	420	0.04
Nitzschia palea	59,006	12.42	107,878	9.12
Nitzschia subcapitellata	720	0.15	5,877	0.50
Nitzschia sublinearis	5,517	1.16	2,519	0.21
Nitzschia tropica	240	0.05	0	0.00
Nitzschia spp.	959	0.20	3,778	0.32
Rhoicosphenia curvata	0	0.00	840	0.07
Skeletonema potamos	70,519	14.84	54,569	4.62
Stephanodiscus astraea v. mir[illegible]la	4,797	1.01	5,459	0.46
Stephanodiscus hantzschii	959	0.20	0	0.00
Stephanodiscus invisitatus	1,679	0.35	2,099	0.18
Surirella ovata	240	0.05	0	0.00
Synedra acus	0	0.00	1,679	0.14
Thalassiosira pseudonana	6,956	1.46	4,198	0.36
Total Bacillariophyta	423,597	89.15	853,801	72.21
Ankistrodesmus falcatus	1,335	0.28	0	0.00
Chlamydomonas spp.	2,403	0.51	0	0.00
Oocystis borgei	0	0.00	604	0.05
Oocystis pusilla	534	0.11	0	0.00
Scenedesmus abundans	534	0.11	0	0.00
Scenedesmus bijuga	267	0.06	0	0.00
Scenedesmus dimorphus	267	0.06	0	0.00

TABLE B-26 (CONT.)

Taxa	Location 2 Units/cm^2	Location 2 %	Location 3 Units/cm^2	Location 3 %
Scenedesmus quadricauda	534	0.11	0	0.00
Schroederia setigera	801	0.17	0	0.00
Selenastrum minutum	0	0.00	604	0.05
Unidentified coccoid green	7,744	1.63	7,248	0.61
Total Chlorophyta	14,419	3.03	8,456	0.72
Anabaena spp.	12,284	2.59	7,852	0.66
Coelosphaerium pallidum	267	0.06	0	0.00
Lyngbya diguetti	801	0.17	273,016	23.09
Lyngbya spp.	13,886	2.92	23,557	1.99
Oscillatoria amoena	0	0.00	15,100	1.28
Oscillatoria spp.	6,943	1.46	0	0.00
Unidentified coccoid blue-green	1,869	0.39	604	0.05
Total Cyanophyta	36,050	7.59	320,129	27.07
Euglena gracilis	534	0.11	0	0.00
Total Euglenophyta	534	0.11	0	0.00
Cryptomonas spp.	534	0.11	0	0.00
Total Cryptophyta	534	0.11	0	0.00
TOTAL PERIPHYTON	475,134		1,182,386	

TABLE B-27 IDENTIFICATION AND ABUNDANCE OF PERIPHYTIC ALGAE COLLECTED FROM ARTIFICIAL SUBSTRATES IN THE CEDAR RIVER NEAR DUANE ARNOLD ENERGY CENTER, 16 NOVEMBER 1981

Taxa	Location 2		Location 3	
	Units/cm^2	%	Units/cm^2	%
Achnanthes lanceolata	0	0.00	3,358	0.15
Amphora perpusilla	1,119	0.07	0	0.00
Asterionella formosa	4,477	0.27	1,697	0.07
Cyclotella atomus	1,119	0.07	0	0.00
Cyclotella kutzingiana	6,716	0.41	18,469	0.81
Cyclotella meneghiniana	6,716	0.41	10,074	0.44
Cyclotella pseudostelligera	3,358	0.20	5,037	0.22
Cyclotella spp.	7,835	0.48	60,445	2.65
Diatoma vulgare	1,010,777	61.53	592,698	25.97
Fragilaria vaucheriae	0	0.00	13,432	0.59
Gomphonema intricatum	1,119	0.07	0	0.00
Gomphonema intricatum v. pumila	1,119	0.07	0	0.00
Gomphonema olivaceum	221,632	13.49	478,524	20.96
Gomphonema parvulum	0	0.00	1,679	0.07
Melosira granulata	3,358	0.20	3,358	0.15
Melosira varians	13,432	0.82	26,865	1.18
Navicula capitata v. hungarica	2,239	0.14	0	0.00
Navicula cryptocephala	6,716	0.41	82,273	3.60
Navicula cryptocephala v. veneta	5,597	0.34	28,544	1.25
Navicula decussis	1,119	0.07	0	0.00
Navicula pelliculosa	2,239	0.14	0	0.00
Navicula rhynchocephala	7,835	0.48	0	0.00
Navicula rhynchocephala v. germanii	0	0.00	6,716	0.29
Navicula secreta v. apiculata	2,239	0.14	3,358	0.15
Navicula tripunctata	3,358	0.20	13,432	0.59
Navicula spp.	2,239	0.14	11,753	0.51
Nitzschia acicularis	10,074	0.61	16,790	0.74
Nitzschia apiculata	0	0.00	11,753	0.51
Nitzschia capitellata	0	0.00	3,358	0.15
Nitzschia dissipata	14,552	0.89	130,964	5.74
Nitzschia fonticola	0	0.00	3,358	0.15
Nitzschia frustulum v. perminuta	0	0.00	6,716	0.29
Nitzschia gandersheimiensis	0	0.00	3,358	0.15
Nitzschia hungarica	0	0.00	5,037	0.22
Nitzschia ignorata	0	0.00	3,358	0.15
Nitzschia lauenbergiana	5,597	0.34	120,890	5.30
Nitzschia linearis	20,148	1.23	67,161	2.94
Nitzschia palea	7,835	0.48	58,766	2.57
Nitzschia rostellata	0	0.00	3,358	0.15

TABLE B-27 (CONT.)

Taxa	Location 2 Units/cm^2	Location 2 %	Location 3 Units/cm^2	Location 3 %
Nitzschia subcapitellata	0	0.00	3,358	0.15
Skeletonema potamos	7,835	0.48	11,753	0.51
Stephanodiscus astraea v. *minutula*	13,432	0.82	62,124	2.72
Stephanodiscus hantzschii	0	0.00	6,716	0.29
Stephanodiscus invisitatus	4,477	0.27	6,716	0.29
Stephanodiscus minutus	11,194	0.68	67,161	2.94
Stephanodiscus niagarae	0	0.00	1,679	0.07
Stephanodiscus tenuis	67,161	4.09	70,519	3.09
Stephanodiscus spp.	11,194	0.68	53,729	2.35
Surirella ovata	2,239	0.14	8,395	0.37
Synedra rumpens	0	0.00	6,716	0.29
Synedra rumpens v. *familiaris*	0	0.00	6,716	0.29
Synedra ulna	32,461	1.98	30,223	1.32
Thalassiosira pseudonana	4,477	0.27	3,358	0.15
Total Bacillariophyta	1,529,034	93.08	2,135,724	93.57
Ankistrodesmus falcatus	0	0.00	2,854	0.13
Micractinium pusillum	0	0.00	317	0.01
Scenedesmus abundans	0	0.00	634	0.03
Scenedesmus acuminatus	0	0.00	1,586	0.07
Scenedesmus dimorphus	353	0.02	2,220	0.10
Scenedesmus quadricauda	1,764	0.11	634	0.03
Unidentified coccoid green	2,117	0.13	4,440	0.19
Total Chlorophyta	4,234	0.26	12,685	0.56
Lyngbya limnetica	2,117	0.13	6,659	0.29
Lyngbya nordgaardii	4,235	0.26	0	0.00
Lyngbya spp.	52,579	3.20	39,004	1.71
Oscillatoria spp.	49,756	3.03	86,571	3.79
Total Cyanophyta	108,687	6.62	132,234	5.79
Euglena gracilis	353	0.02	0	0.00
Euglena spp.	0	0.00	1,268	0.06
Trachelomonas robusta	0	0.00	317	0.01
Total Euglenophyta	353	0.02	1,585	0.07
Cryptomonas spp.	353	0.02	317	0.01
Total Cryptophyta	353	0.02	317	0.01
TOTAL PERIPHYTON	1,642,661		2,282,545	

Appendix C

Benthic Macroinvertebrate Data

LIST OF TABLES

TABLE C-

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE MACHINE DATE: 04-AUG-81 PAGE 1
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 20-MAY-81 METHOD: PONAR

IOWA ELECTRIC - BENTHIC COMPOSITION

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	43.	812.7	71.7	-	-
TOTAL MACROSTOMIDAE	43.				
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
ROBACKIA CLAVIGER	4.	75.6	6.7	-	-
TANYPODINAE					
PROCLADIUS SP	1.	18.9	1.7	-	-
ORTHOCLADIINAE					
NEAR CORYNONEURA SP	11.	207.9	18.3	-	-
TOTAL CHIRONOMIDAE	16.				
MOLLUSCA					
GASTROPODA					
BASOMATOPHORA					
LYMNAEIDE					
LYMNAEA SP	1.	18.9	1.7	-	-
TOTAL LYMNAEIDE	1.				
TOTAL BENTHOS	60.	1134.0	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	5				

TABLE C-1 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   MACHINE DATE 04-AUG-81   PAGE 2
PROJECT NO IEL11   STATION 2   COLLECTION DATE 20-MAY-81   METHOD PONAR

IOWA ELECTRIC - BENTHIC COMPOSITION

T A X A	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	61.	1152.9	75.3	-	-
TOTAL MACROSTOMIDAE	61.				
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS FALLAX GROUP	1.	18.9	1.2	-	-
ROBACKIA CLAVIGER	19.	359.1	23.5	-	-
TOTAL CHIRONOMIDAE	20.				
TOTAL BENTHOS	81.	1530.9	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	3				

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   MACHINE DATE 04-AUG-81
PROJECT NO IEL11   STATION 3   COLLECTION DATE 20-MAY-81   METHOD PONAR

IOWA ELECTRIC - BENTHIC COMPOSITION

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	53.	1001.7	72.6	-	-
TOTAL MACROSTOMIDAE	53.				
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
TUBIFICIDAE					
UNIDENTIFIED IMM WITH CAPILLIFORMS	1.	18.9	1.4	-	-
UNIDENTIFIED IMM WITHOUT CAPILLIFORMS	5.	94.5	6.8	-	-
LIMNODRILUS HOFFMEISTERI	2.	37.8	2.7	-	-
TOTAL TUBIFICIDAE	8.				
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
ROBACKIA CLAVIGER	12.	226.8	16.4	-	-
TOTAL CHIRONOMIDAE	12.				
TOTAL BENTHOS	73.	1379.7	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	5				

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE MACHINE DATE 04-AUG-81 PAGE 4
PROJECT NO IFL11 STATION 4 COLLECTION DATE 20-MAY-81 METHOD PONAR

IOWA ELECTRIC - BENTHIC COMPOSITION

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	1	18.9	1.5	-	-
TOTAL MACROSTOMIDAE	1				
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
NAIDIDAE					
PIGUETIELLA MICHIGANENSIS	2	37.8	3.0	-	-
WAPSA MOBILIS	2	37.8	3.0	-	-
TOTAL NAIDIDAE	4				
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
EPHEMERIAE					
EPHORON SP	2	37.8	3.0	-	-
TOTAL EPHEMERIAE	2				
AMETROPIDAE					
PSEUDIRON CENTRALIS	1	18.9	1.5	-	-
TOTAL AMETROPIDAE	1				
ODONATA					
GOMPHIDAE					
IMMATURE GOMPHIDAE	1	18.9	1.5	-	-
TOTAL GOMPHIDAE	1				
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					

TABLE C-1 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE MACHINE DATE: 04-AUG-81 PAGE 5
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 20-MAY-81 METHOD: PONAR

IOWA ELECTRIC - BENTHIC COMPOSITION

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PARATENDIPES SP	1.	18.9	1.5	-	-
POLYPEDILUM SS SCALAENUM TYPE	1.	18.9	1.5	-	-
POLYPEDILUM SS SIMULANS TYPE	51.	963.9	77.3	-	-
POLYPEDILUM SP PUPA	3.	56.7	4.5	-	-
STICTOCHIRONOMUS SP	1.	18.9	1.5	-	-
TOTAL CHIRONOMIDAE	57.				
TOTAL BENTHOS	66.	1247.4	100.0	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	11				

TABLE C-2

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 21-NOV-81 PAGE 1
PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 18-AUG-81 METHOD: PONAR

IOWA ELECTRIC IEL-11 ETCOMP

T A X A	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	16.	302.4	34.04	-	-
TOTAL MACROSTOMIDAE	16.	302.4	34.04	-	-
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
ROBACKIA CLAVIGER	29.	548.1	61.70	-	-
ORTHOCLADIINAE					
NEAR CORYNONEURA SP	2.	37.8	4.26	-	-
TOTAL CHIRONOMIDAE	31.	585.9	65.96	-	-
TOTAL BENTHOS	47.	888.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	3				

TABLE C-2 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 21-NOV-81
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 18-AUG-81 METHOD: PONAR

IOWA ELECTRIC IEL-11 ETCOMP

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	10.	189.0	23.81	-	-
TOTAL MACROSTOMIDAE	10.	189.0	23.81	-	-
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
ROBACKIA CLAVIGER	32.	604.8	76.19	-	-
TOTAL CHIRONOMIDAE	32.	604.8	76.19	-	-
TOTAL BENTHOS	42.	793.8	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	2				

TABLE C-2 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 21-NOV-81 PAGE 3
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 18-AUG-81 METHOD: PONAR

IOWA ELECTRIC IEL-11 ETCOMP

T A X A	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	36.	680.4	69.23	-	-
TOTAL MACROSTOMIDAE	36.	680.4	69.23	-	-
NEMATODA					
UNIDENTIFIED NEMATODA	3.	56.7	5.77	-	-
ENTOPROCTA					
URNATELLIDAE					
URNATELLA GRACILIS	+	-	-	-	-
TOTAL URNATELLIDAE	+	-	-	-	-
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
AEOLOSOMATIDAE					
UNIDENTIFIED AEOLOSOMATIDAE	1.	18.9	1.92	-	-
TOTAL AEOLOSOMATIDAE	1.	18.9	1.92	-	-
NAIDIDAE					
PIGUETIELLA MICHIGANENSIS	1.	18.9	1.92	-	-
TOTAL NAIDIDAE	1.	18.9	1.92	-	-
TUBIFICIDAE					
LIMNODRILUS UDEKEMIANUS	1.	18.9	1.92	-	-
TOTAL TUBIFICIDAE	1.	18.9	1.92	-	-
ARTHROPODA					

TABLE C-2 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 21-NOV-81   PAGE 4
PROJECT NO: IEL11   STATION: 3   COLLECTION DATE: 18-AUG-81   METHOD: PONAR

IOWA ELECTRIC IEL-11 ETCOMP

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
CHERNOVSKIIA ORBICUS	3.	56.7	5.77	-	-
PARATENDIPES NEAR CONNECTENS TYPE	1.	18.9	1.92	-	-
ROBACKIA CLAVIGER	3.	56.7	5.77	-	-
ROBACKIA CLAVIGR PUPA	1.	18.9	1.92	-	-
ORTHOCLADIINAE					
NEAR CORYNONEURA SP	1.	18.9	1.92	-	-
TOTAL CHIRONOMIDAE	9.	170.1	17.31	-	-
MOLLUSCA					
PELECYPODA					
HETERODONATA					
SPHAERIIDAE					
SPHAERIUM TRANSVERSUM	1.	18.9	1.92	-	-
TOTAL SPHAERIIDAE	1.	18.9	1.92	-	-
TOTAL BENTHOS	52.	982.8	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	12				

TABLE C-2 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 21-NOV-81 PAGE 5
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 18-AUG-81 METHOD: PONAR

IOWA ELECTRIC IEL-11 ETCOMP

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
NEMATODA					
UNIDENTIFIED NEMATODA	1.	18.9	12.50	-	-
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
TUBIFICIDAE					
UNIDENTIFIED IMM WITHOUT CAPILLIFORMS	1.	18.9	12.50	-	-
BRANCHIURA SOWERBYI	1.	18.9	12.50	-	-
TOTAL TUBIFICIDAE	2.	37.8	25.00	-	-
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
CHERNOVSKIIA ORBICUS	1.	18.9	12.50	-	-
HARNISCHIA SP	3.	56.7	37.50	-	-
ORTHOCLADIINAE					
NEAR CORYNONEURA SP	1.	18.9	12.50	-	-
TOTAL CHIRONOMIDAE	5.	94.5	62.50	-	-
TOTAL BENTHOS	8.	151.2	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	6				

TABLE C-3

SUMMARY OF BENTHIC MACROINVERTEBRATF COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 11-JAN-82   PAGE 1
PROJECT NO: IEL11   STATION: 1   COLLECTION DATE: 18-NOV-81   METHOD: PONAR

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	2.	37.8	28.57	-	-
TOTAL MACROSTOMIDAE	2.	37.8	28.57	-	-
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
ROBACKIA CLAVIGER	1.	18.9	14.29	-	-
ORTHOCLADIINAE					
NEAR CORYNONEURA SP	4.	75.6	57.14	-	-
TOTAL CHIRONOMIDAE	5.	94.5	71.43	-	-
TOTAL BENTHOS	7.	132.3	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	3				

TABLE C-3 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 11-JAN-82 PAGE 2
PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 18-NOV-81 METHOD: PONAR

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

T A X A	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	7.	132.3	70.00	-	-
TOTAL MACROSTOMIDAE	7.	132.3	70.00	-	-
ARTHROPODA					
INSECTA					
TRICHOPTERA					
HYDROPSYCHIDAE					
HYDROPSYCHE ORRIS	1.	18.9	10.00	-	-
TOTAL HYDROPSYCHIDAE	1.	18.9	10.00	-	-
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
ROBACKIA CLAVIGER	2.	37.8	20.00	-	-
TOTAL CHIRONOMIDAE	2.	37.8	20.00	-	-
TOTAL BENTHOS	10.	189.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	3				

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 11-JAN-82

PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 18-NOV-81 METHOD: PONAR

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

T A X A	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	3.	56.7	14.29	-	-
TOTAL MACROSTOMIDAE	3.	56.7	14.29	-	-
ANNELIDA					
HIRUDINEA					
UNIDENTIFIED IMMATURE HIRUDINEA	2.	37.8	9.52	-	-
ARTHROPODA					
INSECTA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS SIMULANS TYPE	1.	18.9	4.76	-	-
TOTAL CHIRONOMIDAE	1.	18.9	4.76	-	-
MOLLUSCA					
GASTROPODA					
BASOMATOPHORA					
PHYSIDAE					
PHYSA SP	1.	18.9	4.76	-	-
TOTAL PHYSIDAE	1.	18.9	4.76	-	-
PELECYPODA					
HETERODONATA					
SPHAERIIDAE					
SPHAERIUM TRANSVERSUM	14.	264.6	66.67	-	-
TOTAL SPHAERIIDAE	14.	264.6	66.67	-	-
TOTAL BENTHOS	21.	396.9	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	5				

TABLE C-3 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 11-JAN-82 PAGE 4
PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 18-NOV-81 METHOD: PONAR

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

T A X A	REPLICATES (#/530 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
RHABDOCOELA					
MACROSTOMIDAE					
NEAR MACROSTOMUM SP	3.	56.7	3.53	-	-
TOTAL MACROSTOMIDAE	3.	56.7	3.53	-	-
ARTHROPODA					
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
CHERNOVSKIIA ORBICUS	3.	56.7	3.53	-	-
ROBACKIA CLAVIGER	75.	1417.5	88.24	-	-
ORTHOCLADIINAE					
NEAR CORYNONEURA SP	4.	75.6	4.71	-	-
TOTAL CHIRONOMIDAE	82.	1549.8	96.47	-	-
TOTAL BENTHOS	85.	1606.5	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	4				

TABLE C-4

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 20-MAY-81 METHOD: H-D

IOWA ELECTRIC BENTHOS IEL-11 ELCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
ENCHYTRAEIDAE					
UNIDENTIFIED ENCHYTRAEIDAE	1.	20.0	0.16	-	-
TOTAL ENCHYTRAEIDAE	1.	20.0	0.16	-	-
NAIDIDAE					
NAIS BEHNINGI	39.	780.0	6.09	-	-
NAIS BRETSCHERI	16.	320.0	2.50	-	-
NAIS VARIABILIS	7.	140.0	1.09	-	-
TOTAL NAIDIDAE	62.	1240.0	9.69	-	-
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
EPHEMERIDAE					
EPHORON SP	1.	20.0	0.16	-	-
TOTAL EPHEMERIDAE	1.	20.0	0.16	-	-
CAENIDAE					
CAENIS SP	2.	40.0	0.31	-	-
TOTAL CAENIDAE	2.	40.0	0.31	-	-
HEPTAGENIIDAE					
HEPTAGENIA DIABASIA	5.	100.0	0.78	-	-
STENONEMA SP	2.	40.0	0.31	-	-
TOTAL HEPTAGENIIDAE	7.	140.0	1.09	-	-
BAETIDAE					
BAETIS SP	19.	380.0	2.97	-	-
ISONYCHIA SP	59.	1180.0	9.22	-	-
TOTAL BAETIDAE	78.	1560.0	12.19	-	-
PLECOPTERA					
PERLIDAE					

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 1 COLLECTION DATE: 20-MAY-81 METHOD: H-D RUN DATE: 23-NOV-81 PAGE 2

IOWA ELECTRIC BENTHOS IEL-11 ETCOMP

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
PERLESTA PLACIDA	2.	40.0	0.31	-	-
TOTAL PERLIDAE	2.	40.0	0.31	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
HYDROPSYCHE ORRIS	60.	1200.0	9.37	-	-
HYDROPSYCHE ORRIS PUPA	2.	40.0	0.31	-	-
HYDROPSYCHE SIMULANS	19.	380.0	2.97	-	-
POTAMYIA FLAVA	10.	200.0	1.56	-	-
TOTAL HYDROPSYCHIDAE	91.	1820.0	14.22	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	169.	3380.0	26.41	-	-
SIMULIUM SP PUPA	189.	3780.0	29.53	-	-
TOTAL SIMULIIDAE	358.	7160.0	55.94	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS CONVICTUM TYPE	1.	20.0	0.16	-	-
RHEOTANYTARSUS SP	6.	120.0	0.94	-	-
RHEOTANYTARSUS SP PUPA	1.	20.0	0.16	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	5.	100.0	0.78	-	-
ORTHOCLADIINAE					
CRICOTOPUS BICINCTUS GROUP	3.	60.0	0.47	-	-
CRICOTOPUS TREMULUS GROUP	2.	40.0	0.31	-	-
EUKIEFFERIELLA SP	1.	20.0	0.16	-	-
NANOCLADIUS SP	5.	100.0	0.78	-	-
RHEOCRICOTOPUS SP	2.	40.0	0.31	-	-
THIENEMANNIELLA SP	1.	20.0	0.16	-	-
TOTAL CHIRONOMIDAE	27.	540.0	4.22	-	-
EMPIDIDAE					
UNIDENTIFIED EMPIDIDAE	11.	220.0	1.72	-	-
TOTAL EMPIDIDAE	11.	220.0	1.72	-	-
TOTAL BENTHOS	640.	12800.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	28				

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 20-MAY-81 METHOD: H-D RUN DATE: 23-NOV-81 PAGE

IOWA ELECTRIC BENTHOS IEL-11 ECOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
NAIDIDAE					
NAIS BEHNINGI	91.	1820.0	16.73	-	-
NAIS BRETSCHERI	6.	120.0	1.10	-	-
TOTAL NAIDIDAE	97.	1940.0	17.83	-	-
ARTHROPODA					
ARACHNIDA					
ACARINA					
UNIDENTIFIED HYDRACARINA	1.	20.0	0.18	-	-
INSECTA					
EPHEMEROPTERA					
HEPTAGENIIDAE					
HEPTAGENIA DIABASIA	6.	120.0	1.10	-	-
STENONEMA INTGRUM	1.	20.0	0.18	-	-
STENONEMA SP	3.	60.0	0.55	-	-
TOTAL HEPTAGENIIDAE	10.	200.0	1.84	-	-
BAETIDAE					
BAETIS SP	7.	140.0	1.29	-	-
ISONYCHIA SP	33.	660.0	6.07	-	-
TOTAL BAETIDAE	40.	800.0	7.35	-	-
PLECOPTERA					
PERLIDAE					
PERLESTA PLACIDA	3.	60.0	0.55	-	-
TOTAL PERLIDAE	3.	60.0	0.55	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
HYDROPSYCHE ORRIS	189.	3780.0	34.74	-	-
HYDROPSYCHE ORRIS PUPA	1.	20.0	0.18	-	-
HYDROPSYCHE SIMULANS	47.	940.0	8.64	-	-
POTAMYIA FLAVA	20.	400.0	3.68	-	-

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: [illegible]5-MAY-81 METHOD: H-D

RUN DATE: 23-NOV-81 PAGE 4

IOWA ELECTRIC BENTHOS IEL-11 ETCOMF

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL HYDROPSYCHIDAE	257.	5140.0	47.24	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	100.	2000.0	18.38	-	-
SIMULIUM SP PUPA	17.	340.0	3.12	-	-
TOTAL SIMULIIDAE	117.	2340.0	21.51	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS CONVICTUM TYPE	5.	100.0	0.92	-	-
RHEOTANYTARSUS SP	1.	20.0	0.18	-	-
RHEOTANYTARSUS SP PUPA	1.	20.0	0.18	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	3.	60.0	0.55	-	-
ORTHOCLADIINAE					
CRICOTOPUS BICINCTUS GROUP	1.	20.0	0.18	-	-
CRICOTOPUS TREMULUS GROUP	1.	20.0	0.18	-	-
PARAKIEFFERIELLA SP	1.	20.0	0.18	-	-
TOTAL CHIRONOMIDAE	13.	260.0	2.39	-	-
EMPIDIDAE					
UNIDENTIFIED EMPIDIDAE	6.	120.0	1.10	-	-
TOTAL EMPIDIDAE	6.	120.0	1.10	-	-
TOTAL BENTHOS	544.	10880.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	23				

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: FX111 STATION: 3 COLLECTION DATE: 20-MAY-81 METHOD: H-D RUN DATE: 23-NOV-81 PAGE 5

IOWA ELECTRIC BENTHOS IEL-11 ETCOMP

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
TRICLADIDA					
PLANARIIDAE					
UNIDENTIFIED PLANARIIDAE	2.	40.0	0.37	-	-
TOTAL PLANARIIDAE	2.	40.0	0.37	-	-
ECTOPROCTA					
PHYLACTOLAEMATA					
PLUMATELLINA					
PLUMATELLIDAE					
UNIDENTIFIED PLUMATELLIDAE	+	-	-	-	-
TOTAL PLUMATELLIDAE	+	-	-	-	-
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
ENCHYTRAEIDAE					
UNIDENTIFIED ENCHYTRAEIDAE	1.	20.0	0.18	-	-
TOTAL ENCHYTRAEIDAE	1.	20.0	0.18	-	-
NAIDIDAE					
NAIS BEHNINGI	37.	740.0	6.84	-	-
NAIS BRETSCHERI	88.	1760.0	16.27	-	-
NAIS ELINGUIS	11.	220.0	2.03	-	-
NAIS VARIABILIS	15.	300.0	2.77	-	-
TOTAL NAIDIDAE	151.	3020.0	27.91		-
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
HEPTAGENIIDAE					

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: EIL11   STATION: 3   COLLECTION DATE: 20-MAY-81   METHOD: H-D   RUN DATE: 23-NOV-81   PAGE 6

IOWA ELECTRIC BENTHOS IEL-11 ETCOMP

TAXA	REPLICATES (#/500 CM2) 6	MEAN (#/M2)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
HEPTAGENIA DIABASIA	5.	100.0	0.92	-	-
STENONEMA INTEGRUM	1.	20.0	0.18	-	-
STENONEMA SP	4.	80.0	0.74	-	-
TOTAL HEPTAGENIIDAE	10.	200.0	1.85	-	-
BAETIDAE					
ISONYCHIA SP	34.	680.0	6.28	-	-
TOTAL BAETIDAE	34.	680.0	6.28	-	-
PLECOPTERA					
PERLIDAE					
PERLESTA PLACIDA	1.	20.0	0.18	-	-
TOTAL PERLIDAE	1.	20.0	0.18	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
CHEUMATOPSYCHE SP	1.	20.0	0.18	-	-
HYDROPSYCHE ORRIS	98.	1960.0	18.11	-	-
HYDROPSYCHE ORRIS PUPA	2.	40.0	0.37	-	-
HYDROPSYCHE SIMULANS	26.	520.0	4.81	-	-
HYDROPSYCHE SIMULANS PUPA	1.	20.0	0.18	-	-
HYDROPSYCHE VALANIS	1.	20.0	0.18	-	-
POTAMYIA FLAVA	10.	200.0	1.85	-	-
TOTAL HYDROPSYCHIDAE	139.	2780.0	25.69	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	142.	2840.0	26.25	-	-
SIMULIUM SP PUPA	52.	1040.0	9.61	-	-
TOTAL SIMULIIDAE	194.	3880.0	35.86	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS CONVICTUM TYPE	2.	40.0	0.37	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	1.	20.0	0.18	-	-
ORTHOCLADIINAE					
CRICOTOPUS TIBIALIS	1.	20.0	0.18	-	-
CRICOTOPUS TREMULUS GROUP	4.	80.0	0.74	-	-
TOTAL CHIRONOMIDAE	8.	160.0	1.48	-	-

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 23-NOV-81   PAGE 7

PROJECT NO: EJL11   STATION: 3   COLLECTION DATE: 20-MAY-81   METHOD: H-D

IOWA ELECTRIC BENTHOS TEL-11 ETCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
EMPIDIDAE					
UNIDENTIFIED EMPIDIDAE	1.	20.0	0.18	-	-
TOTAL EMPIDIDAE	1.	20.0	0.18	-	-
TOTAL BENTHOS	541.	10820.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	28				

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 20-MAY-81 METHOD: H-D RUN DATE: 03-NOV-81 PAGE 8

IOWA ELECTRIC BENTHOS IEL-11 FTCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
NAIDIDAE					
NAIS BEHNINGI	37.	740.0	7.30	-	-
NAIS BRETSCHERI	14.	280.0	2.76	-	-
NAIS ELINGUIS	1.	20.0	0.20	-	-
NAIS VARIABILIS	3.	60.0	0.59	-	-
TOTAL NAIDIDAE	55.	1100.0	10.85	-	-
ARTHROPODA					
ARACHNIDA					
ACARINA					
UNIDENTIFIED HYDRACARINA	2.	40.0	0.39	-	-
INSECTA					
EPHEMEROPTERA					
EPHEMERIDAE					
EPHORON SP	1.	20.0	0.20	-	-
TOTAL EPHEMERIDAE	1.	20.0	0.20	-	-
HEPTAGENIIDAE					
HEPTAGENIA DIABASIA	7.	140.0	1.38	-	-
STENONEMA EXIGUUM	1.	20.0	0.20	-	-
STENONEMA INTGRUM	1.	20.0	0.20	-	-
STENONEMA TERMINATUM	2.	40.0	0.39	-	-
STENONEMA SP	6.	120.0	1.18	-	-
TOTAL HEPTAGENIIDAE	17.	340.0	3.35	-	-
BAETIDAE					
BAETIS SP	4.	80.0	0.79	-	-
ISONYCHIA SP	42.	840.0	8.28	-	-
TOTAL BAETIDAE	46.	920.0	9.07	-	-
PLECOPTERA					
PERLIDAE					
PERLESTA PLACIDA	2.	40.0	0.39	-	-

TABLE C-4 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 20-MAY-81 METHOD: H-D

IOWA ELECTRIC BENTHOS IEL-11 ETCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL PERLIDAE	2.	40.0	0.39	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
HYDROPSYCHE ORRIS	43.	860.0	8.48	-	-
HYDROPSYCHE SIMULANS	41.	820.0	8.09	-	-
HYDROPSYCHE SIMULANS PUPA	1.	20.0	0.20	-	-
POTAMYIA FLAVA	5.	100.0	0.99	-	-
TOTAL HYDROPSYCHIDAE	90.	1800.0	17.75	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	236.	4720.0	46.55	-	-
SIMULIUM SP PUPA	27.	540.0	5.33	-	-
TOTAL SIMULIIDAE	263.	5260.0	51.87	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS CONVICTUM TYPE	4.	80.0	0.79	-	-
RHEOTANYTARSUS SP	4.	80.0	0.79	-	-
RHEOTANYTARSUS SP PUPA	2.	40.0	0.39	-	-
TANYTARSUS SP	1.	20.0	0.20	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	7.	140.0	1.38	-	-
ORTHOCLADIINAE					
CRICOTOPUS BICINCTUS GROUP	2.	40.0	0.39	-	-
CRICOTOPUS TREMULUS GROUP	2.	40.0	0.39	-	-
NANOCLADIUS SP	4.	80.0	0.79	-	-
PARAKIEFFERIELLA SP	1.	20.0	0.20	-	-
RHEOCRICOTOPUS SP	1.	20.0	0.20	-	-
THIENEMANNIELLA SP	1.	20.0	0.20	-	-
TOTAL CHIRONOMIDAE	29.	580.0	5.72	-	-
EMPIDIDAE					
UNIDENTIFIED EMPIDIDAE	2.	40.0	0.39	-	-
TOTAL EMPIDIDAE	2.	40.0	0.39	-	-
TOTAL BENTHOS	507.	10140.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	31				

TABLE C-5

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

RUN DATE: 23-NOV-81 PAGE 1

PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 17-AUG-81 METHOD: H-D

IOWA ELECTRIC BENTHOS IEL11-H ETCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	2.	40.0	1.27	-	-
STENONEMA SP	12.	240.0	7.59	-	-
TOTAL HEPTAGENIIDAE	14.	280.0	8.86	-	-
BAETIDAE					
ISONYCHIA SP	6.	120.0	3.80	-	-
TOTAL BAETIDAE	6.	120.0	3.80	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	13.	260.0	8.23	-	-
CHEUMATOPSYCHE SP	1.	20.0	0.63	-	-
HYDROPSYCHE ORRIS	24.	480.0	15.19	-	-
HYDROPSYCHE SIMULANS	56.	1120.0	35.44	-	-
HYDROPSYCHE SIMULANS PUPA	1.	20.0	0.63	-	-
POTAMYIA FLAVA	2.	40.0	1.27	-	-
TOTAL HYDROPSYCHIDAE	97.	1940.0	61.39	-	-
COLEOPTERA					
ELMIDAE					
STENELMIS SP	2.	40.0	1.27	-	-
STENELMIS SP ADULT	1.	20.0	0.63	-	-
TOTAL ELMIDAE	3.	60.0	1.90	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	4.	80.0	2.53	-	-
SIMULIUM SP PUPA	2.	40.0	1.27	-	-
TOTAL SIMULIIDAE	6.	120.0	3.80	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS CONVICTUM TYPE	10.	200.0	6.33	-	-
RHEOTANYTARSUS SP	1.	20.0	0.63	-	-

TABLE C-5 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

RUN DATE: 23-NOV-81 PAGE 2

PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 17-AUG-81 METHOD: H-D

IOWA ELECTRIC BENTHOS IEL11-H ETCOMP

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
STENOCHIRONOMUS SP	11.	220.0	6.96	-	-
STENOCHIRONOMUS SP PUPA	2.	40.0	1.27	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	6.	120.0	3.80	-	-
TOTAL CHIRONOMIDAE	30.	600.0	18.99	-	-
EMPIDIDAE					
UNIDENTIFIED EMPIDIDAE	2.	40.0	1.27	-	-
TOTAL EMPIDIDAE	2.	40.0	1.27	-	-
TOTAL BENTHOS	158.	3160.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	19				

TABLE C-5 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 17-AUG-81 METHOD: H-D

RUN DATE: 23-NOV-81 PAGE 3

IOWA ELECTRIC BENTHOS IEL11-H ETCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
CAENIDAE					
CAENIS SP	13.	260.0	10.16	-	-
TRICORYTHODES SP	1.	20.0	0.78	-	-
TOTAL CAENIDAE	14.	280.0	10.94	-	-
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	9.	180.0	7.03	-	-
STENONEMA INTEGRUM	17.	340.0	13.28	-	-
STENONEMA SP	18.	360.0	14.06	-	-
TOTAL HEPTAGENIIDAE	44.	880.0	34.37	-	-
BAETIDAE					
BAETIS SP	3.	60.0	2.34	-	-
ISONYCHIA SP	12.	240.0	9.37	-	-
TOTAL BAETIDAE	15.	300.0	11.72	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	15.	300.0	11.72	-	-
HYDROPSYCHE ORRIS	3.	60.0	2.34	-	-
HYDROPSYCHE SIMULANS	30.	600.0	23.44	-	-
POTAMYIA FLAVA	2.	40.0	1.56	-	-
TOTAL HYDROPSYCHIDAE	50.	1000.0	39.06	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	1.	20.0	0.78	-	-
SIMULIUM SP PUPA	1.	20.0	0.78	-	-
TOTAL SIMULIIDAE	2.	40.0	1.56	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
RHEOTANYTARSUS SP	1.	20.0	0.78	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	2.	40.0	1.56	-	-

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TABLE C-5 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 17-AUG-81 METHOD: H-D

IOWA ELECTRIC BENTHOS IEL11-H ETCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL CHIRONOMIDAE	3.	60.0	2.34	-	-
TOTAL BENTHOS	128.	2560.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	15				

TABLE C-5 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE

PROJECT NO: IEL11 STATION: 4 COLLECTION DATE: 17-AUG-81 METHOD: H-D

RUN DATE: 23-NOV-81 PAGE 5

IOWA ELECTRIC BENTHOS IEL11-H ETCOMP

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
CAENIDAE					
CAENIS SP	18.	360.0	4.86	-	-
TRICORYTHODES SP	1.	20.0	0.27	-	-
TOTAL CAENIDAE	19.	380.0	5.14	-	-
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	19.	380.0	5.14	-	-
STENONEMA INTGRUM	21.	420.0	5.68	-	-
STENONEMA SP	7.	140.0	1.89	-	-
TOTAL HEPTAGENIIDAE	47.	940.0	12.70	-	-
BAETIDAE					
BAETIS SP	17.	340.0	4.59	-	-
ISONYCHIA SP	37.	740.0	10.00	-	-
TOTAL BAETIDAE	54.	1080.0	14.59	-	-
MEGALOPTERA					
CORYDALIDAE					
CORYDALUS CORNUTUS	1.	20.0	0.27	-	-
TOTAL CORYDALIDAE	1.	20.0	0.27	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	28.	560.0	7.57	-	-
HYDROPSYCHE ORRIS	57.	1140.0	15.41	-	-
HYDROPSYCHE SIMULANS	72.	1440.0	19.46	-	-
HYDROPSYCHE SIMULANS PUPA	1.	20.0	0.27	-	-
POTAMYIA FLAVA	16.	320.0	4.32	-	-
TOTAL HYDROPSYCHIDAE	174.	3480.0	47.03	-	-
DIPTERA					
SIMULIIDAE					
SIMULIUM SP	46.	920.0	12.43	-	-
SIMULIUM SP PUPA	9.	180.0	2.43	-	-
TOTAL SIMULIDAE	55.	1100.0	14.86	-	-

TABLE C-5 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE — RUN DATE: 23-NOV-81 — PAGE 6

PROJECT NO: IEL11 — STATION: 4 — COLLECTION DATE: 17-AUG-81 — METHOD: H-D

IOWA ELECTRIC BENTHOS IEL11-H ETCOMP

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
CHIRONOMIDAE					
CHIRONOMINAE					
POLYPEDILUM SS CONVICTUM TYPE	4.	80.0	1.08	-	-
RHEOTANYTARSUS SP	1.	20.0	0.27	-	-
STENOCHIRONOMS SP	12.	240.0	3.24	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	3.	60.0	0.81	-	-
TOTAL CHIRONOMIDAE	20.	400.0	5.41	-	-
TOTAL BENTHOS	370.	7400.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	19				

TABLE C-6

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 04-FEB-82   PAGE 1
PROJECT NO: IEL11   STATION: 1   COLLECTION DATE: 18-NOV-81   METHOD: H-D

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/500 CM2) 6	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
NAIDIDAE					
NAIS BEHNINGI	1.	20.0	0.41	-	-
NAIS BRETSCHERI	1.	20.0	0.41	-	-
TOTAL NAIDIDAE	2.	40.0	0.82	-	-
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	23.	460.0	9.39	-	-
STENONEMA INTEGRUM	4.	80.0	1.63	-	-
STENONEMA SP	16.	320.0	6.53	-	-
TOTAL HEPTAGENIIDAE	43.	860.0	17.55	-	-
BAETIDAE					
BAETIS SP	1.	20.0	0.41	-	-
TOTAL BAETIDAE	1.	20.0	0.41	-	-
PLECOPTERA					
PERLODIDAE					
ISOPERLA SP	16.	320.0	6.53	-	-
TOTAL PERLODIDAE	16.	320.0	6.53	-	-
TAENIOPTERYGIDAE					
TAENIOPTERYX SP	1.	20.0	0.41	-	-
TOTAL TAENIOPTERYGIDAE	1.	20.0	0.41	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	35.	700.0	14.29	-	-
HYD[illegible]SYCHE ORRIS	4[illegible]	920.0	18.78	-	-
HYD[illegible]SYCHE SIMULANS	3[illegible]	680.0	13.88	-	-
HYDROPSYCHE VALANIS	1.	20.0	0.41	-	-

TABLE C-6 (CONT.)

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
POTAMYIA FLAVA	23.	460.0	9.39	-	-
TOTAL HYDROPSYCHIDAE	139.	2780.0	56.73	-	-
DIPTERA					
CHIRONOMIDAE					
CHIRONOMINAE					
PARATANYTARSUS SP	2.	40.0	0.82	-	-
POLYPEDILUM SS CONVICTUM TYPE	4.	80.0	1.63	-	-
RHEOTANYTARSUS SP	11.	220.0	4.49	-	-
TANYPODINAE					
THIENEMANNIMYIA SERIES	4.	80.0	1.63	-	-
ORTHOCLADIINAE					
BRILLIA SP	1.	20.0	0.41	-	-
CRICOTOPUS TREMULUS GROUP	1.	20.0	0.41	-	-
ORTHOCLADIUS SP	9.	180.0	3.67	-	-
PARAKIEFFERIELLA SP	8.	160.0	3.27	-	-
RHEOCRICOTOPUS SP	1.	20.0	0.41	-	-
TOTAL CHIRONOMIDAE	41.	820.0	16.73	-	-
EMPIDIDAE					
UNIDENTIFIED EMPIDIDAE	2.	40.0	0.82	-	-
TOTAL EMPIDIDAE	2.	40.0	0.82	-	-
TOTAL BENTHOS	245.	4900.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	23				

TABLE C-6 (CONT.)

PROJECT NO: IEL11 STATION: 2 COLLECTION DATE: 18-NOV-81 METHOD: H-D

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ANNELIDA					
OLIGOCHAETA					
PLESIOPORA					
NAIDIDAE					
NAIS BRETSCHERI	1.	20.0	0.88	-	-
TOTAL NAIDIDAE	1.	20.0	0.88	-	-
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
CAENIDAE					
TRICORYTHODES SP	1.	20.0	0.88	-	-
TOTAL CAENIDAE	1.	20.0	0.88	-	-
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	12.	240.0	10.53	-	-
STENONEMA SP	9.	180.0	7.89	-	-
TOTAL HEPTAGENIIDAE	21.	420.0	18.42	-	-
PLECOPTERA					
PERLODIDAE					
ISOPERLA SP	8.	160.0	7.02	-	-
TOTAL PERLODIDAE	8.	160.0	7.02	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	14.	280.0	12.28	-	-
CHEUMATOPSYCHE SP	1.	20.0	0.88	-	-
HYDROPSYCHE ORRIS	30.	600.0	26.32	-	-
HYDROPSYCHE SIMULANS	28.	560.0	24.56	-	-
POTAMYIA FLAVA	3.	60.0	2.63	-	-
TOTAL HYDROPSYCHIDAE	76.	1520.0	66.67	-	-
DIPTERA					
SIMULIDAE					
SIMULIUM SP	[illegible]	20.0	0.88	-	-

TABLE C-6 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 04-FEB-82
PROJECT NO: IEL11   STATION: 2   COLLECTION DATE: 18-NOV-81   METHOD: H-D

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
TOTAL SIMULIDAE	1.	20.0	0.88	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
RHEOTANYTARSUS SP	4.	80.0	3.51	-	-
ORTHOCLADIINAE					
CRICOTOPUS TREMULUS GROUP	1.	20.0	0.88	-	-
ORTHOCLADIUS SP	1.	20.0	0.88	-	-
TOTAL CHIRONOMIDAE	6.	120.0	5.26	-	-
TOTAL BENTHOS	114.	2280.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	14				

TABLE C-6 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE RUN DATE: 04-FEB-82 PAGE 5
PROJECT NO: IEL11 STATION: 3 COLLECTION DATE: 18-NOV-81 METHOD: H-D

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCENT OCCUR	STANDARD ERROR	95% CONF LIMIT
PLATYHELMINTHES					
TURBELLARIA					
TRICLADIDA					
PLANARIIDAE					
UNIDENTIFIED PLANARIIDAE	1.	20.0	0.59	-	-
TOTAL PLANARIIDAE	1.	20.0	0.59	-	-
RHABDOCOELA					
UNIDENTIFIED RHABDOCOELA	2.	40.0	1.18	-	-
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	21.	420.0	12.35	-	-
STENONEMA SP	6.	120.0	3.53	-	-
TOTAL HEPTAGENIIDAE	27.	540.0	15.88	-	-
PLECOPTERA					
PERLODIDAE					
ISOPERLA SP	36.	720.0	21.18	-	-
TOTAL PERLODIDAE	36.	720.0	21.18	-	-
TAENIOPTERYGIDAE					
TAENIOPTERYX SP	2.	40.0	1.18	-	-
TOTAL TAENIOPTERYGIDAE	2.	40.0	1.18	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	8.	160.0	4.71	-	-
HYDROPSYCHE ORRIS	29.	580.0	17.06	-	-
HYDROPSYCHE SIMULANS	48.	960.0	28.24	-	-
POTAMYIA FLAVA	8.	160.0	4.71	-	-
TOTAL HYDROPSYCHIDAE	93.	1860.0	54.71	-	-
DIPTERA					
SIMULIDAE					

TABLE C-6 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 04-FEB-82   PAGE 6
PROJECT NO: IEL11   STATION: 3   COLLECTION DATE: 18-NOV-81   METHOD: H-D

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
SIMULIUM SP PUPA	1.	20.0	0.59	-	-
TOTAL SIMULIDAE	1.	20.0	0.59	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
RHEOTANYTARSUS SP	4.	80.0	2.35	-	-
RHEOTANYTARSUS SP PUPA	1.	20.0	0.59	-	-
ORTHOCLADIINAE					
ORTHOCLADIUS SP	1.	20.0	0.59	-	-
TOTAL CHIRONOMIDAE	6.	120.0	3.53	-	-
MOLLUSCA					
GASTROPODA					
BASOMATOPHORA					
PHYSIDAE					
PHYSA SP	2.	40.0	1.18	-	-
TOTAL PHYSIDAE	2.	40.0	1.18	-	-
TOTAL BENTHOS	170.	3400.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	15				

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 04-FEB-82   PAGE 7
PROJECT NO: IEL11   STATION: 4   COLLECTION DATE: 18-NOV-81   METHOD: H-D

IOWA ELECTRIC - IEL11H

BENTHIC MACROINVERTEBRATE ABUNDANCE

T A X A	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ENTOPROCTA					
URNATELLIDAE					
URNATELLA GRACILIS	.	-	-	-	-
TOTAL URNATELLIDAE	;	-	-	-	-
ARTHROPODA					
INSECTA					
EPHEMEROPTERA					
HEPTAGENIIDAE					
HEPTAGENIA FLAVESCENS	3.	60.0	3.37	-	-
STENONEMA SP	1.	20.0	1.12	-	-
TOTAL HEPTAGENIIDAE	4.	80.0	4.49	-	-
PLECOPTERA					
PERLODIDAE					
ISOPERLA SP	1.	20.0	1.12	-	-
TOTAL PERLODIDAE	1.	20.0	1.12	-	-
TRICHOPTERA					
HYDROPSYCHIDAE					
IMMATURE HYDROPSYCHIDAE	15.	300.0	16.85	-	-
HYDROPSYCHE ORRIS	28.	560.0	31.46	-	-
HYDROPSYCHE SIMULANS	28.	560.0	31.46	-	-
POTAMYIA FLAVA	3.	60.0	3.37	-	-
TOTAL HYDROPSYCHIDAE	74.	1480.0	83.15	-	-
DIPTERA					
SIMULIDAE					
SIMULIUM SP	4.	80.0	4.49	-	-
SIMULIUM SP PUPA	2.	40.0	2.25	-	-
TOTAL SIMULIDAE	6.	120.0	6.74	-	-
CHIRONOMIDAE					
CHIRONOMINAE					
PO[illegible]EDILUM SS CONVICTUM TYPE	[illegible]	20.0	1.12	-	-
RH[illegible]ANYTARSUS SP	[illegible]	40.0	2.25	-	-

TABLE C-6 (CONT.)

SUMMARY OF BENTHIC MACROINVERTEBRATE COMPOSITION, ABUNDANCE, AND PERCENT OCCURRENCE   RUN DATE: 04-FEB-82   PAGE 8
PROJECT NO: IEL11   STATION: 4   COLLECTION DATE: 18-NOV-81   METHOD: H-D

IOWA ELECTRIC - IEL11B

BENTHIC MACROINVERTEBRATE ABUNDANCE

TAXA	REPLICATES (#/500 CM2) A	MEAN (#/M2)	PERCNT OCCUR	STANDARD ERROR	95% CONF LIMIT
ORTHOCLADIINAE					
ORTHOCLADIUS SP	1.	20.0	1.12	-	-
TOTAL CHIRONOMIDAE	4.	80.0	4.49	-	-
TOTAL BENTHOS	89.	1780.0	100.00	-	-
NUMBER OF SPECIES FOUND IN EACH REPLICATE	13				

REPORT

TO THE

IOWA ELECTRIC LIGHT AND POWER
CEDAR RAPIDS, IOWA

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM FOR THE DUANE ARNOLD ENERGY CENTER CEDAR RAPIDS, IOWA

ANNUAL REPORT - PART I
SUMMARY AND INTERPRETATION
JANUARY-DECEMBER 1981

FOR SUBMITTAL TO
THE NUCLEAR REGULATORY COMMISSION

PREPARED AND SUBMITTED
BY
HAZLETON ENVIRONMENTAL SCIENCES
PROJECT NO. 8001-100

Approved by: L. G. Huebner
L. G. Huebner
Director, Nuclear Sciences

11 March 1982

HAZLETON
ENVIRONMENTAL SCIENCES
A DIVISION OF HAZLETON LABORATORIES AMERICA, INC.
1500 FRONTAGE ROAD, NORTHBROOK, ILLINOIS 60062, U.S.A.

REPORT

TO THE

IOWA ELECTRIC LIGHT AND POWER
CEDAR RAPIDS, IOWA

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM
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Approved by: L. G. Huebner
L. G. Huebner
Director, Nuclear Sciences

11 March 1982

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PREFACE

The staff members of the Nuclear Sciences Department of Hazleton Environmental Sciences, a Division of Hazleton Laboratories America, Inc. (HES), were responsible for the acquisition of data presented in this report. All environmental samples, with the exception of aquatic, were collected by personnel of DAEC. Aquatic samples were collected by Ecological Analysts, Inc. personnel.

The report was prepared by C. R. Marucut, Section Supervisor. She was assisted in the report preparation by L. Nicia, Group Leader, and E. Petray, Technical Writer, under the direction of L. G. Huebner, Director, Nuclear Sciences.

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LIST OF TABLES

1.0 INTRODUCTION

This report summarized and interprets results of the Environmental Radiological Monitoring Program conducted by Hazleton Environmental Sciences at the Duane Arnold Energy Center, Cedar Rapids, Iowa, during the period January - December, 1981. This Program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the Plant on its surroundings.

Tabulation of the individual analyses made during the year are not included in this report. These data are included in a reference document (Hazleton Environmental Sciences, 1982) available at the Iowa Electric Light and Power Company, Nuclear Support Services Department.

Duane Arnold Energy Center (DAEC) is located in the Linn County on the Cedar River, Iowa, and is operated by Iowa Electric Light and Power Company. Duane Arnold I Nuclear Station is a 538 MWe boiling water reactor. Initial criticality was attained on 23 March 1974. The reactor reached 100% power on 12 August 1974. Commercial operation began on 1 February 1975.

2.0 SUMMARY

The Environmental Radiological Monitoring Program required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Duane Arnold Nuclear Generating Plant is described. Results for 1981 are summarized and discussed.

Results obtained for gross beta in airborne particulates collected during the first three quarters of 1981 and presence of relatively short-lived fission products, such as niobium-95, zirconium-95, ruthenium-103, and cerium-144 in some of the airborne particulates and soil samples show a moderate effect of fallout from atmospheric nuclear detonation of a 200 kiloton to 1 megaton range device on 16 October 1980. Presence of other fission products, mostly strontium-90 and cesium-137, in some of the sampling media indicates a long range effect on the environment from fallout resulting from previous atmospheric nuclear tests.

No effect on the environment due to the operation of the Duane Arnold Nuclear Plant is indicated.

3.0 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

3.1 Program Design and Data Interpretation

The purpose of the Environmental Radiological Monitoring Program at the Duane Arnold Energy Center (DAEC) is to assess the impact of the plant on its environment. For this purpose, samples are collected from the air, terrestrial, and aquatic environments and analyzed for radioactive content. In addition, ambient gamma radiation levels are monitored by thermoluminescent dosimeters (TLD's).

Sources of environmental radiation include the following:

(1) natural background radiation arising from cosmic rays and primordial radionuclides;

(2) fallout from atmospheric nuclear detonations;

(3) releases from nuclear power plants.

In interpreting the data, effects due to the DAEC operation must be distinguished from those due to other sources.

A major interpretive aid in assessment of these effects is the design of the monitoring program at the DAEC which is based on the indicator-control concept. Most types of samples are collected both at indicator locations (nearby, downwind, or downstream) and at control locations (distant, upwind, or upstream). A station effect would be indicated if the radiation level at an indicator location was significantly larger than that at the control location. The difference would have to be greater than could be accounted for by typical fluctuations in radiation levels arising from other sources.

An additional interpretive technique involves analyses for specific radionuclides present in the environmental samples collected from the DAEC site. The DAEC's monitoring program includes analyses for strontium -89, strontium-90, and iodine-131, which are fission products, and tritium, which is produced by cosmic rays and also by nuclear power plants. Most samples are also analyzed for gamma-emitting isotopes with results for the following groups quantified: zirconium-95, cesium-137, and cerium-144. These three gamma-emitting isotopes were selected as radiological impact indicators because of the different characteristic

proportions in which they appear in the fission product mix produced by a nuclear reactor and that produced by a nuclear detonation. Each of the three isotopes is produced in roughly equivalent amounts by a reactor: each constitutes about 10% of the total activity of fission products 10 days after reactor shutdown. On the other hand, 10 days after a nuclear explosion, the contributions of zirconium-95, cerium-144, and cesium-137 to the activity of the resulting debris are in the approximate ratio 4:1:0.03 (Eisenbud, 1963).

The other group quantified consists of niobium-95, ruthenium-103, and -106, cesium-134, barium-lanthanum-140, and cerium-141. These isotopes are released in small quantities by nuclear power plants, but to date their major source of injection into the general environment has been atmospheric nuclear testing. Nuclides of the next group, manganese-54, cobalt-58, and -60, and zinc-65, are activation products and arise from activation of corrosion products. They are typical components of nuclear power plant's effluents, but are not produced in significant quantities by nuclear detonations. Nuclides of the final group, beryllium-7, which is of cosmogenic origin, and potassium-40, a naturally-occuring isotope, were chosen as calibration monitors and should not be considered radiological impact indicators.

Characteristic properties of isotopes quantified in gamma-spectroscopic analyses are presented in Table 5.1. Other means of distinguishing sources of environmental radiation can be employed in interpreting the data. Current radiation levels can be compared with previous levels, including those measured before the Plant became operational. Results of the DAEC's Monitoring Program can be related to those obtained in other parts of the world. Finally, results can be related to events known to cause elevated levels of radiation in the environment, e.g., atmospheric nuclear detonations.

3.2 Program Description

The sampling and analysis schedule for the environmental radiological monitoring program at the DAEC is summarized in Table 5.2 and is briefly reviewed below. Table 5.3 defines the sampling location codes used in Table 5.2 and specifies for each location its type (indicator or control) and its distance, direction, and sector relative to the reactor site. The types of samples collected at each location and the frequency of collections are presented in Table 5.4 using codes defined in Table 5.5.

To monitor the air environment, airborne particulates are collected on membrane filters by continuous pumping at sixteen locations. Also, airborne iodine is collected by continuous pumping through charcoal filters at eight of these locations. Twelve of the sixteen locations

are indicators and four are controls (D-1, D-2, D-12, and D-13). Filters are changed and counted weekly. Particulate filters are analyzed for gross beta activity and charcoal filters for iodine-131.

Charcoal filters are analyzed on two composites: one from control locations D-8, D-12, and D-14, and one from indicator locations D-4, D-5, D-7, D-11, and D-15. If iodine-131 is detected, each cartridge is analyzed individually. Quarterly composites of airborne particulates from each location are analyzed for strontium-89, strontium-90, and gamma-scanned on a Ge(Li) detector.

Ambient gamma radiation is monitored at sixteen air sampling locations. In addition, gamma radiation is monitored at forty-eight (48) special locations: sixteen in a circle within 0.5 mi radius from DAEC stack; sixteen (16) in 22.5 sectors within 1 mi from DAEC stack; and sixteen (16) in 22.5° sectors between 1 and 3 mi from DAEC stack. The sensors are placed in quintuplicate at each location and are exchanged and analyzed monthly. Additionally, a second set of dosimeters is placed at the same locations and exchanged and analyzed annually.

Precipitation samples are collected monthly and analyzed for gross beta and tritium.

Milk samples are collected monthly from eleven locations during the non-grazing season, October through April, and weekly during the grazing season, May 1 through September 30. Two of the locations are control (D-73 and D-102) and the rest are indicators. During the non-grazing season milk from all indicator and all conrol locations is composited separately and analyzed for iodine-131. If the level of iodine-131 in any of the composites equals or exceeds 2.4 pCi/l, the milk is resampled individually from each location and analyzed for iodine-131. During the grazing season, milk from five locations within a five mile radius of the DAEC stack is analyzed individually for iodine-131 and gamma-emitting isotopes. Milk from four locations within a ten mile radius of the DAEC stack and from two control locations are composited separately and also analyzed for iodine-131 and gamma-emitting isotopes. If the level of iodine-131 in any of the composites equals or exceeds 2.4 pCi/l the milk is resampled individually and analyzed for iodine-131. In addition, monthly composites of weekly collections from each location are analyzed for strontium-89, strontium-90, and elemental calcium.

For additional monitoring of the terrestrial environment, grain and broad leaf natural vegetation is collected annually from eleven locations, two controls and nine indicators. Grain is analyzed for gamma-emitting isotopes and broad leaf vegetation is analyzed for iodine-131. Meat and poultry are collected annually during or immediately following a grazing

period from animals fed on crops grown within and outside ten miles of DAEC. The samples are analyzed for strontium-90 and gamma-emitting isotopes. Also, potable ground water is collected hourly from a treated municipal water system (D-53), daily from inlet to the municipal water treatment system (D-54), and monthly from additional six ground water locations. The samples are composited into monthly and quarterly composites for each location. Gross beta analysis is performed on all monthly composites. Gross beta and tritium analyses are performed on all quarterly composites.

Soil samples are collected three times per year at two control locations (D-73 and D-102) and twelve indicator locations (D-15, D-16, D-58, D-63, D-66, D-72, D-93, D-94, D-96, D-100, D-101, and D-104). The samples are analyzed for strontium-90 and gamma-emitting isotopes.

Surface water is collected monthly from seven river and pond locations, two control (D-49 and D-73) and five indicator (D-50, D-51, D-52,D-99, and D-103). Gamma scan is performed on all monthly samples. Gross beta, tritium, strontium-89, and strontium-90 analyses are performed on quarterly composites from locations D-49, D-50, D-51, D-52, and D-99.

The aquatic environment is also monitored by semi-annual upstream and downstream collections of fish, aquatic biota (periphyton), and river sediment. River sediment is also collected at the plant's intake and discharge. Fish and aquatic biota are analyzed for gamma-emitting isotopes. River sediment is analyzed for strontium-90 and gamma-emitting isotopes.

3.3 Program Execution

The program was executed as described in the preceding section with the following exceptions:

(1) There was no airborne particulate gross beta data for location D-3 for the collection periods ending 1-28-81, 2-12-81, and 2-19-81 due to vandalism.

(2) There were no airborne particulate gross beta datum for location D-9 for the collection period ending 4-09-81 because the electricity was shut off.

(3) There was no airborne particulate gross beta datum for location D-10 for the collection period ending 4-30-81 because of a broken pump.

(4) TLD data for several locations was not abailable for some months because TLDs were stolen, destroyed by vandals, or lost in the field. The lost TLDs are listed below.

Location	Month Lost
D-3	January, March and May
D-7	May
D-14	March
D-17	May
D-36	October
D-37	December
D-40	September
D-43	February
D-44	August
D-45	July
D-81	April
D-83	December
D-84	July

(5) No annual TLD data was available for locations D-4, D-11, D-14, D-23, D-30, D-33, D-34, D-35, D-37, D-38, D-79, D-83, and D-90 because they were lost in the field.

(6) No milk (goat milk) was collected from location D-101 during the months of February and March because the goats were dry.

(7) No milk was collected from location D-104 during the collection weeks of 5-12-81, 5-28-81, and 9-15-81 because of these respective reasons: the farmer was out of town, cooler malfunction, and milk was not available.

(8) No surface water sample was collected from D-49 in December because access to Location 49 was blocked.

(9) No soil was collected at D-57 for the month of March because of frozen ground.

(10) No precipitation was collected for the month of April.

3.4 Laboratory Procedures

All strontium-89, strontium-90, and iodine-131 analyses in milk were made by using a sensitive radiochemical procedure which involves separation of the element of interest by use of an ion-exchange resin and subsequent beta counting.

All gamma-spectroscopic analyses were performed with a Ge(Li) detector. Levels of iodine-131 in natural vegetation were determined by Ge(Li) spectrometry. Levels of airborne iodine-131 in charcoal samples were measured by Ge(Li) spectrometry.

Tritium levels were determined by liquid scintillation technique.

Analytical procedures used by the Nuclear Sciences Department of Hazleton Environmental Sciences are specified in detail elsewhere (Hazleton Environmental Sciences, 1981). Procedures are based on those prescribed by the National Center for Radiological Health of the U. S. Public Health Service (U. S. Public Health Service, 1967) and by the Health and Safety Laboratory of the U. S. Atomic Energy Commission (U. S. Atomic Energy Commission, 1972).

Details of Hazleton's QA Program are presented elsewhere (Hazleton Environmental Sciences, 1982). The HES QA Program includes participation in laboratory intercomparison (crosscheck) programs. Results obtained in crosscheck programs are presented in Appendix A.

3.5 Program Modifications

Location D-56 for well water collection was dropped from the program. Location D-105 replaced D-73 for milk, soil, and vegetation. Four special soil samples which are not a part of the program were collected and analyzed for strontium-90 and gamma-emitting isotopes.

4.0 RESULTS AND DISCUSSION

All of the scheduled collections and analyses were made except those listed in Table 5.6.

All results are summarized in Table 5.7 in a format recommended by the Nuclear Regulatory Commission in Regulagory Guide 4.8. For each type of analysis of each sampled medium, this table lists the mean and range for all indicator locations and for all control locations. The locations with the highest mean and range are also shown.

The tabulated results of all measurements made in 1981 are not included in this section, although references to these results will be made in the discussion. The complete tabulation of the 1981 results is contained in Part II of the 1981 annual report on the Environmental Radiological Monitoring Program for the Duane Arnold Energy Center.

4.1 The Effect of Chinese Atmospheric Nuclear Detonation

There were no reported atmospheric nuclear tests in 1981. The last reported test was conducted by the People's Republic of China on 16 October 1980. The reported yield was in the 200 kiloton to 1 megaton range.

The most pronounced effect of this test was on the gross beta levels in airborne particulates. The annual mean gross beta activity was about four times higher in 1981 than in 1980. The highest activity was reached in the month of May and in the second quarter and then by the end of 1981 declined steadily to the level observed in 1980. Also, the presence of fission products such as niobium-95, zirconium-95, ruthenium-103, cerium-144, and cesium-137 in some of the sampled media is attributable to the most recent (16 October 1980) and previous tests in the atmosphere.

4.2 Program Findings

A number of program findings reflect effects of the latest Chinese and previous worldwide atmospheric nuclear tests. The chief enviornmental indicators of recent test effects were airborne particulates, and to a limited extent, soil. No plant effect was indicated.

Airborne Particulates

The average annual gross beta activity in airborne particulates was nearly identical at both indicator and control locations (0.111 pCi/m^3 and control locations (0.120 pCi/m^3) and was about four times higher than in 1980 (0.029 pCi/m^3). The increase in the activity is attributable to the fallout from the test conducted 16 October 1980. The highest averages for gross beta were for the month of May and the second quarter, then decreased gradually to the 1980 level by the end of the year.

The elevated activity in May and the second quarter was due to a spring peak, which has been observed almost annually (1976, 1979 and 1980 were exceptions) for many years (Wilson et al., 1969). The spring peak has been attributed to fallout of nuclides from the stratosphere (Gold et al., 1964). It was more pronounced in 1981 because of the addition of the radioactive debris from the latest nuclear test.

Two pieces of evidence indicate conclusively that the elevated observed activity during the first three quarters was not attributable to the Plant. In the first place, elevated activity of similar size occurred simultaneously at both the indicator and control locations. Secondly, a similar pattern was observed at other nuclear power plant locations in the Midwest.

Strontium-89 and -90 was detected in composites for the first and second quarters. The levels measured were identical at both indicator and control locations. Presence of radiostrontium in airborne particulates is attributable to the fallout from the previous and latest nuclear tests.

Trace amounts of niobium-95, zirconium-95, ruthenium-103, and cerium-144 were detected in several composites, mostly for the first and second quarters. Presence of these isotopes in airborne particulates is also attributable to the fallout from the recent nuclear test. Except for beryllium-7, which is produced continuously in the upper atmosphere by cosmic-ray interactions (Arnold and Al-Salih, 1955), all other gamma-emitting isotopes were below their respective LLD levels. None of the activities detected were attributable to the Plant operation.

Airborne Iodine

Airborne iodine-131 results were below the detection limits of 0.006 pCi/m^3 for all indicator locations and below 0.01 pCi/m^3 for all control locations.

Ambient Radiation (TLD's)

The mean monthly doses as measured by the monthly TLD's measured (5.1±0.8) mrem/30 days at indicator locations and (4.8±1.2) mrem/30 days at control locations. Annual TLD's, normalized to 30 days, yielded (5.6±0.7) mrem/30 days and (5.0±0.6) mrem/30 days for indicator and control locations, respectively. Since standard deviations were larger than the differences, the differences are not statistically significant. No Plant effect was indicated.

Precipitation

Gross beta levels varied widely indicating the relationship between the level of activity and amount of rainfall. Tritium was detected in one of eleven samples and the activity was 540 pCi/l.

Milk

Iodine-131 results were below the detection limit of 0.4 pCi/l in all samples.

Strontium-89 was detected in five of forty-five samples and the activity ranged from 4.0 to 7.6 pCi/l. Presence of this isotope in some of the milk samples is attributable to the fallout from the latest nuclear test.

Strontium-90 activity was detected in all samples and was slightly higher at indicator locations (3.5 pCi/l) than at control locations (2.6 pCi/l), ranging from 1.0 pCi/l to 10.6 pCi/l. The activity and range were similar to those observed in 1980. Strontium-90 levels in this range are attributable to worldwide fallout from previous atmospheric nuclear tests and reflect the long half-life (28.64 years) of this isotope. Cesium-137 results were below the LLD level of 15 pCi/l in all samples but one. Cesium-137 is also a long-lived component (with a half-life of 30.24 years) of worldwide fallout and is found in the environment in trace amounts. The apparent absence of the effect of the latest nuclear test on strontium-90 and cesium-137 results is consistent with the low initial production of these isotopes in nuclear explosions (Eisenbud, 1963). Also, no other gamma-emitting isotopes, except potassium-40, were detected in any milk samples. This is consistent with the finding of the National Center for Radiological Health that most radiocontaminants in feed do not find their way into milk due to the selective metabolism of the cow. The common exceptions are radioisotopes of potassium, cesium, strontium, barium, and iodine (National Center for Radiological Health, 1968). Calcium was measured in all samples and ranged from 0.5 g/l to 1.6 g/l, averaging 1.2 g/l. The measured concentrations of calcium are in agreement with the published national values (National Center for Radiological Health, 1968).

In summary, the milk data for 1981 show no radiological effects of the Plant operation, but the presence of strontium-90 in milk samples does exhibit a long range residual effect of previous atmospheric nuclear tests.

Ground Water

Ground water samples were analyzed monthly for gross beta activity. Quarterly composites were also analyzed for gross beta and for tritium. The annual mean for gross beta in monthly measurements was nearly identical to the mean in quarterly measurements (3.0 pCi/l and 3.3 pCi/l, respectively). The location with the highest mean, 6.5 pCi/l, was D-58, Frantz Farm, 0.5 mi distant from DAEC. Tritium was detected in one of thirty-one samples and was slightly above the LLD level of 370 pCi/l (420 pCi/l). The difference is not statistically significant since counting uncertainty is larger than the difference (80-190 pCi/l). There was no indication of a Plant effect.

Meat and Poultry

In meat and poultry naturally-occuring potassium-40 was the only gamma-emitting isotope detected. All other gamma-emitting isotopes were below their respective LLD's. Thus, no Plant effect was indicated.

Vegetation

Iodine-131 results in broad leaf vegetation were below the LLD level of 0.081 pCi/g wet weight in all samples. In corn, strontium-90 activity was below the LLD level of 0.03 pCi/g wet weight in all samples. In hay, strontium-90 was detected in all samples and was slightly higher at indicator locations (0.35 pCi/g wet weight) than at control locations (0.26 pCi/g wet weight). Presence of strontium-90 in hay is attributable to the fallout from nuclear tests. No plant effect was indicated.

Except for potassium-40, which was observed in all samples, gamma-emitting isotopes were below detection limits in all samples. No Plant effect was indicated.

Soil

Strontium-90 was detected in all soil samples and averaged 0.13 pCi/g for indicator locations and 0.12 pCi/g for control locations. The difference is not statistically significant.

The predominant gamma-emitting isotope detected was potassium-40. The measured activity was identical at both indicator and control locations (18.53 pCi/g dry weight). Cesium-137 was detected in all but two samples and the activity was essentially identical at both indicator locations (0.57 pCi/g) and control locations (0.56 pCi/g).

Trace amounts of niobium-95 and zirconium-95 were detected in some of the samples. Presence of these fission products in soil is attributable to the fallout from the recent nuclear test. Presence of strontium-90 and cesium-137 is attributable to the fallout from recent and previous tests in the atmosphere. No Plant effect was indicated.

Surface Water

Mean gross beta activity was slightly higher at indicator locations (5.8 pCi/l) than at control locations (5.6 pCi/l) and was similar to that observed in 1980. The difference is not statistically significant. Tritium was below LLD level of 330 pCi/l in all samples. Strontium-89 and strontium-90 were below the LLD levels of 10 pCi/l and 2.0 pCi/l, respectively, in all samples. No gamma-emitting isotopes were detected in any of the samples analyzed. No Plant effect on surface water was indicated.

Fish

All gamma-emitting isotopes, except naturally-occuring potassium-40, in edible portions were below detection limits. No Plant effect on fish was indicated.

Periphyton

Slime and bottom organisms were collected in February, May, August and November. All gamma-emitting isotopes, except potassium-40, were below detection limits. No Plant effect was indicated.

River Sediments

River sediments were collected in May and November and analyzed for strontium-90 and gamma-emitting isotopes. Strontium-90 results were below the LLD level of 0.025 pCi/g in all samples but one. The detected activity was 0.062 pCi/g dry weight in an upstream (control) sample. All gamma-emitting isotopes, except potassium-40, were below detection limits in all samples. There was no indication of Plant effect.

5.0 TABLES

Table 5.1 Characteristic properties of isotopes quantified in gamma-spectroscopic analyses.

Designation	Comment	Isotope	Half-life[a]
I. Naturally occurring			
A. Cosmogenic	Produced by interaction of cosmic rays with atmosphere	Be-7	53.2 d
B. Terrestrial	Primordial	K-40	1.26×10^9 y
II. Fission Products [b]	Nuclear detonations constitute the major environmental source		
A. Short-lived		I-131	8.04 d
		Ba-140	12.8 d
B. Other than short-lived		Nb-95	35.15 d
		Zr-95	65 d
		Ru-103	39.35 d
		Ru-106	368.2 d
		Cs-134	2.061 y
		Cs-137	30.174 y
		Ce-141	32.5 d
		Ce-144	284.31 d
III. Activation Products	Typically found in nuclear power plant effluents	Mn-54	312.5 d
		Co-58	70.78 d
		Co-60	5.26 y
		Zn-65	245[d]

[a] Half-lives are taken from Appendix E of Environmental Quarterly, 1 January 1978, EML-334 (U. S. Department of Energy, 1978).
[b] Includes fission-product daughters.

Table 5.2. Sample collection and analysis program, 1981.

Medium	Locations No.	Locations Codes (and Type)[a]	Collection Type (and Frequency)[b]	Analysis (and Frequency)[c]
Airborne Particulates	16	D-1-16	C/W	GB,GS (if GB>10 pCi/m^3) Sr-89,90 (quarter comp.)
Airborne Iodine	8	D-4,5,7,8,11 12,14,15	C/W	I-131 (Analyze as two composites) Comp. I-8,12,14 Comp. II-4,5,7,11,15 (Individual analysis if I-131 is detected)
Ambient Radiation	63	D-1,2,3,4,6-48 76-91	C/M	Ambient gamma
	63	D-1,2,3,4,6-48 76-91	C/A	Ambient gamma
Surface Water	7	D-49-52,73,99,103	G/M	GS
	5	D-49,50,51,52,99	G/Q	H-3,GB,Sr-89,Sr-90
Ground Water	8	D-53-54 D-55-60	G/D G/M	GB,GS (if GB>10pCi/l) on MC H-3,GB,Sr-89,90 (if GB>10pCi/l) on QC
Soil	14	D-15,16,58,63,66 72,73,93,94,96,100, 101,102,104	3 times per year	Sr-90,GS
River Sediment	4	D-49,50,51,61	ESM or(SA)	Sr-90,GS

Table 5.2. (continued)

Medium	Locations No.	Locations Codes (and Type)[a]	Collection Type (and Frequency)[b]	Analysis (and Frequency)[c]
Vegetation	10	D-57,58,63,66,72,73,93, 94,96,100,101,102	Annually at Harvest Time One sample each, grain and broad leaf vegetation	GS (on edible portion on grain samples) I-131 (broad leaf vegetation)
Meat and Poultry		From anmals fed on crops grown within 10 miles of DAEC and outside 10 miles	Annually during or immediately following grazing season	GS (on edible portions)
Fish	2	D-49,61	1 sample per (6 months) (ESM)	GS (on edible portions)
Aquatic Biota (periphyton)	2	D-49,61	Quarterly (as available)	GS
Milk	2	Comp. (D-63,66,72, 93,94,96, 100,101,104)	Monthly (during non-grazing)	I-131 (if I-131≥2.4 pCi/l, resample and analyze individually for I-131)
	4	D-63,93,94,101,104	Weekly (during grazing season)	I-131, GS
	1	Comp. (D-66,72,96,100)	Weekly (during grazing season)	I-131,GS (if I-131≥2.4 pCi/l, resample and analyze individually for I-131)

Table 5.2. (continued)

Medium	Locations No.	Locations Codes (and Type)[a]	Collection Type (and Frequency)[b]	Analysis (and Frequency)[c]
Milk (cont'd)	1	Comp. (D-73 and 102)	Weekly (during grazing season)	I-131,GS (if I-131≥2.4 pCi/l, resample and analyze individually for I-131)

[a] Location codes are defined in Table 1. Control stations are indicated by (C). All other stations are indicators.
[b] Collection type is coded as follows: C/ = continuous, G/ = grab. Collection frequency is coded as follows: W = weekly, M = monthly, Q = quarterly, SA = semi-annually, ESM = every six months.
[c] Analysis type is coded as follows: GB = gross beta, GS = gamma sepctroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine 131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

Table 5.3 Sampling locations, Duane Arnold Energy Center.

Code	Type[a]	Sampling Location: Sampling Point	Sampling Location: Location Description	Sampling Location: Distance and Direction from Site Stack
D-1	C	1	Cedar Rapids	11 mi @ 135° SE
D-2	C	2	Marion	11 mi @ 125° SE
D-3		3	Hiawatha	7 mi @ 130° SE
D-4		4	Johnson	3 mi @ 140° SE
D-5		5	Palo	3 mi @ 200° SW
D-6		6	Center Point	7 mi @ 0° N
D-7		7	Shellsburg	6 mi @ 255° W
D-8		8	Urbana	9 mi @ 345° NW
D-9		9	Route W26	7 mi @ 295° NW
D-10		10	Atkins	8 mi @ 210° SW
D-11		11	Toddville	4 mi @ 90° E
D-12	C	12	Iowa City	25 mi @ 160° S
D-13	C	13	Alburnett	8 mi @ 70° NE
D-14		14	Alice Substation	7 mi @ 35° NE
D-15		15	On-site, North	0.5 mi @ 305° NW
D-16		16	On-site, South	0.5 mi @ 190° S
D-17		17		0.5 mi N
D-18		18		0.5 mi NE
D-19		19		0.5 mi NE
D-20		20		0.5 mi NE
D-21		21		0.5 mi E
D-22		22		0.5 mi SE
D-23		23		0.5 mi SE
D-24		24		0.5 mi S
D-25		25		0.5 mi SW
D-26		26		0.5 mi SW
D-27		27		0.5 mi SW
D-28		28		0.5 mi SW
D-29		29		0.5 mi SW
D-30		30		0.5 mi W
D-31		31		0.5 mi NW
D-32		32		0.5 mi NW
D-33		33		3.0 mi N
D-34		34		3.0 mi NE
D-35		35		3.0 mi NE
D-36		36		3.0 mi NE
D-37		37		3.0 mi E
D-38		38		3.0 mi SE
D-39		39		3.0 mi SE
D-40		40		3.0 mi SE
D-41		41		3.0 mi S
D-42		42		3.0 mi SW
D-43		43		1.0 mi SW

Table 5.3 (continued)

Code	Type[a]	Sampling Point	Sampling Location: Location Description	Sampling Location: Distance and Direction from Site Stack
D-44		44		1.0 mi SW
D-45		45		1.0 mi SW
D-46		46		1.0 mi W
D-47		47		1.0 mi NW
D-48		48		1.0 mi NW
D-49	C	49	Lewis access, upstream of DAEC	
D-50		50	Plant Intake	
D-51		51	Plant Discharge	
D-52		52	Cedar Rapids City Park	7.5 mi SE
D-53		53	Treated Municipal Water	
D-54		54	Inlet to Municipal Water Treatment System	
D-55		55	On-site Well	
D-56		56	Test Well	
D-57		57	Bull (Off-site well)	
D-58		58	Frantz Farm, 0.5 mi of DAEC	
D-59		59	Frantz Farm, 0.5 mi of DAEC	
D-60		60	Wiley, Off-site within 1.0 mi of DAEC	
D-61		61	One-half mile downstream of plant discharge	
D-63		63	Andrews Farm, 1.5 mi NW	
D-66		66	Gott Farm, within 5 miles of site	
D-72		72	Van Note Farm, within 2 miles of site, SW	
D-73	C	73	Hansen Farm, within 22 miles of site	
D-76		76		0.5 mi NE
D-77		77		0.5 mi NE
D-78		78		0.5 mi NE
D-79		79		0.5 mi E
D-80		80		0.5 mi SE
D-81		81		0.5 mi SE
D-82		82		0.5 mi SE
D-83		83		0.5 mi S
D-84		84		0.5 mi SW
D-85		85		0.5 mi SW
D-86		86		0.5 mi SW
D-87		87		0.5 mi SW

Table 5.3 (continued)

Code	Type[a]	Sampling Point	Location Description	Distance and Direction from Site Stack
		Sampling Location		
D-88		88		0.5 mi W
D-89		89		0.5 mi W
D-90		90		0.5 mi NW
D-91		91		0.5 mi N
D-93		93	Yarborough Farm	2.8 mi of site, NW
D-94		94	Hines Farm	2.7 mi NE
D-96		96	Keiper Farm	7.5 mi SW
D-99		99	Pleasant Creek	2.2 mi NW
D-100		100	Stark Farm	
D-101		101	Flecksing Farm	4.0 mi NE
D-102	C	102	McCardle Farm	20.0 mi NW
D-103		103	Park Pond	1.5 mi E
D-104		104	Jim Miller Farm	1.2 mi NE
D-105	C	105	Schulte Farm	21.3 mi SW

[a]"C" denotes control location. All other locations are indicators.

Table 5.4 Type and frequency of collection.

Location	Loc. Type[a]	Weekly	Monthly	Quarterly	Semi-Annually	Annually
D-1	C	AP	TLD			TLD
D-2	C	AP	TLD			TLD
D-3		AP	TLD			TLD
D-4		AP,AI	TLD			TLD
D-5		AP,AI	TLD			TLD
D-6		AP	TLD			TLD
D-7		AP,AI	TLD			TLD
D-8		AP,AI	TLD			TLD
D-9		AP	TLD			TLD
D-10		AP	TLD			TLD
D-11		AP,AI	TLD			TLD
D-12	C	AP,AI	TLD			TLD
D-13	C	AP	TLD			TLD
D-14		AP,AI	TLD			TLD
D-15		AP,AI	TLD			TLD SO
D-16		AP	TLD			TLD SO
D-17-48			TLD			TLD
D-49	C		SW	SL	F,BS	
D-50			SW		BS	
D-51			SW		BS	
D-52			SW			
D-53			WW[b]			
D-54			WW[c]			
D-55			WW			
D-56			WW			
D-57			WW			
D-58			WW			SO
D-59			WW			
D-60			WW			
D-61				SL	F,BS	
D-63			M[d]			G[e],SO
D-66			M[d]			G[e],SO
D-72			M[d]			G[e],SO
D-73	C		SW			
D-76-91			TLD			TLD
D-93			M[d]			G[e],SO
D-94			M[d]			G[e],SO,ME
D-96			M[d]			G[e],SO
D-99			SW			

Table 5.4 (continued)

Location	Loc. Type[a]	Weekly	Monthly	Quarterly	Semi-Annually	Annually
D-100			M[d]			G[e],SO
D-101			M[d]			G[e],SO
D-102	C		M[d]			G[e],SO,ME
D-103			SW			
D-104			M[d]			G[e],SO
D-105	C		M[d]			G[e],SO

[a] Control locations are indicated by a "C" in this column. All other locations are indicators.
[b] Collected hourly and composited monthly and quarterly.
[c] Collected daily and composited monthly and quarterly.
[d] Monthly from October through April; weekly from May through September.
[e] Vegetation (G) includes broad leaf vegetation and grain.

Table 5.5 Sample codes used in Table 5.4

Code	Description
AP	Airborne Particulates
AI	Airborne Iodine
TLD	Thermoluminescent Dosimeter
P	Precipitation
MI	Milk
WW	Well Water
G	Vegetation (broad leaf and grain)
ME	Meat and Poultry
SO	Soil
SW	Surface Water
F	Fish
SL	Periphyton (aquatic biota)
BS	River Sediment
WL	Wildlife

Table 5.6 Missed collections and analyses, 1981, DAEC.

Sample	Analysis	Location	Collection Date or Period	Comments
Airborne particulate	Gross beta	D-3	1-28-81 2-12-81 2-19-81	Vandalism
		D-9	4-09-81	Electricity was shut off
		D-10	4-30-81	Broken pump
TLD		D-3	January, March and May 1981	Lost in the field
		D-7	May	Lost in the field
		D-14	March	Lost in the field
		D-17	May	Lost in the field
		D-36	October	Lost in the field
		D-37	December	Lost in the field
		D-40	September	Lost in the field
		D-43	February	Lost in the field
		D-44	August	Lost in the field
		D-45	July	Lost in the field
		D-81	April	Lost in the field
		D-83	December	Lost in the field
		D-84	July	Lost in the field

Table 5.6 (continued)

Sample	Analysis	Location	Collection Date or Period	Comments
TLD (cont'd)		D-4, D-11, D-14, D-23, D-30, D-33, D-34, D-35, D-37, D-38, D-79, D-89, and D-90	Jan. - Dec, 1981	Lost in the field
Milk		D-104	5-12-81, 5-26-81, 9-15-81	Milk not available
Well Water		D-60		Location temporarily shut off for winter
Soil		D-57	March 1981	Frozen ground
Precipitation			April	Not collected

Table 5.7 Environmental Radiological Monitoring Program Summary.
Name of facility Duane Arnold Energy Center Docket No. 50-331
Location of facility Linn, Iowa (County, state) Reporting period January-December 1981

Sample Type (Units)	Type and Number of Analyses[a]		LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean		Control Locations Mean(F) Range	Number of Non-routine Results[e]
					Location[d]	Mean(F) Range		
Airborne Particulates (pCi/m^3)	GB	827[f]	0.001	0.111 (617/619) (0.009-0.488)	D-10, Atkins 8 mi @ 210° SW	0.143 (51/52) (0.017-0.48[illegible])	0.120 (206/208) (0.014-0.502)	0
	Sr-89	64	0.005	0.010 (24/48) (0.005-0.016)	D-10, Atkins 8 mi @ 210° SW	0.014 (2/4) (0.012-0.016)	0.011 (8/16) (0.008-0.014)	0
	Sr-90	64	0.001	0.002 (13/48) (0.001-0.002)	D-10, Atkins 8 mi @ 210° SW	0.002 (1/4) -	0.0[illegible] (4/16) (0.001-0.002)	0
	GS	64			D-12	0.002 (1/4) -		
	Be-7		0.120	0.148 (8/48) (0.126-0.210)	D-2, Marion 11.0 mi @ 125° SE	0.200 (1/4) -	0.177 (4/16) (0.137-0.220)	0
	Nb-95		0.078	0.089 (25/48) (0.038-0.628)	D-13, Alburnett 8 mi @ 70° NE	0.260 (3/4) (0.066-0.636)	0.137 (9/16) (0.045-0.636)	0
	Zr-95		0.031	0.042 (19/48) (0.030-0.058)	D-2, Marion 11.0 mi @ 125° SE	0.070 (2/4) (0.050-0.090)	0.051 (8/16) (0.032-0.090)	0
	Ru-103		0.025	0.034 (5/48) (0.027-0.042)	D-2, Marion 11.0 mi @ 125° SE	0.050 (1/4) -	0.038 (3/16) (0.025-0.050)	0
	Ru-106		0.045	<LLD	-	-	<LLD	0
	Cs-134		0.0042	<LLD	-	-	<LLD	0
	Cs-137		0.0050	<LLD	-	-	<LLD	0
	Ce-141		0.040	<LLD	-	-	<LLD	0
	Ce-144		0.023	0.059 (13/48) (0.034-0.082)	D-10, Atkins 8 mi @ 210° SW	0.082 (1/4) -	0.056 (7/14) (0.034-0.081)	0
Airborne Iodine (pCi/m^3)	I-131	104						
(D-4,5,7,11&15 composite)		52	0.006	<LLD	-	-	<LLD	0
(D-8,12&14 composite)		52	0.01	<LLD	-	-	<LLD	0

Table 5.7 (continued)
Name of facility Duane Arnold Energy Center

Sample Type (Units)	Type and Number of Analyses[a]		LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean		Control Locations Mean(F) Range	Number of Non-routine Results[e]
					Location[d]	Mean(F) Range		
TLD Monthly (mrem/30 days)	Gamma	741	1	5.1 (693/693) (2.8-11.6)	D-37, 3.0 mi E	6.5 (11/12) (4.3-11.6)	4.8 (48/48) (2.5-8.5)	0
TLD-Annual (mrem/365 days)	Gamma	50	1	68.4 (46/46) (52.8-88.9)	D-89, 0.5 mi W	88.9 (1/1) -	60.4 (4/4) (55.5-70.1)	0
TLD-Annual Normalized to 30 days (mrem/30 days)	Gamma	50	1	5.6 (46/46) (4.3-7.3)	D-89, 0.5 mi W	7.3 (1/1) -	5.0 (4/4) (4.6-5.8)	0
Precipitation (pCi/l)	GB	11	1.0	38.0 (10/11) (1.3-179.5)	On-site	38.0 (10/11) (1.3-179.5)	None	0
	H-3	11	370	540 (1/11) -	On-site	540 (1/11) -	None	0
Milk (pCi/l)	I-131	165	0.4	<LLD	-	-	<LLD	0
	Sr-89	45	3.8	5.5 (5/35) (4.0-7.6)	D-93, Yarborough Farm 2.8 mi of site, NW	7.6 (1/5) -	<LLD	0
	Sr-90	45	0.5	3.5 (35/35) (1.0-10.6)	D-104, Jim Miller Farm 1.2 mi, NE	6.7 (5/5) (4.4-10.6)	2.6 (10/10) (1.2-6.7)	0
	GS	151						
	K-40		100	1470 (129/129) (540-2190)	D-101, Flecksing Farm 4.0 mi, NE	1940 (22/22) (1580-2190)	1330 (22/22) (900-1790)	0
	Cs-137		15	21.8 (1/129) -	D-104, Jim Miller Farm 1.2 mi, NE	21.8(1/19) -	<LLD	0
	Ba-La-140		20	<LLD	-	-	<LLD	0
(g/l)	Ca		0.1	1.2 (35/35) (0.5-1.6)	D-94, Hines Farm 2.7 mi, NE	1.3 (5/5) (1.0-1.6)	1.2 (10/10) (0.8-1.4)	0
Ground Water (pCi/l) (monthly)	Gross Beta	88	0.8	3.0 (85/88) (0.9-6.5)	D-58, Frantz Farm 0.5 mi of DAEC	5.1 (12/12) (3.7-6.5)	None	0
Ground Water (pCi/l) (quarterly comp.)	Gross Beta	31	0.3	3.3 (31/31) (0.4-10.9)	D-58, Frantz Farm 0.5 mi of DAEC	6.5 (4.4) (6.0-6.7)	None	0
	H-3	31	370	420 (1/31) -	D-53, Treated Municipal Water	420 (1/31) -	None	0

Table 5.7 (continued)
Name of facility Duane Arnold Energy Center

Sample Type (Units)	Type and Number of Analyses[a]		LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean		Control Locations Mean(F) Range	Number of Non-routine Results[e]
					Location[d]	Mean(F) Range		
Meat and Poultry (pCi/g wet)	GS	6						
	K-40		1.04	2.52 (4/5) (1.94-3.00)	Siech Farm Inside 10 miles of plant	3.00 (1/1) -	2.31 (1/1) -	0
	Mn-54		0.079	<LLD	-	-	<LLD	0
	Co-58		0.20	<LLD	-	-	<LLD	0
	Co-60		0.064	<LLD	-	-	<LLD	0
	Cs-134		0.099	<LLD	-	-	<LLD	0
	Cs-137		0.19	<LLD	-	-	<LLD	0
	Other gammas		1.29	<LLD	-	-	<LLD	0
Wildlife (pCi/g wet)	GS	1						
	K-40		1.0	3.55 (1/1) -	Inside 10 miles of plant	3.55 (1/1)	None	0
	Mn-54		0.030	<LLD	-	-	None	0
	Co-58,		0.12	<LLD	-	-	None	0
	Co-60		0.043	<LLD	-	-	None	0
	Cs-134		0.045	<LLD	-	-	None	0
	Cs-137		0.033	<LLD	-	-	None	0
	Other gammas		1.40	<LLD	-	-	None	0
Broad Leaf Vegetation (pCi/g wet)	I-131	11	0.081	<LLD	-	-	<LLD	0

Table 5.7 (continued)
Name of facility Duane Arnold Energy Center

Sample Type (Units)	Type and Number of Analyses[a]		LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean		Control Locations Mean(F) Range	Number of Non-routine Results[e]
					Location[d]	Mean(F) Range		
Vegetation-Corn (pCi/g wet)	Sr-90	10	0.03		-	-	<LLD	0
	GS	10						
	K-40		0.5	2.38 (8/8) (2.09-2.77)	D-94, Hines Farm 2.7 mi NE	2.77 (1/1) -	1.97 (2/2) (1.84-2.10)	0
	Cs-134		0.040	<LLD	-	-	<LLD	0
	Cs-137		0.047	<LLD	-	-	<LLD	0
	Other gammas		0.53	<LLD	-	-	<LLD	0
Vegetation-Hay (pCi/g wet)	Sr-90	9	0.030	0.346 (7/7) (0.164-0.773)	D-104, Jim Miller Farm, 1.2 mi NE	0.773 (1/2) -	0.262 (2/2) (0.206-0.318)	0
	GS	9						
	K-40		0.5	13.14 (7/7) (8.32-17.04)	D-102, McCardle Farm 20.0 mi NW	17.54 (1/1) -	13.89 (2/2) (10.24-17.54)	0
	Cs-134		0.16	<LLD	-	-	<LLD	0
	Cs-137		0.14	<LLD	-	-	<LLD	0
	Other gammas		3.41	<LLD	-	-	<LLD	0
Soil (pCi/g dry)	Sr-90	38	0.01	0.13 (32/32) (0.02-0.28)	D-94, Hines Farm 2.7 mi NE	0.21 (3/3) (0.13-0.28)	0.12 (6/6) (0.05-0.21)	0
	GS	38						
	K-40		0.5	18.53 (32/32) (10.26-23.83)	D-96, Keiper Farm 7.5 mi SW	22.06 (3/3) (19.50-23.83)	18.53 (6/6) (13.12-25.6)	0
	Mn-54		0.11	<LLD	-	-	<LLD	0
	Co-58,-60		0.28	<LLD	-	-	<LLD	0
	Nb-95		0.34	0.45 (8/32) (0.29-0.77)	D-15, On-site, North 0.5 mi @ 305° NW	0.58 (2/3) (0.38-0.77)	<LLD	0

Table 5.7 (continued)
Name of facility Duane Arnold Energy Center

Sample Type (Units)	Type and Number of Analyses[a]		LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Mean(F) Range	Control Locations Mean(F) Range	Number of Non-routine Results[e]
Soil (pCi/g dry) (continued)	Zr-95		0.33	0.41 (3/32) (0.36-0.48)	D-58, Frantz Farm 0.5 mi of DAEC	0.48 (1/3) -	<LLD	0
	Cs-134		0.64	<LLD	-	-	<LLD	0
	Cs-137		0.053	0.57 (30/32) (0.18-1.16)	D-94, Hines Farm 2.7 mi NE	0.72 (3/3) (0.39-1.16)	0.56 (6/6) (0.23-1.10)	0
					D-73, Hansen Farm within 22 miles of site	0.72 (3/3) (0.30-1.10)		
	Other gammas		1.04	<LLD	-	-	<LLD	0
Surface Water (pCi/l)	GB	20	1.0	5.8 (16/16) (3.2-7.9)	D-99, Pleasant Creek 2.2 mi NW	7.4 (4/4) (7.0-7.9)	5.6 (4/4) (5.1-6.7)	0
	H-3	20	330	<LLD	-	-	<LLD	0
	Sr-89	20	10	<LLD	-	-	<LLD	0
	Sr-90	20	2.0	<LLD	-	-	<LLD	0
	GS	83						
	Mn-54		15	<LLD	-	-	<LLD	0
	Co-58,-60		15	<LLD	-	-	<LLD	0
	Zr-Nb-95		31	<LLD	-	-	<LLD	0
	Cs-134		15	<LLD	-	-	<LLD	0
	Cs-137		15	<LLD	-	-	<LLD	0
	Other gammas		110	<LLD	-	-	<LLD	0
Fish (Edible portion) (pCi/g wet)	GS	10						
	K-40		0.5	2.8 (8/8) (2.23-3.06)	D-49, Lewis Access Upstream of DAEC	3.2 (2/2) (2.05-4.26)	3.2 (2/2) (2.05-4.26)	0
	Mn-54		0.17	<LLD	-	-	<LLD	0
	Co-58,-60		0.096	<LLD	-	-	<LLD	0
	Cs-134,-137		0.090	<LLD	-	-	<LLD	0
	Other gammas		0.62	<LLD	-	-	<LLD	0

Table 5.7 (continued)
Name of facility Duane Arnold Energy Center

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location[d]	Location with Highest Annual Mean: Mean(F) Range	Control Locations Mean(F) Range	Number of Non-routine Results[e]
Periphyton (pCi/g wet)	GS 8[g]						
	K-40	1.0	4.25 (3/4) (2.17-6.28)	D-61, 0.5 mi downstream of plant discharge	4.25 (3/4) (2.17-6.28)	3.05 (3/4) (2.61-3.57)	0
	Cs-134	0.19	<LLD	-	-	<LLD	0
	Cs-137	0.19	<LLD	-	-	<LLD	0
	Other gammas	0.79	<LLD	-	-	<LLD	0
River Sediments (pCi/g dry)	Sr-90 8	0.040	<LLD	D-49, Lewis Access Upstream of DAEC	0.062 (1/2) -	0.062 (1/2) -	0
	GS 8						
	K-40	1.0	12.16 (6/6) (10.65-15.90)	D-61, 0.5 mi downstream of Plant discharge	13.28 (2/2) (10.65-15.90)	11.26 (2/2) (10.90-11.62)	0
	Mn-54	0.050	<LLD	-	-	<LLD	0
	Co-58,-60	0.067	<LLD	-	-	<LLD	0
	Zr-Nb-95	0.11	<LLD	-	-	<LLD	0
	Cs-134	0.040	<LLD	-	-	<LLD	0
	Cs-137	0.051	<LLD	-	-	<LLD	0
	Other gammas	0.36	<LLD	-	-	<LLD	0

[a] GB = gross beta; GS = gamma scan.
[b] LLD = nominal lower limit of detection based on 3 sigma error for background sample.
[c] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).
[d] Locations are specified (1) by name and code (Table 2) and (2) distance, direction, and sector relative to reactor site.
[e] Nonroutine results are those which exceed ten times the control station value. If no control station value is available, the result is considered nonroutine if it exceeds ten times the preoperational value for the location.
[f] Four unreliable results due to low volume (pump malfunction) were excluded in the determination of the Annual Mean.
[g] Two samples resulted in elevated LLDs due to small volume of sample available for analysis. Results were excluded in the evaluation of annual averages.

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Appendix B

Data Reporting Conventions

Data Reporting Conventions

1. All activities are corrected to collection time.

2. Single Measuements

   Each single measurement is reported as follows:

   $$x \pm s$$

   where x = value of the measurement;

   s = 2σ counting uncertainty (corresponding to the 95% confidence level).

   In cases where the activity is found to be below the lower limit of detection L it is reported as

   $$<L .$$

   Detection limits are based on 4.66σ background counting uncertainties.

3. Duplicate measurements, the average result is reported as follows:

   a. Individual results: $x_1 \pm s_1$
   $x_2 \pm s_2$

   Reported result: $x \pm s$

   where $x = (1/2)\ (x_1 + x_2)$

   $$s = (1/2)\ \sqrt{s_1^2 + s_2^2}$$

   b. Individual Results: $<L_1$

   $<L_2$

   Reported result: $<L$

   where L = lower of L_1 and L_2

c. Individual results: $x \pm s$

$<L$

Reported result: $x \pm s$ if $x \leq L$;

$<L$ otherwise

4. Unless otherwide indicated, the "cumulative average" for a location is the average of all measurements from the beginning of the current year through the date of the last entered result. "Less-than" values are ignored in the computation of the average. If all results are less-than values, the highest value is reported.

5. Unless otherwise indicated, the "previous average" for a location is the average obtained during the previous year.

6. In rounding off, the following rules are followed:

   a. If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.

   b. If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.

   c. If the figure following those to be retained is 5, and if there are no figures other than zeros beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one of it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.

Appendix C

Maximum Permissible Concentrations of Radioactivity in Air and Water Above Background in Unrestricted Areas

Table C-1. Maximum permissible concentrations of radioactivity in air and water above natural background in unrestricted areas.[a]

Air			Water	
Gross alpha	3	pCi/m^3	Strontium-89	3,000 pCi/l
Gross beta	100	pCi/m^3	Strontium-90	300 pCi/l
Iodine-131[b]	0.14	pCi/m^3	Cesium-137	20,000 pCi/l
			Barium-140	20,000 pCi/l
			Iodine-131	300 pCi/l
			Potassium-40[c]	3,000 pCi/l
			Gross alpha	30 pCi/l
			Gross beta	100 pCi/l
			Tritium	3×10^6 pCi/l

[a]Taken from Code of Federal Regulations Title 10, Part 20, Table II and appropriate footnotes. Concentrations may be averaged over a priod not greater than one year.
[b]From 10 CFR 20 but adjusted by a factor of 700 to reduce the dose resulting from the air-grass-cow-milk-child pathway.
[c]A natural radionuclide.

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REPORT TO
IOWA ELECTRIC LIGHT AND POWER
CEDAR RAPIDS, IOWA

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM
FOR
THE DUANE ARNOLD ENERGY CENTER
CEDAR RAPIDS, IOWA

ANNUAL REPORT - II
DATA TABULATIONS AND ANALYSES
FEBRUARY-DECEMBER 1981

PREPARED AND SUBMITTED
BY
HAZLETON ENVIRONMENTAL SCIENCES CORPORATION
PROJECT NO. 8001-100

Approved by: L. G. Huebner
L. G. Huebner
Director, Nuclear Sciences

12 March 1982

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Director, Nuclear Sciences

12 March 1982

PREFACE

The staff members of the Nuclear Sciences Department of Hazleton Environmental Sciences, a Division of Hazleton Laboratories America, Inc. (HES), were responsible for the acquisition of data presented in this report. All environmental samples, with the exception of aquatic, were collected by personnel of DAEC. Aquatic samples were collected by HES personnel.

The report was prepared by C. R. Marucut, Section Supervisor, Nuclear Sciences. She was assisted in the report preparation by L. Nicia, Group Leader, and E. Petray, Technical Writer under the direction of L. G. Huebner, Director, Nuclear Sciences.

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1.0 Introduction

The following consists of data tabultaions and analyses for the Annual Report - Part I for the 1981 Environmental Radiological Monitoring Program conducted at the Duane Arnold Energy Center, Cedar Rapids, Iowa.

A summary with interpretation of the data presented here is contained in a separate report to the Iowa Electric Light and Power Company.

Table 1 Sampling locations, Duane Arnold Energy Center.

Code	Type[a]	Sampling Location: Sampling Point	Sampling Location: Location Description	Sampling Location: Distance and Direction from Site Stack
D-1	C	1	Cedar Rapids	11 mi @ 135° SE
D-2	C	2	Marion	11 mi @ 125° SE
D-3		3	Hiawatha	7 mi @ 130° SE
D-4		4	Johnson	3 mi @ 140° SE
D-5		5	Palo	3 mi @ 200° SW
D-6		6	Center Point	7 mi @ 0° N
D-7		7	Shellsburg	6 mi @ 255° W
D-8		8	Urbana	9 mi @ 345° NW
D-9		9	Route W26	7 mi @ 295° NW
D-10		10	Atkins	8 mi @ 210° SW
D-11		11	Toddville	4 mi @ 90° E
D-12	C	12	Iowa City	25 mi @ 160° S
D-13	C	13	Alburnett	8 mi @ 70° NE
D-14		14	Alice Substation	7 mi @ 35° NE
D-15		15	On-site, North	0.5 mi @ 305° NW
D-16		16	On-site, South	0.5 mi @ 190° S
D-17		17		0.5 mi N
D-18		18		0.5 mi NE
D-19		19		0.5 mi NE
D-20		20		0.5 mi NE
D-21		21		0.5 mi E
D-22		22		0.5 mi SE
D-23		23		0.5 mi SE
D-24		24		0.5 mi S
D-25		25		0.5 mi SW
D-26		26		0.5 mi SW
D-27		27		0.5 mi SW
D-28		28		0.5 mi SW
D-29		29		0.5 mi SW
D-30		30		0.5 mi W
D-31		31		0.5 mi NW
D-32		32		0.5 mi NW
D-33		33		3.0 mi N
D-34		34		3.0 mi NE
D-35		35		3.0 mi NE
D-36		36		3.0 mi NE
D-37		37		3.0 mi E
D-38		38		3.0 mi SE
D-39		39		3.0 mi SE
D-40		40		3.0 mi SE
D-41		41		3.0 mi S
D-42		42		3.0 mi SW
D-43		43		1.0 mi SW

Table 1 (continued)

Code	Type[a]	Sampling Location: Sampling Point	Sampling Location: Location Description	Sampling Location: Distance and Direction from Site Stack
D-44		44		1.0 mi SW
D-45		45		1.0 mi SW
D-46		46		1.0 mi W
D-47		47		1.0 mi NW
D-48		48		1.0 mi NW
D-49	C	49	Lewis access, upstream of DAEC	
D-50		50	Plant Intake	
D-51		51	Plant Discharge	
D-52		52	Cedar Rapids City Park	7.5 mi SE
D-53		53	Treated Municipal Water	
D-54		54	Inlet to Municipal Water Treatment System	
D-55		55	On-site Well	
D-56		56	Test Well	
D-57		57	Bull (Off-site well)	
D-58		58	Frantz Farm, 0.5 mi of DAEC	
D-59		59	Frantz Farm, 0.5 mi of DAEC	
D-60		60	Wiley, Off-site within 1.0 mi of DAEC	
D-61		61	One-half mile downstream of plant discharge	
D-63		63	Andrews Farm, 1.5 mi NW	
D-66		66	Gott Farm, within 5 miles of site	
D-72		72	Van Note Farm, within 2 miles of site, SW	
D-73	C	73	Hansen Farm, within 22 miles of site	
D-76		76		0.5 mi NE
D-77		77		0.5 mi NE
D-78		78		0.5 mi NE
D-79		79		0.5 mi E
D-80		80		0.5 mi SE
D-81		81		0.5 mi SE

Table 1 (continued)

Code	Type[a]	Sampling Location		
		Sampling Point	Location Description	Distance and Direction from Site Stack
D-82		82		0.5 mi SE
D-83		83		0.5 mi S
D-84		84		0.5 mi SW
D-85		85		0.5 mi SW
D-86		86		0.5 mi SW
D-87		87		0.5 mi SW
D-88		88		0.5 mi W
D-89		89		0.5 mi W
D-90		90		0.5 mi NW
D-91		91		0.5 mi N
D-93		93	Yarborough Farm	2.8 mi of site, NW
D-94		94	Hines Farm	2.7 mi NE
D-96		96	Keiper Farm	7.5 mi SW
D-99		99	Pleasant Creek	2.2 mi NW
D-100		100	Stark Farm	
D-101		101	Flecksing Farm	4.0 mi NE
D-102	C	102	McCardle Farm	20.0 mi NW
D-103		103	Park Pond	1.5 mi E
D-104		104	Jim Miller Farm	1.2 mi NE
D-105	C	105	Schulte Farm	21.3 mi SW

[a]"C" denotes control location. All other locations are indicators.

Table 2 Type and frequency of collection.

Location	Loc. Type[a]	Weekly	Monthly	Quarterly	Semi-Annually	Annually
D-1	C	AP	TLD			TLD
D-2	C	AP	TLD			TLD
D-3		AP	TLD			TLD
D-4		AP,AI	TLD			TLD
D-5		AP,AI	TLD			TLD
D-6		AP	TLD			TLD
D-7		AP,AI	TLD			TLD
D-8		AP,AI	TLD			TLD
D-9		AP	TLD			TLD
D-10		AP	TLD			TLD
D-11		AP,AI	TLD			TLD
D-12	C	AP,AI	TLD			TLD
D-13	C	AP	TLD			TLD
D-14		AP,AI	TLD			TLD
D-15		AP,AI	TLD			TLD SO
D-16		AP	TLD			TLD SO
D-17-48			TLD			TLD
D-49	C		SW	SL	F,BS	
D-50			SW		BS	
D-51			SW		BS	
D-52			SW			
D-53			WW[b]			
D-54			WW[c]			
D-55			WW			
D-56			WW			
D-57			WW			
D-58			WW			SO
D-59			WW			
D-60			WW			
D-61				SL	F,BS	
D-63			M[d]			G[e],SO
D-66			M[d]			G[e],SO
D-72			M[d]			G[e],SO
D-73	C		SW			
D-76-91			TLD			TLD
D-93			M[d]			G[e],SO
D-94			M[d]			G[e],SO,ME
D-96			M[d]			G[e],SO
D-99			SW			

Table 2 (continued)

Location	Loc. Type[a]	Weekly	Monthly	Quarterly	Semi-Annually	Annually
D-100			M[d]			G[e],SO
D-101			M[d]			G[e],SO
D-102	C		M[d]			G[e],SO,ME
D-103			SW			
D-104			M[d]			G[e],SO
D-105	C		M[d]			G[e],SO

[a]Control locations are indicated by a "C" in this column. All other locations are indicators.
[b]Collected hourly and composited monthly and quarterly.
[c]Collected daily and composited monthly and quarterly.
[d]Monthly from October through April; weekly from May through September.
[e]Vegetation (G) includes broad leaf vegetation and grain.

Table 3 Sample codes used in Table 2

Code	Description
AP	Airborne Particulates
AI	Airborne Iodine
TLD	Thermoluminescent Dosimeter
P	Precipitation
MI	Milk
WW	Well Water
G	Vegetation (broad leaf and grain)
ME	Meat and Poultry
SO	Soil
SW	Surface Water
F	Fish
SL	Periphyton (aquatic biota)
BS	River Sediment
WL	Wildlife

2.0 Data Tables

Table 4. Airborne particulates collected at Location D-1, (Cedar Rapids), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	396	0.076±0.004
1-15-81	344	0.086±0.005
1-22-81	337	0.114±0.006
1-29-81	341	0.123±0.006
2-05-81	340	0.071±0.005
2-12-81	338	0.071±0.005
2-19-81	335	0.149±0.007
2-26-81[a]	310	0.074±0.005
3-05-81	290	0.111±0.006
3-12-81	288	0.139±0.007
3-19-81	287	0.198±0.008
3-26-81	282	0.201±0.008
4-02-81	286	0.293±0.010
4-09-81	291	0.285±0.010
4-16-81	289	0.232±0.009
4-23-81	291	0.220±0.009
4-30-81	290	0.203±0.008
5-07-81	291	0.210±0.009
5-14-81	289	0.281±0.010
5-21-81	291	0.336±0.010
5-28-81	291	0.212±0.008
6-04-81[a]	292	0.256±0.009
6-11-81[b]	284	0.199±0.008
6-18-81	285	0.148±0.007
6-25-81	285	0.098±0.006
7-02-81	286	0.170±0.008
7-09-81	285	0.140±0.007
7-16-81	287	0.103±0.006
7-23-81	285	0.080±0.005
7-30-81[a]	284	0.063±0.005
8-06-81	283	0.042±0.004
8-13-81	288	0.042±0.004
8-20-81	284	0.060±0.005
8-27-81	287	0.065±0.005
9-03-81	283	0.027±0.003
9-10-81	283	0.043±0.004
9-17-81	282	0.043±0.004
9-24-81[a]	277	0.033±0.004
10-01-81	290	0.032±0.003

Table 4. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	291	0.021±0.003
10-15-81	289	0.022±0.003
10-22-81	293	0.019±0.003
10-29-81	293	0.033±0.004
11-05-81	286	0.027±0.004
11-12-81	291	0.026±0.004
11-19-81	287	0.036±0.004
11-25-81	246	0.017±0.003
12-03-81	329	0.024±0.003
12-10-81	228	0.034±0.004
12-17-81	287	0.037±0.004
12-23-81	244	0.037±0.004
12-31-81	326	0.041±0.004
Annual Mean ± s.d.		0.110±0.088

[a] Changed unit.
[b] Replaced broken fan.

Table 5. Airborne particulates collected at Location D-2, (Marion), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	192[a]	0.116±0.009
1-15-81	265	0.082±0.006
1-22-81	303	0.131±0.007
1-29-81	294	0.173±0.008
2-05-81	288	0.092±0.006
2-12-81	290	0.079±0.005
2-19-81	290	0.201±0.008
2-26-81	254[b]	0.086±0.006
3-05-81[c]	284	0.073±0.005
3-12-81	257	0.166±0.008
3-19-81	261	0.252±0.010
3-26-81	261	0.277±0.010
4-02-81	272	0.302±0.010
4-09-81	278	0.326±0.011
4-16-81	276	0.227±0.009
4-23-81[d]	277	0.280±0.010
4-30-81	285	0.214±0.009
5-07-81	290	0.216±0.009
5-14-81	287	0.305±0.010
5-21-81	288	0.353±0.011
5-28-81	290	0.201±0.008
6-04-81	289	0.290±0.010
6-11-81	287	0.218±0.009
6-18-81	288	0.136±0.007
6-25-81	288	0.101±0.006
7-02-81	290	0.166±0.008
7-09-81	286	0.128±0.007
7-16-81	280	0.091±0.006
7-23-81	285	0.075±0.005
7-30-81	289	0.068±0.005
8-06-81	288	0.042±0.004
8-13-81	288	0.056±0.005
8-20-81	285	0.061±0.005
8-27-81	285	0.075±0.005
9-03-81	285	0.028±0.003
9-10-81[e]	286	0.039±0.004
9-17-81	299	0.042±0.004
9-24-81[f]	293	0.031±0.003
10-01-81	284	0.030±0.003

Table 5. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	288	0.023±0.003
10-15-81	285	0.021±0.003
10-22-81	289	0.024±0.003
10-29-81	294	0.032±0.004
11-05-81	279	0.030±0.004
11-12-81	287	0.029±0.004
11-19-81	281	0.039±0.004
11-25-81	244	0.020±0.003
12-03-81	321	0.017±0.003
12-10-81	293	0.033±0.004
12-17-81	293	0.040±0.004
12-23-81	247	0.034±0.004
12-31-81	334	0.042±0.002
Annual Mean ± s.d.		0.119±0.098

[a] Pump malfunction.
[b] Blown fuse at 153.9 hours.
[c] Changed pump on 5 March 1981.
[d] Replaced unit on 23 April 1981.
[e] Changed unit.
[f] Changed unit, electricity shut off.

Table 6. Airborne particulates collected at Location D-3, (Hiawatha), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	337	0.087±0.005
1-15-81	293	0.098±0.006
1-22-81	295	0.142±0.007
1-28-81	ND[a]	ND[a]
2-05-81	250	0.084±0.006
2-12-81	ND[a]	ND[a]
2-19-81	ND[a]	ND[a]
2-26-81	292	0.087±0.006
3-05-81	287	0.112±0.007
3-12-81	299	0.144±0.007
3-19-81	298	0.228±0.009
3-26-81	285	0.186±0.008
4-02-81	300	0.297±0.010
4-09-81	298	0.279±0.009
4-16-81	298	0.210±0.009
4-23-81[b]	300	0.212±0.008
4-30-81	280	0.204±0.009
5-07-81	282	0.206±0.009
5-14-81	278	0.331±0.011
5-21-81	280	0.324±0.010
5-28-81	282	0.183±0.008
6-04-81	282	0.257±0.010
6-11-81	281	0.225±0.009
6-18-81	279	0.114±0.007
6-25-81	282	0.114±0.006
7-02-81	301	0.144±0.007
7-09-81	517[c]	0.051±0.003
7-16-81[d]	526	0.038±0.003
7-23-81	331	0.075±0.005
7-30-81	334	0.058±0.004
8-06-81	294	0.045±0.004
8-13-81	303	0.066±0.005
8-20-81	298	0.054±0.005
8-27-81	300	0.056±0.005
9-03-81	290	0.029±0.003
9-10-81[e]	289	0.033±0.004
9-17-81	286	0.040±0.004
9-24-81	282	0.028±0.003
10-01-81	288	0.028±0.003

Table 6. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	285	0.022±0.003
10-15-81	286	0.017±0.003
10-22-81	286	0.020±0.003
10-29-81	290	0.028±0.004
11-05-81	282	0.031±0.004
11-12-81	287	0.025±0.003
11-19-81	284	0.036±0.004
11-25-81	245	0.014±0.003
12-03-81	327	0.023±0.003
12-10-81	285	0.030±0.004
12-17-81	286	0.032±0.004
12-23-81	245	0.037±0.004
12-31-81	326	0.038±0.004
Annual Mean ± s.d.		0.106±0.092

[a] No sample due to vandalism.
[b] Replaced unit on 23 April 1981.
[c] Seal leak.
[d] Replaced unit 16 July 1981.
[e] Changed unit.

Table 7. Airborne particulates collected at Location D-4, (Johnson) analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	373	0.072±0.005
1-15-81	297	0.099±0.006
1-22-81	298	0.146±0.007
1-29-81	298	0.136±0.007
2-05-81	294	0.079±0.005
2-12-81[a]	301	0.085±0.005
2-19-81	295	0.178±0.008
2-26-81	271	0.083±0.006
3-05-81	288	0.100±0.006
3-12-81	287	0.142±0.007
3-19-81	287	0.210±0.008
3-26-81	285	0.186±0.008
4-02-81	287	0.281±0.010
4-09-81	288	0.310±0.010
4-16-81	301[b]	0.216±0.008
4-23-81	306	0.187±0.008
4-30-81[c]	311	0.189±0.008
5-07-81	297	0.199±0.008
5-14-81	311	0.244±0.009
5-21-81	295	0.267±0.009
5-28-81	278	0.193±0.008
6-04-81	280	0.236±0.009
6-11-81	270	0.175±0.008
6-18-81	277	0.126±0.007
6-25-81	272	0.087±0.006
7-02-81	278	0.154±0.008
7-09-81	283	0.115±0.006
7-16-81[d]	449	0.040±0.003
7-23-81	283	0.068±0.005
7-30-81	277	0.058±0.005
8-06-81	277	0.036±0.004
8-13-81	284	0.047±0.004
8-20-81	282	0.057±0.005
8-27-81	289	0.058±0.005
9-03-81	285	0.027±0.003
9-10-81	283	0.034±0.004
9-17-81	284	0.036±0.004
9-24-81[e]	232	0.019±0.003
10-01-81	281	0.027±0.003

Table 7. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	286	0.020±0.003
10-15-81	276	0.015±0.003
10-22-81	290	0.019±0.003
10-29-81	290	0.031±0.004
11-05-81	302	0.022±0.003
11-12-81	302	0.025±0.003
11-19-81	294	0.036±0.004
11-25-81	243	0.015±0.003
12-03-81	326	0.014±0.003
12-10-81	295	0.027±0.003
12-17-81	294	0.033±0.004
12-23-81	253	0.038±0.004
12-31-81	338	0.043±0.004
Annual Mean ± s.d.		0.103±0.083

[a] Pump changed 12 February 1981.
[b] Split hose.
[c] Changed sampler.
[d] Replaced unit 16 July 1981.
[e] Changed unit, electricity off.

Table 8. Airborne particulates collected at Location D-5, (Palo), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	322	0.085±0.005
1-15-81	282	0.105±0.006
1-22-81	282	0.146±0.007
1-29-81[a]	281	0.136±0.007
2-05-81	267	0.086±0.006
2-12-81	121	0.195±0.013
2-19-81	233	0.205±0.008
2-26-81	211	0.107±0.008
3-05-81	273	0.121±0.007
3-12-81	273	0.155±0.007
3-19-81	274	0.216±0.009
3-26-81	272	0.201±0.008
4-02-81	274	0.281±0.010
4-09-81[b]	273	0.285±0.010
4-16-81	312	0.208±0.008
4-23-81	302	0.217±0.008
4-30-81	302	0.207±0.008
5-07-81	302	0.195±0.008
5-14-81	295	0.307±0.010
5-21-81	304	0.321±0.010
5-28-81	380[c]	0.140±0.006
6-04-81	302	0.229±0.009
6-11-81	299	0.185±0.008
6-18-81	289	0.106±0.006
6-25-81	310	0.071±0.005
7-02-81	298	0.141±0.007
7-09-81	301	0.118±0.006
7-16-81	305	0.094±0.006
7-23-81	300	0.067±0.005
7-30-81	282	0.064±0.005
8-06-81	294	0.040±0.004
8-13-81	300	0.046±0.004
8-20-81	284	0.069±0.005
8-27-81	286	0.051±0.005
9-03-81	285	0.022±0.003
9-10-81[d]	285	0.030±0.003
9-17-81	285	0.038±0.004
9-24-81	283	0.028±0.003
10-01-81	287	0.028±0.003

Table 8. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	285	0.022±0.003
10-15-81	285	0.017±0.003
10-22-81	286	0.015±0.003
10-29-81	290	0.031±0.004
11-05-81	282	0.029±0.004
11-12-81	286	0.026±0.004
11-19-81	285	0.038±0.004
11-25-81	245	0.016±0.003
12-03-81	327	0.021±0.003
12-10-81	285	0.032±0.004
12-17-81	285	0.037±0.004
12-23-81	246	0.036±0.004
12-31-81	326	0.036±0.003
Annual Mean ± s.d.		0.110±0.087

[a] Pump changed.
[b] Changed No. 42 on 9 April 1981.
[c] Seal leak.
[d] Changed Unit.

Table 9. Airborne particulates collected at Location D-6, (Center Point), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	322	0.079±0.005
1-15-81	280	0.112±0.006
1-22-81	280	0.132±0.007
1-29-81	279	0.147±0.007
2-05-81	279	0.136±0.007
2-12-81	275	0.073±0.005
2-19-81	432	0.111±0.005
2-26-81	334	0.066±0.005
3-05-81	298	0.096±0.006
3-12-81	291	0.144±0.007
3-19-81	288	0.284±0.010
3-26-81	286	0.211±0.008
4-02-81	288	0.324±0.010
4-09-81	288	0.312±0.010
4-16-81	286	0.237±0.009
4-23-81	287	0.204±0.008
4-30-81	287	0.223±0.009
5-07-81	288	0.226±0.009
5-14-81	258	0.327±0.011
5-21-81	283	0.361±0.011
5-28-81	284	0.172±0.008
6-04-81[a]	286	0.248±0.009
6-11-81	305	0.220±0.009
6-18-81	301	0.139±0.007
6-25-81	295	0.111±0.006
7-02-81	299	0.176±0.008
7-09-81	302	0.139±0.007
7-16-81	303	0.107±0.006
7-23-81	301	0.073±0.005
7-30-81	298	0.069±0.005
8-06-81	294	0.040±0.004
8-13-81	301	0.055±0.004
8-20-81	284	0.051±0.005
8-27-81	287	0.069±0.005
9-03-81	284	0.029±0.003
9-10-81	285	0.042±0.004
9-17-81[b]	286	0.043±0.004
9-14-81	289	0.030±0.003
10-01-81	278	0.032±0.004

Table 9. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	278	0.019±0.003
10-15-81	295	0.012±0.003
10-22-81	284	0.021±0.003
10-29-81	292	0.034±0.004
11-05-81	285	0.020±0.003
11-12-81	299	0.026±0.003
11-19-81	291	0.026±0.004
11-25-81	250	0.014±0.003
12-03-81	331	0.016±0.003
12-10-81	296	0.029±0.004
12-17-81	298	0.034±0.004
12-23-81	256	0.034±0.004
12-31-81	336	0.041±0.004
Annual Mean ± s.d.		0.115±0.097

[a] Changed unit.
[b] Changed sampler.

Table 10. Airborne particulates collected at Location D-7, (Shellsburg), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	490	0.048±0.003
1-15-81[a]	415	0.058±0.004
1-27-81	298	0.139±0.007
1-29-81	295	0.125±0.007
2-05-81	292	0.088±0.006
2-12-81	213	0.121±0.008
2-19-81	372	0.136±0.006
2-26-81	373	0.041±0.004
3-05-81	313	0.101±0.006
3-12-81	390[b]	0.095±0.005
3-19-81	498[c]	0.082±0.004
3-26-81	298	0.194±0.008
4-02-81[d]	338	0.251±0.008
4-09-81	284	0.303±0.010
4-16-81	459[e]	0.079±0.004
4-23-81	285	0.197±0.008
4-30-81	284	0.186±0.008
5-07-81	288	0.190±0.008
5-14-81	284	0.270±0.009
5-21-81	282	0.232±0.009
5-28-81	288	0.160±0.007
6-04-81	286	0.242±0.009
6-11-81	274	0.170±0.008
6-18-81	287	0.135±0.007
6-25-81	281	0.089±0.006
7-02-81	288	0.152±0.008
7-09-81	291	0.111±0.006
7-16-81	289	0.074±0.005
7-23-81	288	0.071±0.005
7-30-81	284	0.061±0.005
8-06-81	286	0.033±0.004
8-13-81[f]	292	0.042±0.004
8-20-81	285	0.055±0.005
8-27-81	286	0.062±0.005
9-03-81	286	0.029±0.003
9-10-81	286	0.036±0.004
9-17-81[g]	286	0.046±0.004
9-14-81	291	0.031±0.003
10-01-81	285	0.028±0.003

Table 10. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	290	0.022±0.003
10-15-81	282	0.025±0.004
10-22-81	287	0.021±0.003
10-29-81	291	0.027±0.004
11-05-81	274	0.023±0.004
11-12-81	284	0.016±0.003
11-19-81	279	0.023±0.004
11-25-81	266	0.014±0.003
12-03-81	322	0.018±0.003
12-10-81	284	0.034±0.004
12-17-81	281	0.029±0.004
12-23-81	243	0.031±0.004
12-31-81	326	0.037±0.004
An. [illegible] Mean ± s.d.		0.094±0.077

[a] Changed out.
[b] Seal leak, no spare.
[c] Fixed seal leak.
[d] Replaced unit on 2 April 1981.
[e] Seal problem.
[f] Changed unit.
[g] Changed sampler.

Table 11. Airborne particulates collected at Location D-8, (Urbana), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	327	0.123±0.006
1-15-81	285	0.130±0.007
1-22-81	285	0.211±0.009
1-29-81[a]	286	0.328±0.011
2-05-81	285	0.094±0.006
2-12-81	285	0.093±0.006
2-19-81	286	0.236±0.009
2-26-81	287	0.090±0.006
3-05-81	284	0.101±0.006
3-12-81	285	0.204±0.008
3-19-81	286	0.237±0.009
3-26-81	285	0.273±0.010
4-02-81	286	0.319±0.010
4-09-81	286	0.253±0.009
4-16-81	283	0.233±0.009
4-23-81	286	0.248±0.009
4-30-81	284	0.224±0.009
5-07-81	285	0.250±0.009
5-14-81	285	0.358±0.011
5-21-81	285	0.445±0.012
5-28-81	286	0.220±0.009
6-04-81	285	0.324±0.011
6-11-81[b]	285	0.253±0.011
6-18-81	286	0.132±0.007
6-25-81	284	0.106±0.006
7-02-81	286	0.175±0.008
7-09-81	288	0.150±0.007
7-16-81	290	0.101±0.006
7-23-81	284	0.073±0.005
7-30-81	287	0.061±0.005
8-06-81	284	0.037±0.004
8-13-81	296	0.051±0.004
8-20-81	285	0.054±0.005
8-27-81	287	0.060±0.005
9-03-81	287	0.029±0.003
9-10-81	282	0.034±0.004
9-17-81	296	0.038±0.004
9-24-81[b]	281	0.033±0.004
10-01-81	288	0.028±0.003

Table 11. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	285	0.022±0.003
10-15-81	285	0.014±0.003
10-22-81	287	0.015±0.003
10-29-81	291	0.021±0.004
11-05-81	282	0.022±0.003
11-12-81	286	0.028±0.004
11-19-81	285	0.030±0.004
11-25-81	245	0.013±0.003
12-03-81	327	0.016±0.003
12-10-81	285	0.033±0.004
12-17-81	285	0.038±0.004
12-23-81	246	0.037±0.004
12-31-81	326	0.036±0.003
Annual Mean ± s.d.		0.132±0.116

[a] Changed pump.
[b] Changed unit.

Table 12. Airborne particulates collected at Location D-9, (Route W26), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	330	0.079±0.005
1-15-81	256	0.096±0.006
1-22-81	287	0.142±0.007
1-29-81	286	0.142±0.007
2-05-81	283	0.089±0.006
2-12-81	220	0.089±0.007
2-19-81	47[a]	0.262±0.026
2-26-81[b]	280	0.044±0.004
3-05-81	283	0.098±0.006
3-12-81	287	0.132±0.007
3-19-81	286	0.189±0.008
3-26-81	280	0.159±0.007
4-02-81	218[c]	0.315±0.012
4-09-81	NS[d]	NS[d]
4-16-81	284	0.295±0.010
4-23-81	281	0.199±0.008
4-30-81	276	0.162±0.008
5-07-81	272	0.193±0.009
5-14-81	266	0.281±0.010
5-21-81	265	0.338±0.011
5-28-81[e]	258	0.154±0.008
6-04-81	278	0.267±0.010
6-11-81	283	0.219±0.009
6-18-81	283	0.133±0.007
6-25-81	282	0.099±0.006
7-02-81	290	0.155±0.008
7-09-81	285	0.129±0.007
7-16-81	285	0.099±0.006
7-23-81	283	0.068±0.005
7-30-81	280	0.063±0.005
8-06-81	282	0.037±0.004
8-13-81	298	0.049±0.004
8-20-81	283	0.045±0.004
8-27-81	282	0.063±0.005
9-03-81	282	0.029±0.003
9-10-81	278	0.037±0.004
9-17-81[f]	278	0.027±0.004
9-24-81	290	0.021±0.003
10-01-81	280	0.029±0.003

Table 12. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	281	0.018±0.003
10-15-81	275	0.014±0.003
10-22-81	285	0.014±0.003
10-29-81	289	0.031±0.004
11-05-81	268	0.023±0.004
11-12-81	283	0.023±0.002
11-19-81	270	0.034±0.004
11-25-81	231	0.015±0.003
12-03-81	311	0.015±0.003
12-10-81	286	0.023±0.003
12-17-81	285	0.034±0.004
12-23-81	244	0.038±0.004
12-31-81	323	0.038±0.004
Annual Mean ± s.d.		0.102±0.088

[a] Low volume due to motor malfunction. Results excluded in the determination of Annual Mean.
[b] Changed pump.
[c] Electricity shut off - blown fuse.
[d] NS = Not sampled; electricity shut off.
[e] Changed unit.
[f] Changed sampler.

Table 13. Airborne particulates collected at Location D-10, (Atkins), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	353	0.094±0.005
1-15-81[a]	305	0.096±0.006
1-22-81	284	0.142±0.007
1-29-81	282	0.146±0.007
2-05-81	265	0.086±0.006
2-12-81	281	0.073±0.005
2-19-81	284	0.177±0.008
2-26-81	286[b]	0.065±0.005
3-05-81[c]	287	0.115±0.007
3-12-81	285	0.240±0.009
3-19-81	286	0.239±0.009
3-26-81	285	0.317±0.010
4-02-81	287	0.439±0.012
4-09-81[d]	286	0.414±0.012
4-16-81	325	0.200±0.008
4-23-81	248[e]	0.185±0.009
4-30-81	NS[f]	NS[f]
5-07-81[g]	211	0.390±0.014
5-14-81	284	0.463±0.012
5-21-81	286	0.488±0.013
5-28-81	286	0.292±0.010
6-04-81	286	0.421±0.012
6-11-81	285	0.319±0.011
6-18-81	285	0.202±0.009
6-25-81	282	0.129±0.007
7-02-81	285	0.249±0.010
7-09-81	286	0.186±0.008
7-16-81	288	0.167±0.008
7-23-81	284	0.104±0.006
7-30-81	285	0.093±0.006
8-06-81	280	0.037±0.004
8-13-81	290	0.051±0.004
8-20-81	280	0.052±0.005
8-27-81	284	0.060±0.005
9-03-81	282	0.030±0.003
9-10-81[h]	276	0.038±0.004
9-17-81	276	0.043±0.004
9-24-81[i]	282	0.038±0.004
10-01-81	288	0.030±0.003

Table 13. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	285	0.021±0.003
10-15-81	285	0.017±0.003
10-22-81	284	0.022±0.003
10-29-81	288	0.030±0.004
11-05-81	275	0.026±0.004
11-12-81	272	0.028±0.004
11-19-81	279	0.030±0.004
11-25-81	245	0.020±0.003
12-03-81	326	0.021±0.003
12-10-81	285	0.035±0.004
12-17-81	289	0.040±0.004
12-23-81	244	0.041±0.004
12-31-81	327	0.044±0.004
Annual Mean ± s.d.		0.143±0.137

[a] Changed out.
[b] Volume was estimated because the gauge was broken.
[c] Changed pump.
[d] No. 43
[e] Compressor blown.
[f] NS = Not sampled; pump broken.
[g] Replaced unit 2 May 1981.
[h] Changed unit.
[i] Flow calculated from elapsed time because the flow meter skipped.

Table 14. Airborne particulates collected at Location D-11, (Toddville), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	330	0.089±0.005
1-15-81	300	0.094±0.006
1-22-81	390	0.093±0.005
1-29-81	600	0.040±0.003
2-05-81	297	0.066±0.005
2-12-81	284	0.106±0.006
2-19-81	833	0.069±0.003
2-26-81	287	0.077±0.006
3-05-81	308	0.076±0.005
3-12-81	330	0.135±0.006
3-19-81	286	0.239±0.009
3-26-81	308	0.220±0.008
4-02-81	314	0.284±0.009
4-09-81	309	0.313±0.010
4-16-81	309	0.209±0.008
4-23-81	307	0.204±0.008
4-30-81	307	0.203±0.008
5-07-81	305	0.215±0.008
5-14-81	304	0.288±0.009
5-21-81	303	0.324±0.010
5-28-81[a]	375	0.182±0.007
6-04-81	293	0.243±0.009
6-11-81	298	0.199±0.008
6-18-81	297	0.139±0.007
6-25-81	295	0.106±0.006
7-02-81	299	0.166±0.008
7-09-81	299	0.119±0.006
7-16-81	301	0.108±0.006
7-23-81	287	0.075±0.005
7-30-81	296	0.063±0.005
8-06-81	297	0.042±0.004
8-13-81	300	0.051±0.004
8-20-81	294	0.050±0.004
8-27-81	299	0.063±0.005
9-03-81	296	0.033±0.003
9-10-81	297	0.037±0.004
9-17-81[b]	297	0.042±0.004
9-24-81	282	0.037±0.004
10-01-81	288	0.034±0.004

Table 14. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	284	0.015±0.003
10-15-81	285	0.009±0.003
10-22-81	287	0.012±0.003
10-29-81	290	0.020±0.004
11-05-81	282	0.015±0.003
11-12-81	286	0.019±0.003
11-19-81	284	0.028±0.004
11-25-81	245	0.012±0.003
12-03-81	327	0.012±0.002
12-10-81	105	0.009±0.005
12-17-81	121	0.058±0.008
12-23-81	245	0.042±0.003
12-31-81	326	0.049±0.004
Annual Mean ± s.d.		0.104±0.089

[a] Changed unit.
[b] Changed sampler.

Table 15. Airborne particulates collected at Location D-12, (Iowa City), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	327	0.069±0.005
1-15-81	283	0.122±0.007
1-22-81	285	0.081±0.006
1-29-81	288	0.128±0.007
2-05-81	285	0.063±0.005
2-12-81[a]	284	0.067±0.005
2-19-81	287	0.183±0.008
2-26-81	288	0.097±0.006
3-05-81	284	0.028±0.004
3-12-81	286	0.297±0.010
3-19-81	286	0.347±0.011
3-26-81	286	0.384±0.011
4-02-81	288	0.475±0.012
4-09-81	286	0.310±0.010
4-16-81	284	0.344±0.011
4-23-81[b]	287	0.328±0.010
4-30-81	283	0.245±0.009
5-07-81	287	0.278±0.010
5-14-81	283	0.349±0.011
5-21-81	285	0.502±0.013
5-28-81	286	0.301±0.010
6-04-81	287	0.391±0.012
6-11-81	285	0.347±0.011
6-18-81	285	0.195±0.008
6-25-81	285	0.139±0.007
7-02-81	287	0.098±0.006
7-09-81	284	0.187±0.008
7-16-81[c]	274	0.129±0.007
7-23-81	285	0.091±0.006
7-30-81	285	0.076±0.005
8-06-81	284	0.045±0.004
8-13-81	288	0.060±0.005
8-20-81	283	0.065±0.005
8-27-81	287	0.083±0.006
9-03-81	284	0.041±0.004
9-10-81	285	0.051±0.004
9-17-81	287	0.055±0.005
9-24-81[d]	282	0.041±0.004
10-01-81[e]	286	0.035±0.004

Table 15. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	284	0.025±0.004
10-15-81	285	0.016±0.003
10-22-81	37.4[f]	0.041±0.019
10-29-81	302	0.033±0.004
11-05-81	282	0.036±0.004
11-12-81	286	0.029±0.004
11-19-81	284	0.034±0.004
11-25-81	245	0.024±0.004
12-03-81	327	0.024±0.003
12-10-81	285	0.036±0.004
12-17-81	287	0.043±0.004
12-23-81	245	0.034±0.004
12-31-81	325	0.046±0.004
Annual Mean ± s.d.		0.147±0.137

[a] Changed pump.
[b] Replaced unit.
[c] Electric off for 7 hours.
[d] Changed unit.
[e] Electricity off for 2 hours.
[f] Low volume due to pump malfunction. Result was excluded in the determination of the Annual mean.

Table 16. Airborne particulates collected at Location D-13, (Alburnett), analysis for gorss beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	261[a]	0.088±0.006
1-15-81	235	0.093±0.007
1-22-81	271	0.049±0.005
1-29-81	266	0.169±0.008
2-05-81	256	0.081±0.006
2-12-81	212	0.070±0.006
2-19-81	81[b]	0.437±0.024
2-26-81	287	0.103±0.006
3-05-81	421	0.047±0.004
3-12-81	411[c]	0.089±0.005
3-19-81	395[d]	0.272±0.008
3-26-81	379[c]	0.174±0.007
4-02-81	323	0.293±0.009
4-09-81[e]	384	0.202±0.007
4-16-81	429	0.150±0.006
4-23-81	315	0.185±0.008
4-30-81	315	0.206±0.008
5-07-81	302	0.240±0.009
5-14-81	298	0.313±0.010
5-21-81	281	0.375±0.011
5-28-81	285	0.201±0.008
6-04-81	283	0.250±0.009
6-11-81	286	0.234±0.009
6-18-81	283	0.138±0.007
6-25-81	294	0.098±0.004
7-02-81	200[f]	0.156±0.009
7-09-81[g]	248	0.133±0.007
7-16-81	290	0.104±0.006
7-23-81	288	0.065±0.005
7-30-81	282	0.057±0.005
8-06-81	282	0.037±0.004
8-13-81	292	0.048±0.004
8-20-81	286	0.048±0.004
8-27-81	289	0.055±0.005
9-03-81	286	0.034±0.003
9-10-81	281	0.035±0.004
9-17-81[h]	285	0.040±0.004
9-24-81	273	0.031±0.004
10-01-81	285	0.031±0.003

Table 16. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	294	0.017±0.003
10-15-81	293	0.014±0.003
10-22-81	300	0.018±0.003
10-29-81	290	0.032±0.004
11-05-81	282	0.038±0.004
11-12-81	286	0.031±0.004
11-19-81	285	0.036±0.004
11-25-81	245	0.021±0.003
12-03-81	327	0.025±0.003
12-10-81	285	0.034±0.004
12-17-81	286	0.034±0.004
12-23-81	244	0.038±0.004
12-31-81	326	0.038±0.004
Annual Mean ± s.d.		0.105±0.091

[a] Pump malfunction.
[b] Low volume due to motor malfunction. Result was excluded in the determination of the Annual Mean.
[c] Vacuum seal leak on pump.
[d] Fixed seal leak.
[e] Replaced No. 23 on 9 April 1981.
[f] Pump shorted out.
[g] Replaced blown unit on 3 July 1981.
[h] Changed sampler.

Table 17. Airborne particulates collected at Location D-14, (Alice), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	327	0.106±0.006
1-15-81	285	0.147±0.007
1-22-81	285	0.197±0.008
1-29-81	286	0.210±0.009
2-05-81	285	0.118±0.007
2-12-81[a]	285	0.096±0.006
2-19-81	262	0.264±0.010
2-26-81	198	0.094±0.007
3-05-81[a]	172	0.154±0.010
3-12-81	309	0.125±0.006
3-19-81	297	0.251±0.009
3-26-81	306	0.198±0.008
4-02-81	245	0.272±0.010
4-09-81	287	0.318±0.010
4-16-81	284	0.222±0.009
4-23-81	269	0.199±0.009
4-30-81	283	0.188±0.008
5-07-81	287	0.213±0.009
5-14-81	285	0.271±0.009
5-21-81	280	0.300±0.010
5-28-81	290	0.192±0.008
6-04-81	290	0.248±0.009
6-11-81	292	0.215±0.009
6-18-81	291	0.130±0.007
6-25-81	289	0.097±0.006
7-02-81	290	0.167±0.008
7-09-81	290	0.119±0.007
7-16-81	291	0.099±0.006
7-23-81	290	0.071±0.005
7-30-81	288	0.065±0.005
8-06-81	287	0.036±0.004
8-13-81	291	0.047±0.004
8-20-81	286	0.047±0.004
8-27-81	288	0.065±0.005
9-03-81	286	0.033±0.003
9-10-81	285	0.032±0.004
9-17-81[b]	287	0.039±0.004
9-24-81	281	0.029±0.003
10-01-81	281	0.032±0.003

Table 17. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	282	0.020±0.003
10-15-81	277	0.015±0.003
10-22-81	298	0.018±0.003
10-29-81	288	0.030±0.004
11-05-81	277	0.025±0.004
11-12-81	284	0.024±0.004
11-19-81	271	0.037±0.004
11-25-81	238	0.015±0.003
12-03-81	321	0.021±0.003
12-10-81	285	0.032±0.004
12-17-81	[illegible]	0.036±0.004
12-23-81	[illegible]	0.034±0.004
12-31-81	321	0.047±0.004
Annual Mean ± s.d.		0.116±0.091

[a] Pump changed.
[b] Changed sampler.

Table 18. Airborne particulates collected at Location D-15, (On-site), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	83a	0.108±0.013
1-15-81	399	0.069±0.004
1-22-81	316	0.113±0.006
1-29-81	280	0.147±0.007
2-05-81	278	0.084±0.006
2-12-81	274	0.090±0.006
2-19-81	340	0.166±0.007
2-26-81	266	0.074±0.006
3-05-81	279	0.082±0.006
3-12-81	454b	0.107±0.005
3-19-81	287	0.287±0.010
3-26-81	288	0.252±0.009
4-02-81	288	0.295±0.010
4-09-81	288	0.285±0.010
4-16-81	312	0.196±0.008
4-23-81	289	0.208±0.008
4-30-81	290	0.180±0.008
5-07-81	291	0.206±0.008
5-14-81	290	0.306±0.010
5-21-81	288	0.337±0.011
5-28-81c	302	0.192±0.008
6-04-81	285	0.272±0.010
6-11-81	284	0.177±0.008
6-18-81	288	0.135±0.007
6-25-81	285	0.086±0.006
7-02-81	292	0.168±0.008
7-09-81	286	0.129±0.007
7-16-81	284	0.086±0.006
7-23-81	280	0.078±0.005
7-30-81	300	0.061±0.005
8-06-81	303	0.033±0.003
8-13-81	308	0.044±0.004
8-20-81	304	0.049±0.004
8-27-81	304	0.061±0.005
9-03-81	353d	0.023±0.003
9-10-81c	299	0.038±0.004
9-17-81	291	0.040±0.004
9-24-81	283	0.029±0.003
10-01-81	284	0.026±0.003

Table 18. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	284	0.015±0.003
10-15-81	282	0.016±0.003
10-22-81	286	0.020±0.003
10-29-81	289	0.024±0.004
11-05-81	271	0.022±0.003
11-12-81	283	0.022±0.003
11-19-81	281	0.034±0.004
11-25-81	226	0.013±0.003
12-03-81	323	0.014±0.003
12-10-81	278	0.030±0.004
12-17-81	282	0.034±0.004
12-23-81	241	0.038±0.004
12-31-81	322	0.040±0.004
Annual Mean ± s.d.		0.108±0.093

[a] Motor burned out - replaced 6 January 1981. Result was excluded in the determination of the Annual Mean.
[b] Pump hose split.
[c] Changed unit.
[d] 20% l.ak developed which could not be repaired.

Table 19. Airborne particulates collected at Location D-16, (On-site), analysis for gross beta. Collection: Weekly.

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
1-08-81	324	0.089±0.005
1-15-81	283	0.122±0.007
1-22-81	283	0.147±0.007
1-29-81[a]	282	0.147±0.007
2-05-81	301	0.124±0.006
2-12-81	298	0.087±0.006
2-19-81	303	0.184±0.008
2-26-81	270	0.102±0.006
3-05-81	300	0.091±0.006
3-12-81	302	0.132±0.007
3-19-81	304	0.218±0.008
3-26-81	303	0.198±0.008
4-02-81	286	0.360±0.011
4-09-81	286	0.296±0.010
4-16-81	284	0.285±0.010
4-23-81	286	0.153±0.007
4-30-81	283	0.117±0.007
5-07-81	286	0.151±0.007
5-14-81	285	0.187±0.008
5-21-81	285	0.233±0.009
5-28-81	286	0.142±0.007
6-04-81	285	0.132±0.007
6-11-81	285	0.139±0.007
6-18-81	286	0.091±0.006
6-25-81	285	0.064±0.005
7-02-81	286	0.105±0.006
7-09-81	285	0.087±0.006
7-16-81	288	0.059±0.005
7-23-81	285	0.046±0.004
7-30-81	285	0.034±0.004
8-06-81	296	0.039±0.004
8-13-81	299	0.049±0.004
8-20-81	294	0.053±0.004
8-27-81	294	0.061±0.005
9-03-81	293	0.029±0.003
9-10-81[a]	293	0.038±0.004
9-17-81	285	0.039±0.004
9-24-81	283	0.027±0.003
10-01-81	287	0.031±0.003

Table 19. (continued)

Date Collected	Volume (m^3)	Gross Beta Activity (pCi/m^3)
10-08-81	285	0.018±0.003
10-15-81	285	0.022±0.003
10-22-81	287	0.019±0.003
10-29-81	290	0.029±0.004
11-05-81	282	0.029±0.004
11-12-81	286	0.021±0.003
11-19-81	285	0.031±0.004
11-25-81	245	0.016±0.003
12-03-81	327	0.021±0.003
12-10-81	285	0.034±0.004
12-17-81	285	0.032±0.004
12-23-81	246	0.036±0.004
12-31-81	326	0.045±0.004
Annual Mean ± s.d.		0.097±0.080

[a] Changed pump.

Table 20. Airborne particulate samples, quarterly composites of weekly samples, analysis for strontium-89, strontium-90, and gamma emitting isotopes.

Location	Isotope	Sample Description and Activity (pCi/m³)			
		1st Q	2nd Q	3rd Q	4th Q
D-1	Lab Code	DAP-301	DAP-445	DAP-584	DAP-727
	Volume (m³)	3888	3755	3698	3750
	Sr-89	0.0083±0.0011	0.0116±0.0011	<0.0035	<0.0012
	Sr-90	0.0008±0.0002	0.0015±0.0002	0.0005±0.0004	<0.0006
	Be-7	<0.067	<0.071	0.137±0.037	<0.073
	Nb-95	0.045±0.006	0.079±0.007	<0.0090	<0.0034
	Zr-95	0.032±0.006	0.046±0.008	<0.0090	<0.0062
	Ru-103	0.027±0.007	0.025±0.006	<0.0068	<0.0045
	Ru-106	<0.015	<0.030	<0.025	<0.011
	Cs-134	<0.0012	<0.0017	<0.0022	<0.0023
	Cs-137	<0.0015	<0.0031	<0.0022	<0.0015
	Ce-141	<0.015	<0.011	<0.0098	<0.013
	Ce-144	<0.010	0.055±0.008	<0.017	<0.014
D-2	Lab Code	DAP-302	DAP-446	DAP-585	DAP-728
	Volume (m³)	3239	3713	3733	3734
	Sr-89	0.0095±0.0012	0.0106±0.0010	<0.0033	<0.0014
	Sr-90	0.0004±0.0002	0.0015±0.0002	0.0008±0.0004	0.0005±0.0004
	Be-7	<0.088	0.200±0.050	<0.099	<0.085
	Nb-95	0.164±0.014	0.095±0.010	<0.0078	<0.0037
	Zr-95	0.090±0.015	0.050±0.010	<0.0087	<0.0059
	Ru-103	0.050±0.013	<0.015	<0.0096	<0.0050
	Ru-106	<0.033	<0.030	<0.029	<0.013
	Cs-134	<0.0022	<0.0023	<0.0020	<0.0014
	Cs-137	<0.0028	<0.0040	<0.0022	<0.0017
	Ce-141	<0.029	<0.017	<0.011	<0.0010
	Ce-144	0.047±0.012	0.074±0.011	<0.015	<0.0099

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-3	Lab Code	DAP-303	DAP-447	DAP-586	DAP-729
	Volume (m^3)	2636	3723	4339	3714
	Sr-89	0.0092±0.0016	0.0096±0.0011	<0.0027	<0.0026
	Sr-90	0.0007±0.0003	0.0015±0.0002	0.0007±0.0003	<0.0012
	Be-7	<0.11	0.172±0.05	<0.081	<0.068
	Nb-95	0.062±0.010	0.091±0.010	<0.0068	<0.0025
	Zr-95	<0.025	0.044±0.010	<0.0087	<0.0079
	Ru-103	<0.031	<0.013	<0.0085	<0.0078
	Ru-106	<0.040	<0.036	<0.023	<0.020
	Cs-134	<0.0042	<0.0022	<0.0019	<0.0026
	Cs-137	<0.0031	<0.0043	<0.0030	<0.0017
	Ce-141	<0.040	<0.016	<0.012	<0.014
	Ce-144	<0.022	0.064±0.012	<0.013	<0.016
D-4	Lab Code	DAP-304	DAP-448	DAP-587	DAP-730
	Volume (m^3)	3574	3764	3789	3790
	Sr-89	0.0076±0.0035	0.0115±0.0013	<0.0038	<0.0017
	Sr-90	<0.0010	0.0016±0.0003	<0.0008	<0.0009
	Be-7	<0.079	0.14±0.03	<0.081	<0.051
	Nb-95	0.050±0.007	0.080±0.006	<0.0093	<0.0026
	Zr-95	0.030±0.008	0.051±0.008	<0.011	<0.0085
	Ru-103	<0.015	<0.0096	<0.0074	<0.010
	Ru-106	<0.017	<0.028	<0.015	<0.012
	Cs-134	<0.0026	<0.0017	<0.0024	<0.0015
	Cs-137	<0.0019	0.0046±0.0013	<0.0033	<0.0014
	Ce-141	<0.023	<0.0091	<0.015	<0.014
	Ce-144	<0.015	0.054±0.008	<0.015	<0.011

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-5	Lab Code	DAP-305	DAP-449	DAP-588	DAP-731
	Volume (m^3)	3091	3968	3777	3713
	Sr-89	0.0058±0.0011	0.0099±0.0010	<0.0033	<0.0024
	Sr-90	<0.0004	0.0010±0.0002	<0.0069	<0.0014
	Be-7	<0.107	<0.087	<0.073	<0.060
	Nb-95	0.060±0.008	0.078±0.010	<0.059	<0.0053
	Zr-95	0.031±0.009	0.042±0.010	<0.0099	<0.0048
	Ru-103	0.040±0.019	0.030±0.008	<0.0062	<0.0051
	Ru-106	<0.0019	<0.037	<0.017	<0.023
	Cs-134	<0.0019	<0.0023	<0.0028	<0.0022
	Cs-137	<0.0017	<0.0040	<0.0025	<0.0016
	Ce-141	<0.023	<0.017	<0.015	<0.0082
	Ce-144	<0.012	0.059±0.012	<0.015	<0.0098
D-6	Lab Code	DAP-306	DAP-450	DAP-589	DAP-732
	Volume (m^3)	3644	3747	3792	3474
	Sr-89	0.0082±0.0012	0.0123±0.0012	<0.0050	<0.0016
	Sr-90	0.0007±0.0002	0.0015±0.0003	0.0009±0.0005	<0.0008
	Be-7	<0.074	<0.099	<0.107	<0.059
	Nb-95	0.058±0.007	0.079±0.010	<0.0081	<0.0033
	Zr-95	<0.017	0.042±0.011	<0.0096	<0.0074
	Ru-103	0.028±0.007	<0.019	<0.0081	<0.0081
	Ru-106	<0.022	<0.042	<0.019	<0.022
	Cs-134	<0.0028	<0.0028	<0.0020	<0.0026
	Cs-137	<0.0020	<0.0045	<0.0020	<0.0022
	Ce-141	<0.017	<0.017	<0.011	<0.013
	Ce-144	<0.014	0.066±0.013	<0.013	<0.010

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-7	Lab Code	DAP-307	DAP-451	DAP-590	DAP-733
	Volume (m^3)	4247	3870	3735	3709
	Sr-89	0.0085±0.0010	0.0105±0.0012	<0.0044	<0.0015
	Sr-90	0.0004±0.0002	0.0015±0.0003	<0.0006	<0.0009
	Be-7	<0.081	<0.088	0.153±0.036	<0.082
	Nb-95	0.038±0.007	0.082±0.010	0.628±0.023	<0.0054
	Zr-95	<0.017	<0.022	<0.0081	<0.0068
	Ru-103	<0.017	<0.019	<0.0059	<0.012
	Ru-106	<0.022	<0.034	<0.017	<0.019
	Cs-134	<0.0025	<0.0037	<0.0023	<0.0071
	Cs-137	<0.0017	<0.0045	<0.0025	<0.0020
	Ce-141	<0.019	<0.019	<0.014	<0.013
	Ce-144	<0.013	0.048±0.012	<0.014	<0.014
D-8	Lab Code	DAP-308	DAP-452	DAP-591	DAP-734
	Volume (m^3)	3466	3706	3735	3714
	Sr-89	0.0107±0.0013	0.0128±0.0013	0.0054±0.0041	<0.0014
	Sr-90	0.0006±0.0002	0.0015±0.0003	<0.0005	<0.0007
	Be-7	<0.11	<0.096	<0.076	<0.090
	Nb-95	0.075±0.011	0.091±0.010	<0.0076	<0.0043
	Zr-95	0.046±0.12	0.043±0.010	<0.0061	<0.0064
	Ru-103	0.042±0.013	<0.016	<0.0090	<0.011
	Ru-106	<0.025	<0.036	<0.020	<0.023
	Cs-134	<0.0021	<0.0012	<0.0016	<0.0019
	Cs-137	<0.0031	<0.0042	<0.0022	<0.0026
	Ce-141	<0.026	<0.011	<0.0082	<0.011
	Ce-144	<0.017	0.076±0.012	<0.017	<0.014

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-9	Lab Code	DAP-309	DAP-453	DAP-592	DAP-735
	Volume (m^3)	3125	3318	3686	3630
	Sr-89	0.0079±0.0017	0.0113±0.0013	<0.0034	<0.0015
	Sr-90	0.0011±0.0003	0.0015±0.0002	0.0004±0.0004	<0.0007
	Be-7	<0.095	0.21±0.06	0.141±0.035	<0.087
	Nb-95	0.054±0.009	0.092±0.011	<0.0081	<0.0042
	Zr-95	0.041±0.011	0.039±0.010	<0.014	<0.0087
	Ru-103	<0.020	<0.019	<0.0074	<0.0074
	Ru-106	<0.034	<0.025	<0.017	<0.023
	Cs-134	<0.0018	<0.0036	<0.0017	<0.0015
	Cs-137	<0.0021	<0.0045	<0.0026	<0.0020
	Ce-141	<0.023	<0.017	<0.0079	<0.012
	Ce-144	<0.022	0.058±0.012	<0.011	<0.013
D-10	Lab Code	DAP-310	DAP-454	DAP-593	DAP-736
	Volume (m^3)	3483	3349	3681	3684
	Sr-89	0.0121±0.0013	0.0158±0.0015	<0.0031	<0.0014
	Sr-90	0.0005±0.0002	0.0021±0.0003	0.0006±0.0003	<0.0007
	Be-7	<0.12	<0.12	<0.098	<0.074
	Nb-95	0.083±0.011	0.14±0.01	<0.011	<0.0064
	Zr-95	0.048±0.04	0.058±0.012	<0.010	<0.0093
	Ru-103	<0.025	<0.020	<0.0047	<0.0085
	Ru-106	<0.026	<0.045	<0.023	<0.019
	Cs-134	<0.0023	<0.0029	<0.0023	<0.0011
	Cs-137	<0.0030	<0.0050	<0.0017	<0.0013
	Ce-141	<0.025	<0.014	<0.015	<0.0096
	Ce-144	<0.017	0.082±0.013	<0.013	<0.014

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-11	Lab Code	DAP-311	DAP-455	DAP-594	DAP-737
	Volume (m^3)	4553	4001	3833	3367
	Sr-89	0.0085±0.0010	0.0117±0.0011	<0.0030	<0.0017
	Sr-90	0.0004±0.0002	0.0019±0.0002	0.0009±0.0005	<0.0008
	Be-7	<0.060	0.16±0.04	0.152±0.039	<0.085
	Nb-95	0.048±0.007	0.084±0.010	<0.064	<0.0062
	Zr-95	0.031±0.008	0.038±0.010	<0.0096	<0.0070
	Ru-103	<0.014	0.027±0.008	<0.0090	<0.0088
	Ru-106	<0.022	<0.030	<0.020	<0.016
	Cs-134	<0.0018	<0.0017	<0.0020	<0.0020
	Cs-137	<0.0021	<0.0040	<0.0023	<0.0028
	Ce-141	<0.022	<0.017	<0.016	<0.016
	Ce-144	<0.014	0.057±0.011	<0.018	<0.014
D-12	Lab Code	DAP-312	DAP-456	DAP-595	DAP-738
	Volume (m^3)	3469	3710	3694	3791
	Sr-89	0.0115±0.0013	0.0144±0.0013	<0.0033	<0.0026
	Sr-90	0.0006±0.0002	0.0020±0.0003	<0.0009	<0.0013
	Be-7	0.166±0.040	0.220±0.050	<0.115	<0.060
	Nb-95	0.078±0.007	0.110±0.010	<0.0068	<0.0045
	Zr-95	0.050±0.009	0.060±0.011	<0.0064	<0.0051
	Ru-103	<0.013	<0.015	<0.0095	<0.0079
	Ru-106	<0.014	<0.040	<0.023	<0.013
	Cs-134	<0.0012	<0.0025	<0.0012	<0.0022
	Cs-137	<0.0025	<0.0042	<0.0028	<0.0020
	Ce-141	<0.015	<0.019	<0.017	<0.012
	Ce-144	0.034±0.007	0.081±0.013	0.034±0.009	<0.013

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-13	Lab Code	DAP-313	DAP-457	DAP-596	DAP-739
	Volume (m^3)	3475	3955	3667	3742
	Sr-89	0.0076±0.0013	0.0112±0.0012	<0.0032	<0.0014
	Sr-90	0.0009±0.0002	0.0016±0.0002	0.0007±0.0003	<0.0007
	Be-7	<0.090	<0.076	<0.087	<0.078
	Nb-95	0.066±0.008	0.079±0.009	0.636±0.026	<0.0031
	Zr-95	0.036±0.008	0.046±0.010	<0.0096	<0.0067
	Ru-103	<0.016	<0.014	<0.0054	<0.0051
	Ru-106	<0.020	<0.031	<0.023	<0.019
	Cs-134	<0.0014	<0.0029	<0.0012	<0.0019
	Cs-137	<0.0019	<0.0033	<0.0023	<0.0017
	Ce-141	<0.026	<0.014	<0.015	<0.012
	Ce-144	<0.017	0.058±0.010	<0.017	<0.014
D-14	Lab Code	DAF-314	DAP-458	DAP-597	DAP-740
	Volume (m^3)	3297	3717	3731	3669
	Sr-89	0.0143±0.0020	0.0121±0.0014	<0.0032	<0.0015
	Sr-90	0.0005±0.0003	0.0016±0.0003	<0.0014	<0.0007
	Be-7	<0.099	<0.010	<0.081	<0.051
	Nb-95	0.070±0.010	0.082±0.009	<0.0099	<0.0048
	Zr-95	0.045±0.012	0.051±0.011	<0.011	<0.0093
	Ru-103	<0.025	<0.015	<0.0096	<0.0092
	Ru-106	<0.037	<0.030	<0.015	<0.016
	Cs-134	<0.0028	<0.0028	<0.0014	<0.0019
	Cs-137	<0.0025	<0.0045	<0.0031	<0.0019
	Ce-141	<0.029	<0.013	<0.0087	<0.015
	Ce-144	<0.023	0.058±0.012	0.034±0.009	<0.0098

Table 20. (continued)

Location	Isotope	Sample Description and Activity (pCi/m^3)			
		1st Q	2nd Q	3rd Q	4th Q
D-15	Lab Code	DAP-315	DAP-459	DAP-598	DAP-741
	Volume (m^3)	3544	3784	3879	3648
	Sr-89	0.0075±0.0018	0.0105±0.0012	<0.0036	<0.0027
	Sr-90	<0.0004	0.0014±0.0002	0.0005±0.0004	<0.0016
	Be-7	<0.093	<0.092	0.126±0.031	<0.065
	Nb-95	0.054±0.008	0.084±0.010	<0.0065	<0.0071
	Zr-95	0.045±0.011	0.039±0.010	<0.0090	<0.0074
	Ru-103	<0.022	<0.014	<0.0088	<0.0059
	Ru-106	<0.017	<0.042	<0.013	<0.019
	Cs-134	<0.0025	<0.0029	<0.0012	<0.0023
	Cs-137	<0.0030	<0.0047	<0.0025	<0.0019
	Ce-141	<0.029	<0.019	<0.0090	<0.011
	Ce-144	<0.015	0.058±0.013	<0.013	<0.015
D-16	Lab Code	DAP-316	DAP-460	DAP-599	DAP-742
	Volume (m^3)	3553	3708	3767	3714
	Sr-89	0.0106±0.0014	0.0062±0.0011	<0.0036	<0.0029
	Sr-90	0.0004±0.0002	0.0013±0.0002	0.0008±0.0004	<0.0017
	Be-7	<0.10	<0.092	<0.073	0.120±0.033
	Nb-95	0.057±0.009	0.068±0.010	<0.0054	<0.0067
	Zr-95	0.039±0.011	<0.022	<0.0071	<0.0031
	Ru-103	<0.020	<0.017	<0.0081	<0.0059
	Ru-106	<0.020	<0.028	<0.017	<0.022
	Cs-134	<0.0022	<0.0022	<0.0017	<0.0031
	Cs-137	<0.0028	<0.0036	<0.0023	<0.0026
	Ce-141	<0.025	<0.014	<0.012	<0.0090
	Ce-144	<0.017	0.057±0.013	<0.011	<0.016

Table 21. Charcoal samples, weekly composites from indicator locations D-4, D-5, D-7, D-11, and D-15; analysis for iodine-131. Collection: Weekly.

Date Collected	Volume (m3)	I-131 Activity (pCi/m3)
1-08-81	1597	<0.006
1-15-81	1693	<0.006
1-22-81	1584	<0.006
1-29-81	1753	<0.006
2-05-81	1428	<0.006
2-12-81	1193	<0.006
2-19-81	2073	<0.006
2-26-81	1408	<0.006
3-05-81	1461	<0.006
3-12-81	1735	<0.006
3-19-81	1631	<0.006
3-26-81	1452	<0.006
4-02-81	1501	<0.006
4-09-81	1442	<0.006
4-16-81	1692	<0.006
4-23-81	1489	<0.006
4-30-81	1494	<0.006
5-07-81	1483	<0.006
5-14-81	1484	<0.006
5-21-81	1472	<0.006
5-28-81	1573	<0.006
6-04-81	1446	<0.006
6-11-81	1425	<0.006
6-18-81	1438	<0.006
6-25-81	1443	<0.006
7-02-81	1455	<0.006
7-09-81	1460	<0.006
7-16-81	1628	<0.006
7-23-81	1448	<0.006
7-30-81	1439	<0.006
8-06-81	1457	<0.006
8-13-81	1484	<0.006
8-20-81	1449	<0.006
8-27-81	1464	<0.006
9-03-81	1505	<0.006
9-10-81	1425	<0.006
9-17-81	1411	<0.006
9-24-81	1373	<0.006
10-01-81	1425	<0.006
10-08-81	1429	<0.006
10-15-81	1410	<0.006
10-22-81	1436	<0.006
10-29-81	1451	<0.006

Table 21. (continued)

Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)
11-05-81	1411	<0.006
11-12-81	1440	<0.006
11-19-81	1423	<0.006
11-26-81	1225	<0.006
12-03-81	1625	<0.006
12-10-81	1143	<0.006
12-17-81	1263	<0.006
12-23-81	1228	<0.006
12-31-81	1638	<0.006

Table 22. Charcoal samples, weekly composites from control locations D-8, D-12, and D-14; analysis for iodine-131. Collection: Weekly.

Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)
1-08-81	980	<0.01
1-15-81	853	<0.01
1-22-81	856	<0.01
1-29-81	860	<0.01
2-05-81	855	<0.01
2-12-81	853	<0.01
2-19-81	835	<0.01
2-26-81	772	<0.01
3-05-81	739	<0.01
3-12-81	879	<0.01
3-19-81	869	<0.01
3-26-81	878	<0.01
4-02-81	819	<0.01
4-09-81	859	<0.01
4-16-81	851	<0.01
4-23-81	842	<0.01
4-30-81	850	<0.01
5-07-81	859	<0.01
5-14-81	853	<0.01
5-21-81	850	<0.01
5-28-81	862	<0.01
6-04-81	862	<0.01
6-11-81	862	<0.01
6-18-81	862	<0.01
6-25-81	858	<0.01
7-02-81	863	<0.01
7-09-81	862	<0.01
7-16-81	855	<0.01
7-23-81	859	<0.01
7-30-81	860	<0.01
8-06-81	855	<0.01
8-13-81	875	<0.01
8-20-81	854	<0.01
8-27-81	862	<0.01
9-03-81	857	<0.01
9-10-81	852	<0.01
9-17-81	855	<0.01
9-24-84	844	<0.01
10-01-81	855	<0.01
10-08-81	851	<0.01
10-15-81	847	<0.01
10-22-81	622	<0.01
10-29-81	880	<0.01

Table 22. Charcoal samples, weekly composites from control locations D-8, D-12, and D-14; analysis for iodine-131. Collection: weekly.

Date Collected	Volume (m^3)	I-131 Activity (pCi/m^3)
11-05-81	841	<0.01
11-12-81	843	<0.01
11-19-81	840	<0.01
11-26-81	728	<0.01
12-03-81	975	<0.01
12-10-81	855	<0.01
12-17-81	858	<0.01
12-23-81	732	<0.01
12-31-81	973	<0.01

Table 23. Ambient gamma radiation (TLD), monthly exposure.

Location No.	Location Descr.	mrem/30 days[a] January	February	March	April	May	June
D-1	Cedar Rapids	7.0±2.5	4.4±0.8	3.6±0.6	5.2±1.4	3.6±0.4	4.2±0.4
D-2	Marion	8.5±2.4	5.5±0.8	5.0±1.0	6.1±1.3	4.1±0.5	4.7±0.4
D-3	Hiawatha	ND[a]	6.2±0.9	ND[a]	6.8±1.2	ND[a]	4.3±0.2
D-4	Morris	4.5±0.4	4.7±0.8	3.3±0.5	5.0±1.0	3.7±0.3	4.0±0.3
D-6	Center Point	7.2±0.3	5.0±1.0	4.3±0.6	6.4±1.1	4.1±0.4	4.6±0.4
D-7	Shellsberg	5.6±1.3	4.3±0.6	4.0±0.7	5.4±0.9	ND[a]	4.5±0.3
D-8	Urbana	8.6±1.5	5.9±2.0	4.4±0.6	8.7±2.0	4.4±0.2	4.8±0.4
D-9	Route W26	9.9±2.9	7.1±1.1	5.5±1.2	8.4±0.9	5.6±0.4	5.8±0.4
D-10	Atkins	8.0±2.9	5.8±0.5	4.1±0.7	7.1±1.2	4.2±0.3	5.1±0.2
D-11	Toddville	8.8±2.7	5.5±0.8	4.2±0.6	6.6±0.7	4.7±0.3	4.6±0.2
D-12	Univ. of Iowa	6.1±1.8	5.4±1.5	5.2±1.2	6.2±0.7	4.1±0.4	4.9±0.6
D-13	Albrunett	7.1±1.9	7.7±2.0	4.5±0.6	7.7±1.4	5.1±0.3	5.6±0.3
D-14	Alice	7.8±2.3	7.1±1.5	ND[a]	8.4±1.2	5.0±0.7	5.1±0.3
D-15	On-Site	5.7±1.2	7.7±1.3	5.3±0.6	7.8±0.9	6.0±0.5	6.3±0.6
D-16	On-Site	6.1±1.7	5.4±1.1	5.1±1.2	6.2±0.9	4.6±0.3	5.1±0.5
Mean ± s.d.		7.2±1.5	5.8±1.1	4.5±0.7	6.8±1.2	4.6±0.7	4.9±0.6

Table 23. (continued)

Location	mrem/30 days July	August	September	October	November	December
D-1	4.9±0.4	3.9±0.4	2.5±0.9	3.9±0.6	3.8±0.3	3.5±0.2
D-2	4.6±0.2	4.0±0.4	3.1±0.9	4.7±0.5	4.1±0.4	3.9±0.3
D/3	3.6±0.3	3.5±0.4	2.0±0.8	4.1±0.4	3.9±0.3	3.7±0.4
D-4	3.4±0.4	3.7±0.4	2.8±0.9	3.8±0.5	3.8±0.3	3.4±0.2
D-6	3.8±0.3	3.7±0.5	2.6±0.9	4.3±0.6	4.0±0.3	3.8±0.2
D-7	4.3±0.7	4.2±0.3	2.5±0.9	5.0±0.6	4.1±0.3	3.7±0.2
D-8	4.5±0.4	4.2±0.4	3.0±1.3	4.8±0.5	4.1±0.3	4.1±0.3
D-9	5.4±0.2	4.7±0.6	4.2±0.8	5.7±0.5	4.4±0.6	4.4±0.4
D-10	4.3±0.5	4.1±0.5	3.4±0.9	4.6±0.5	4.7±0.3	4.1±0.3
D-11	4.5±0.3	4.4±0.4	4.7±1.6	5.1±0.6	4.5±0.3	4.4±0.5
D-12	3.6±0.3	3.7±0.5	3.6±1.0	4.5±0.8	4.1±0.4	3.6±0.4
D-13	4.6±0.4	4.2±0.4	4.3±1.0	4.6±0.7	4.5±0.6	4.6±0.4
D-14	4.7±0.3	4.7±0.3	4.7±1.1	5.2±0.5	4.0±0.2	4.2±0.2
D-15	5.9±0.3	5.4±0.5	4.5±1.0	5.4±0.5	5.4±0.3	4.8±0.2
D-16	4.9±0.2	4.5±0.4	3.6±1.2	4.5±0.5	4.7±0.7	4.1±0.2
Mean ± s.d.	4.5±0.7	4.2±0.5	3.4±0.9	4.7±0.5	4.3±0.4	4.0±0.4

Table 23. (continued)

Location No.	Location Descr.	mrem/30 days[a]					
		January	February	March	April	May	June
D-17	0.5 mi N	5.1±1.9	4.6±0.8	4.0±0.6	7.0±1.4	ND[a]	7.0±0.6
D-18	0.5 mi NNE	4.4±0.8	6.4±1.5	4.2±0.5	5.3±1.3	4.8±0.3	5.3±0.4
D-19	0.5 mi NE	5.3±1.2	5.1±0.6	5.4±0.8	7.0±1.0	4.7±0.4	4.9±0.3
D-20	0.5 mi ENE	6.0±2.2	5.5±1.5	6.5±0.9	7.1±0.8	4.5±0.3	5.4±0.3
D-21	0.5 mi E	5.0±2.3	6.0±1.3	5.5±0.7	6.2±1.0	4.5±0.4	5.1±0.3
D-22	0.5 mi ESE	4.1±2.2	5.2±1.0	5.9±0.9	6.5±1.3	4.2±0.3	4.8±0.2
D-23	0.5 mi SE	3.8±1.1	5.3±0.7	4.6±0.8	6.7±0.7	4.4±0.4	4.4±0.5
D-24	0.5 mi SSE	4.3±1.7	6.1±0.8	4.6±0.6	6.9±1.2	4.5±0.4	5.4±0.3
D-25	0.5 mi S	3.9±1.7	4.2±0.8	5.2±0.7	6.7±1.6	4.5±0.4	5.4±0.3
D-26	0.5 mi SSW	5.7±0.7	5.7±1.0	4.3±0.6	6.9±2.0	5.0±0.4	5.5±0.3
D-27	0.5 mi SW	4.7±1.0	6.4±0.6	5.0±0.8	6.5±1.1	5.2±0.4	5.4±0.2
D-28	0.5 mi WSW	5.7±1.7	6.6±0.7	5.0±0.6	7.2±1.4	5.7±0.2	6.0±0.2
D-29	0.5 mi W	6.4±2.2	6.9±0.8	5.9±0.8	7.6±1.7	5.5±0.6	6.2±0.3
D-30	0.5 mi WNW	6.3±2.4	7.4±0.6	4.6±0.9	8.0±0.6	5.9±0.5	5.8±0.3
D-31	0.5 mi NW	7.2±1.4	7.3±0.5	6.0±0.9	6.0±1.0	5.8±0.5	6.4±0.6
D-32	0.5 mi NNW	7.2±0.9	6.5±3.6	5.8±0.9	8.2±1.7	6.3±0.9	6.4±0.4
Mean ± s.d.		5.3±1.1	6.0±0.9	5.2±0.8	6.9±0.7	5.0±0.7	5.6±0.7

Table 23. (continued)

Location	mrem/30 days July	August	September	October	November	December
D-17	5.4±0.3	4.2±0.6	3.9±1.2	4.5±0.6	4.5±0.3	4.4±0.3
D-18	4.6±0.4	4.3±0.3	3.4±0.9	4.2±0.5	4.5±0.3	4.0±0.3
D-19	4.9±0.5	4.5±0.5	3.7±0.9	4.3±0.5	4.4±0.2	4.4±0.3
D-20	5.0±0.2	4.7±0.5	4.8±1.1	4.8±0.6	4.1±0.3	4.2±0.4
D-21	4.4±0.5	4.4±0.4	3.6±1.1	4.3±0.5	4.2±0.3	4.0±0.3
D-22	4.0±0.4	4.0±0.4	3.8±0.9	4.5±0.5	4.0±0.7	4.1±0.2
D-23	4.6±0.4	4.5±0.3	3.4±1.1	5.1±0.5	3.8±0.5	3.7±0.4
D-24	4.5±0.4	4.3±0.5	4.5±0.9	5.3±0.6	4.2±0.4	4.7±0.6
D-25	4.7±0.4	4.2±0.5	3.4±0.9	5.0±0.5	4.3±0.7	4.0±0.2
D-26	4.7±0.4	4.4±0.3	3.6±0.9	5.7±0.6	3.9±0.5	4.1±0.4
D-27	4.3±0.5	4.1±0.3	4.1±0.8	5.2±0.5	4.0±0.5	4.3±0.2
D-28	5.1±0.4	4.4±0.4	4.8±0.8	5.4±0.4	4.2±0.6	4.3±0.2
D-29	4.8±0.4	5.0±0.6	3.6±0.8	5.5±0.6	4.3±0.5	4.7±0.3
D-30	5.4±0.6	4.8±0.6	4.2±0.9	6.5±0.6	5.3±0.5	4.8±0.2
D-31	6.2±0.4	5.2±0.3	4.5±0.9	6.2±0.3	4.9±0.8	4.4±0.4
D-32	5.9±0.2	5.3±0.3	5.0±1.1	5.9±0.4	4.2±0.6	4.8±0.5
Mean ± s.d.	4.9±0.6	4.5±0.4	4.0±0.6	5.2±0.7	4.3±0.4	4.3±0.3

Table 23. (continued)

Location No.	Location Descr.	mrem/30 days[a] January	February	March	April	May	June
D-33	3.0 mi N	5.2±0.9	5.9±0.4	4.8±0.5	6.9±1.0	4.6±0.4	5.4±0.7
D-34	3.0 mi NE	4.9±0.9	6.9±0.6	5.7±1.0	7.3±1.7	4.7±0.3	5.4±0.3
D-35	3.0 mi NE	4.9±1.6	3.7±0.8	4.6±1.0	6.2±1.7	3.9±0.3	4.6±0.5
D-36	3.0 mi NE	7.0±1.7	6.7±1.8	4.9±0.7	7.4±1.5	5.2±0.4	5.7±0.6
D-37	3.0 mi E	7.5±2.2	11.6±2.7	6.1±1.1	8.1±1.4	5.8±0.4	6.3±0.2
D-38	3.0 mi SE	5.7±1.1	7.3±1.8	4.5±0.8	7.0±1.5	4.9±0.5	5.0±0.4
D-39	3.0 mi SE	5.4±0.4	6.4±1.6	5.0±0.9	7.8±1.4	5.5±0.5	5.8±0.3
D-40	3.0 mi SE	5.7±0.4	6.9±0.9	6.0±0.8	6.8±0.8	5.5±0.2	6.0±0.2
D-41	3.0 mi S	5.0±1.0	4.7±0.6	4.8±0.6	6.1±1.3	5.0±0.3	5.6±0.3
D-42	3.0 mi SW	7.2±1.1	4.3±0.7	4.0±0.6	6.1±1.3	4.5±0.4	4.6±0.6
D-43	3.0 mi SW	5.0±1.2	ND[a]	4.1±0.9	5.4±0.8	4.3±0.3	5.3±0.5
D-44	1.0 mi SW	6.6±2.0	5.1±0.7	6.0±0.7	7.1±1.3	5.1±0.5	6.3±0.2
D-45	1.0 mi SW	7.6±2.4	7.0±1.7	5.7±0.7	7.0±1.3	5.9±0.4	6.1±0.4
D-46	1.0 mi W	6.4±0.3	6.9±0.7	5.7±0.5	7.6±1.6	5.9±0.5	7.2±0.5
D-47	1.0 mi NW	6.6±0.9	7.6±1.0	5.5±0.5	8.4±1.7	6.0±0.3	6.6±0.4
D-48	1.0 mi NW	7.2±1.8	8.3±2.0	5.5±1.0	6.9±1.3	5.7±0.5	6.8±0.4
Mean ± s.d.		6.1±1.0	6.6±1.9	5.2±0.7	7.0±0.8	5.2±0.6	5.8±0.8

Table 23. (continued)

Location	mrem/30 days July	August	September	October	November	December
D-33	4.7±0.4	4.2±0.3	3.7±0.9	6.4±0.3	3.7±0.6	3.9±0.2
D-34	4.6±0.2	4.1±0.3	3.7±1.0	5.2±0.5	3.6±0.6	3.7±0.3
D-35	4.2±0.2	4.0±0.5	5.5±1.0	6.2±0.3	3.4±0.5	3.9±0.5
D-36	4.8±0.3	4.4±0.4	5.0±0.8	ND[a]	4.6±0.6	4.5±0.4
D-37	5.9±0.5	5.1±0.5	4.3±0.9	6.1±0.5	4.8±0.7	ND[a]
D-38	5.0±0.5	3.9±0.4	3.7±1.0	5.2±0.3	3.9±0.5	3.9±0.3
D-39	5.3±0.3	4.8±0.7	4.1±1.0	5.5±0.4	4.3±0.6	4.1±0.2
D-40	5.2±0.2	4.7±0.4	ND[a]	5.4±0.4	4.3±0.5	3.9±0.2
D-41	4.6±0.3	4.4±0.4	4.0±1.0	5.2±0.5	3.6±0.6	4.1±0.3
D-42	4.9±0.4	4.1±0.6	2.8±0.8	5.7±0.4	4.0±0.7	3.9±0.3
D-43	4.3±0.4	3.8±0.5	3.7±0.9	4.7±0.3	3.8±0.5	4.0±0.3
D-44	5.2±0.5	ND[a]	6.2±1.5	6.4±0.4	4.4±0.6	4.8±0.4
D-45	ND[a]	4.7±0.5	5.5±1.1	6.0±0.5	5.2±0.6	4.5±0.3
D-46	5.9±0.6	6.3±0.5	4.8±0.8	6.3±0.2	5.5±0.7	4.6±0.3
D-47	5.4±0.3	4.8±0.3	4.3±0.8	5.7±0.2	5.4±0.5	4.5±0.4
D-48	5.7±0.5	5.2±0.4	4.8±0.8	5.7±0.5	4.9±0.5	4.6±0.3
Mean ± s.d.	5.0±0.5	4.6±0.6	4.4±0.9	5.7±0.5	4.3±0.7	4.2±0.4

Table 23. (continued)

Location No.	Location Descr.	mrem/30 days[a] January	February	March	April	May	June
D-76	0.5 mi NE	5.2±0.6	5.7±0.9	4.6±0.6	6.8±1.4	5.2±0.4	5.8±0.5
D-77	0.5 mi NE	4.9±0.6	5.6±1.9	4.1±0.9	5.2±0.8	4.7±0.3	5.0±0.6
D-78	0.5 mi NE	6.9±0.5	5.1±1.2	5.5±1.0	6.8±1.3	4.2±0.4	5.2±0.5
D-79	0.5 mi E	5.7±1.4	6.5±1.0	5.3±0.9	5.1±0.9	4.6±0.4	5.6±0.2
D-80	0.5 mi SE	4.5±0.9	4.9±1.3	3.5±0.5	7.4±1.6	3.9±0.4	5.4±0.3
D-81	0.5 mi SE	5.6±2.0	5.5±1.4	3.6±0.7	ND[a]	3.8±0.3	4.6±0.2
D-82	0.5 mi SE	3.9±0.4	11.2±1.6	3.8±0.6	5.9±1.2	3.8±0.4	4.5±0.4
D-83	0.5 mi S	5.0±0.9	4.5±0.5	4.6±0.6	10.5±2.5	4.5±0.3	6.1±0.3
D-84	0.5 mi SW	5.0±1.1	5.4±1.1	4.5±0.7	8.1±1.4	4.8±0.6	5.8±0.6
D-85	0.5 mi SW	4.5±1.0	4.2±0.6	4.4±0.7	7.0±1.7	4.4±0.4	5.4±0.3
D-86	0.5 mi SW	5.9±1.4	6.4±1.8	5.5±0.7	6.3±1.1	5.3±0.3	5.6±0.4
D-87	0.5 mi SW	5.7±0.5	6.1±0.9	5.5±1.0	7.0±0.7	5.0±0.3	5.6±0.4
D-88	0.5 mi W	5.2±0.6	6.2±1.3	5.3±0.6	5.8±1.3	5.5±0.5	6.0±0.6
D-89	0.5 mi W	5.7±0.6	7.6±1.3	5.2±0.6	6.9±0.9	6.6±0.5	6.6±0.7
D-90	0.5 mi NW	6.4±0.3	6.8±2.3	6.0±0.7	7.3±1.1	7.4±0.7	6.6±0.6
D-91	0.5 mi N	5.3±0.3	5.5±0.6	4.7±0.7	6.6±0.9	5.9±0.5	5.6±0.5
Mean ± s.d.		5.3±0.7	6.1±1.6	4.8±0.8	6.8±1.3	5.0±1.0	5.6±0.6

Table 23. (continued)

Location	mrem/30 days					
	July	August	September	October	November	December
D-76	5.1±0.3	4.6±0.5	4.2±0.8	5.3±0.3	4.5±0.6	4.0±0.4
D-77	4.4±0.6	4.3±0.4	3.2±0.8	5.1±0.2	4.4±0.6	3.7±0.3
D-78	5.3±0.4	5.0±0.4	4.3±1.0	5.0±0.3	4.6±0.5	4.2±0.3
D-79	4.6±0.4	4.4±0.7	4.1±0.9	4.9±0.5	4.7±0.5	4.3±0.3
D-80	4.2±0.5	3.8±0.5	3.3±0.8	4.0±0.3	4.2±0.6	3.7±0.2
D-81	3.9±0.4	3.6±0.3	3.3±0.9	4.6±0.7	4.0±0.7	3.6±0.3
D-82	4.0±0.3	3.3±0.3	3.1±1.0	4.5±0.3	4.0±0.6	3.4±0.3
D-83	4.4±0.2	4.1±0.4	3.9±0.8	5.6±0.7	4.3±0.6	ND[a]
D-84	ND[a]	4.3±0.4	3.7±0.9	5.1±0.3	4.4±0.7	3.7±0.3
D-85	4.4±0.4	4.3±0.4	4.3±1.2	5.4±0.4	4.3±0.5	3.9±0.2
D-86	4.8±0.4	4.9±1.0	4.0±0.8	5.2±0.2	4.8±0.5	4.2±0.2
D-87	5.2±0.4	4.6±0.4	3.9±0.9	5.4±0.3	4.5±0.5	4.5±0.3
D-88	5.1±0.4	4.6±0.4	3.8±0.9	6.0±0.3	4.7±0.5	4.6±0.5
D-89	5.7±0.2	5.0±0.5	4.8±0.9	5.9±0.5	5.1±0.5	4.7±0.3
D-90	6.0±0.6	5.2±0.5	4.8±1.2	6.6±0.6	5.6±0.6	4.7±0.8
D-91	5.8±0.3	4.7±0.4	4.0±1.0	5.7±0.3	4.6±0.5	5.2±0.5
Mean ± s.d.	4.9±0.6	4.4±0.5	3.9±0.[illegible]	5.3±0.6	4.5±0.4	4.2±0.5

[a] ND = No data. TLD's lost in the field.

Table 24. Ambient gamma radiation (TLD), annual exposure.

Location	mrem/365 days	normalized to 30 days	Location	mrem/365 days	normalized to 30 days
D-1	55.5±3.4	4.6±0.3	D-33	ND	ND
D-2	58.8±3.5	4.8±0.3	D-34	55.4±5.8	4.6±0.5
D-3	52.8±4.8	4.3±0.4	D-35	ND	ND
D-4	ND[a]	ND	D-36	63.7±3.4	5.2±0.3
D-6	58.7±3.4	4.8±0.3	D-37	ND	ND
D-7	60.0±2.0	4.9±0.2	D-38	ND	ND
D-8	63.8±2.4	5.2±0.2	D-39	74.1±5.8	6.1±0.5
D-9	75.6±4.1	6.2±0.3	D-40	64.3±4.6	5.3±0.4
D-10	63.6±3.4	5.2±0.3	D-41	61.5±4.6	5.1±0.4
D-11	ND	ND	D-42	60.1±5.0	4.9±0.4
D-12	57.3±1.9	4.7±0.2	D-43	58.4±4.1	4.8±0.3
D-13	70.1±2.1	5.8±0.2	D-44	70.6±3.2	5.8±0.3
D-14	ND	ND	D-45	74.8±2.1	6.2±0.2
D-15	83.9±5.6	6.9±0.5	D-46	77.0±4.6	6.3±0.4
D-16	67.0±1.7	5.5±0.1	D-47	78.0±3.6	6.4±0.3
			D-48	79.3±5.1	6.5±0.4
Mean ± s.d.	63.9±9.0	5.2±0.8	Mean ± s.d.	68.1±8.5	5.6±0.7
D-17	73.1±4.9	6.0±0.4	D-76	69.8±3.7	5.7±0.3
D-18	63.5±2.8	5.2±0.2	D-77	63.0±3.3	5.2±0.3
D-19	61.1±2.5	5.0±0.2	D-78	70.5±5.7	5.8±0.5
D-20	67.5±3.9	5.6±0.3	D-79	55.4±5.5	4.6±0.5
D-21	64.8±2.7	5.3±0.2	D-80	61.9±3.2	5.1±0.3
D-22	64.4±2.8	5.3±0.2	D-81	56.6±2.6	4.7±0.2
D-23	50.5±5.7	4.2±0.5	D-82	57.7±1.2	4.7±0.1
D-24	66.3±2.5	5.5±0.2	D-83	ND	ND
D-25	63.9±3.1	5.3±0.3	D-84	61.6±1.8	5.1±0.2
D-26	61.6±6.2	5.1±0.5	D-85	64.9±2.4	5.3±0.2
D-27	67.4±3.4	5.5±0.3	D-86	70.3±3.2	5.8±0.3
D-28	74.7±3.8	6.1±0.3	D-87	75.1±4.5	6.2±0.4
D-29	74.4±4.4	6.1±0.4	D-88	73.7±3.4	6.1±0.3
D-30	ND	ND	D-89	88.9±2.1	7.3±0.2
D-31	83.1±8.6	6.8±0.7	D-90	74.9±5.3	6.2±0.4
D-32	30.8±3.5	6.6±0.3	D-91	76.5±3.1	6.3±0.3
Mean ± s.d.	64.5±11.9	5.6±0.7	Mean ± s.d.	68.1±9.1	5.6±0.8

[a] ND = No data. TLD's lost in the field.

Table 25. Milk samples collected during the non-grazing season, analysis for Iodine-131. Collection: Monthly, October through April.

Location and Date Collected	Lab Code	Activity (pCi/l) I-131
Indicator		
Composite[a,b]		
1-06-81	DMI-1062	<0.4
2-03-81	1098	<0.4
3-03-81	1149	<0.4
4-07-81	1212	<0.4
10-06-81	2064,5	<0.4
11-03-81	2164	<0.4
12-01-81	2222	<0.4
Control		
Composite[c]		
1-06-81	DMI-1063	<0.4
2-03-81	1097	<0.4
3-03-81	1148	<0.4
4-07-81	1211	<0.4
10-06-81	2066	<0.4
11-03-81	2165	<0.4
12-01-81	2223	<0.4

[a] Composite of samples from locations D-63, D-72, D-93, D-94, D-96, D-101, and D-104.
[b] Composite does not include location D-101. Goat was dry in February and March.
[c] Composite of samples from locations D-73 and D-102. Location D-105 replaced D-73 on 5-12-81.

Table 26. Milk samples collected during the grazing season, analysis for iodine-131 and gamma-emitting isotopes. Collection: weekly, May through September.

Location and Date Collected	Lab Code	Activity (pCi/l)			
		K-40	I-131	Cs-137	Ba-La-140[c]
D-63					
5-05-81	DMI-1251	1250±110	<0.4	<15	<15
5-12-81	1283	1480±40	<0.4	<15	<15
5-19-81	1312	1350±160	<0.4	<15	<15
5-26-81	1336	1320±200	<0.4	<15	<15
6-02-81	1363	1170±130	<0.4	<15	<15
6-09-81	1423	1500±210	<0.4	<15	<15
6-16-81	1452	1320±140	<0.4	<15	<15
6-23-81	1479	1220±130	<0.4	<15	<15
6-30-81	1513	1230±130	<0.4	<15	<15
7-07-81	1564	1420±210	<0.4	<15	<18
7-14-81	1599	1420±150	<0.4	<15	<15
7-21-80	1634	1550±150	<0.4	<15	<15
7-28-81	1667	1360±200	<0.4	<15	<15
8-04-81	1705	1340±90	<0.4	<15	<15
8-11-81	1758	1120±180	<0.4	<15	<15
8-18-81	1789	1280±180	<0.4	<15	<15
8-25-81	1818,9	1150±50	<0.4	<15	<15
9-01-81	1864	1350±80	<0.4	<15	<15
9-08-81	1894	990±140	<0.4	<15	<15
9-15-81	1947	1290±180	<0.4	<15	<16
9-22-81	1974	1030±190	<0.4	<15	<15
9-29-81	2003	1290±210	<0.4	<15	<16
Annual Mean ± s.d.		1290±140	<0.4	<15	<18

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l)			
		K-40	I-131	Cs-137	Ba-La-140
D-93					
5-05-81	DMI-1252	1820±100	<0.4	<15	<15
5-12-81	1284	1920±50	<0.4	<15	<15
5-19-81	1313	1580±150	<0.4	<15	<15
5-26-81	1337	1670±150	<0.4	<15	<15
6-02-81	1364	1830±190	<0.4	<15	<15
6-09-81	1424	1880±220	<0.4	<15	<15
6-16-81	1453	1900±240	<0.4	<15	<15
6-23-81	1480	1600±150	<0.4	<15	<15
6-30-81	1514	1710±220	<0.4	<15	<15
7-07-81	1565	1410±210	<0.4	<15	<15
7-14-81	1600	1680±150	<0.4	<15	<20
7-21-80	1635	1680±230	<0.4	<15	<15
7-28-81	1668	1860±230	<0.4	<15	<15
8-04-81	1706	2070±110	<0.4	<15	<15
8-11-81	1759	1810±90	<0.4	<15	<15
8-18-81	1790	1620±90	<0.4	<15	<15
8-25-81	1820	1750±100	<0.4	<15	<15
9-01-81	1865	1640±200	<0.4	<15	<15
9-08-81	1895	1550±240	<0.4	<15	<15
9-15-81	1948	2030±170	<0.4	<15	<15
9-22-81	1975	1900±170	<0.4	<15	<15
9-29-81	2004	1860±160	<0.4	<15	<15
Annual Mean ± s.d.		1760±160	<0.4	<15	<20

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140
D-94					
5-05-81	DMI-1253	1200±40	<0.4	<15	<15
5-12-81	1285	1340±90	<0.4	<15	<15
5-19-81	1314	1390±200	<0.4	<15	<15
5-26-81	1338	1110±130	<0.4	<15	<15
6-02-81	1365	1250±200	<0.4	<15	<15
6-09-81	1425	970±100	<0.4	<15	<15
6-16-81	1454	1240±130	<0.4	<15	<15
6-23-81	1481	880±170	<0.4	<15	<15
6-30-81	1515	1510±220	<0.4	<15	<15
7-07-81	1566	540±140	<0.4	<15	<15
7-14-81	1601	630±100	<0.4	<15	<15
7-21-80	1636	1370±140	<0.4	<15	<15
7-28-81	1669,70	1220±200	<0.4	<15	<15
8-04-81	1707	1080±170	<0.4	<15	<15
8-11-81	1760	1030±170	<0.4	<15	<15
8-18-81	1791	1670±50	<0.4	<15	<15
8-25-81	1821	1460±50	<0.4	<15	<15
9-01-81	1866,67	1340±100	<0.4	<15	<15
9-08-81	1896	1500±140	<0.4	<15	<15
9-15-81	1949	980±170	<0.4	<15	<15
9-22-81	1976	960±170	<0.4	<15	<15
9-29-81	2005	1150±130	<0.4	<15	<15
Annual Mean ± s.d.		1170±280	<0.4	<15	<15

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l)			
		K-40	I-131	Cs-137	Ba-La-140
D-101					
5-05-81	DMI-1254	2090±50	<0.4	<15	<15
5-12-81	1286	2190±110	<0.4	<15	<15
5-19-81	1315	1860±150	<0.4	<15	<15
5-26-81	1339	2100±250	<0.4	<15	<15
6-02-81	1366	1740±150	<0.4	<15	<15
6-09-81	1426	1770±160	<0.4	<15	<15
6-16-81	1455	2130±250	<0.4	<15	<17
6-23-81	1482	2000±100	<0.4	<15	<15
6-30-81	1516	1600±150	<0.4	<15	<16
7-07-81	1567	1810±230	<0.4	<15	<16
7-14-81	1602	1910±240	<0.4	<15	<16
7-21-80	1637	2160±250	<0.4	<15	<15
7-28-81	1671	2020±240	<0.4	<15	<15
8-04-81	1708,9	2105±90	<0.4	<15	<15
8-11-81	1761	1820±220	<0.4	<15	<15
8-18-81	1792,3	2090±60	<0.4	<15	<15
8-25-81	1822	1980±90	<0.4	<15	<15
9-01-81	1868	1910±180	<0.4	<15	<15
9-08-81	1897	1590±210	<0.4	<15	<15
9-15-81	1950	1930±230	<0.4	<15	<17
9-22-81	1977	1950±170	<0.4	<15	<15
9-29-81	2006	1980±240	<0.4	<15	<16
Annual Mean ± s.d.		1940±170	<0.4	<15	<17

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l)			
		K-40	I-131	Cs-137	Ba-La-140
D-104					
5-05-81	DMI-1255	1420±90	<0.4	<15	<15
5-12-81[c]	--	---	--	--	--
5-19-81	1316	1510±210	<0.4	<15	<15
5-27-81[d]	--	---	--	--	--
6-02-81	1367	1680±170	<0.4	<15	<15
6-09-81	1427	1290±100	<0.4	<15	<15
6-16-81	1456	1380±200	<0.4	<15	<16
6-23-81	1483,4	1380±140	<0.4	21.8±4.2[a]	<15
6-30-81	1517	1210±130	<0.4	<15	<15
7-07-81	1568	1260±130	<0.4	<15	<16
7-14-81	1603	1510±210	<0.4	<15	<16
7-21-80	1638	1400±120	<0.4	<15	<15
7-28-81	1672	1260±130	<0.4	<15	<15
8-04-81	1710	1280±90	<0.4	<15	<15
8-11-81	1762	1520±100	<0.4	<15	<15
8-18-81	1794	1160±140	<0.4	<15	<15
8-25-81	1823	1410±80	<0.4	<15	<15
9-01-81	1869	1140±140	<0.4	<15	<15
9-08-81	1898	1160±150	<0.4	<15	<15
9-15-81[b]	--	--	--	--	--
9-22-81	1978	1190±140	<0.4	<15	<15
9-29-81	2007,8	1230±110	<0.4	<15	<15
Annual Mean ± s.d.		1340±150	<0.4	21.8±4.2	<16

[a] Result represents the average of two analyses.
[b] No collection (milk not available).
[c] No collection because farmer was out of town.
[d] No collection due to cooler malfunction.

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l) K-40	I-131	Cs-137	Ba-La-140
Indicator					
Composite[a]					
5-05-81	DMI-1259	1390±200	<0.4	<15	<15
5-12-81	1291	1380±190	<0.4	<15	<15
5-19-81	1321	1440±200	<0.4	<15	<16
5-26-81	1344	1380±200	<0.4	<15	<15
6-02-81	1372	1480±220	<0.4	<15	<15
6-09-81	1432	1210±130	<0.4	<15	<15
6-16-81	1457	1540±40	<0.4	<15	<15
6-23-81	1492	1200±130	<0.4	<15	<15
6-30-81	1518	1460±200	<0.4	<15	<15
7-07-81	1569	1680±220	<0.4	<15	<15
7-14-81	1604	1440±150	<0.4	<15	<19
7-21-81	1639	1370±200	<0.4	<15	<16
7-28-81	1673	1280±180	<0.4	<15	<15
8-04-81	1711	1430±140	<0.4	<15	<15
8-11-81	1763	1550±110	<0.4	<15	<15
8-18-81	1795	1410±50	<0.4	<15	<15
8-25-81	1824	1310±160	<0.4	<15	<17
9-01-81	1870	1120±160	<0.4	<15	<15
9-08-81	1899	1290±130	<0.4	<15	<15
9-15-81	1951	1180±210	<0.4	<15	<20
9-22-81	1979	850±190	<0.4	<15	<20
9-29-81	2009	1080±140	<0.4	<15	<15
Annual Mean ± s.d.		1340±180	<0.4	<15	<20

Table 26. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l)			
		K-40	I-131	Cs-137	Ba-La-140
<u>Control</u>					
<u>Composite</u>[b]					
5-05-81	DMI-1258	1160±100	<0.4	<15	<18
5-12-81	1292	1220±120	<0.4	<15	<15
5-19-81	1322	1160±130	<0.4	<15	<15
5-26-81	1345	1250±130	<0.4	<15	<15
6-02-81	1373	1250±170	<0.4	<15	<15
6-09-81	1433	1460±210	<0.4	<15	<16
6-16-81	1460	1180±130	<0.4	<15	<15
6-23-81	1493	1470±200	<0.4	<15	<16
6-30-81	1519	1140±120	<0.4	<15	<15
7-07-81	1570,1	1220±200	<0.4	<15	<15
7-14-81	1605	1420±190	<0.4	<15	<15
7-21-81	1640	900±100	<0.4	<15	<15
7-28-81	1674	1190±130	<0.4	<15	<15
8-04-81	1712	1430±110	<0.4	<15	<15
8-11-81	1764	1610±160	<0.4	<15	<15
8-18-81	1796	1500±90	<0.4	<15	<15
8-25-81	1825	1220±150	<0.4	<15	<15
9-01-81	1871	1220±150	<0.4	<15	<17
9-08-81	1900	1260±120	<0.4	<15	<15
9-15-81	1952	1670±180	<0.4	<15	<15
9-22-81	1980	1540±230	<0.4	<15	<16
9-29-81	2010	1790±260	<0.4	<15	<15
Annual Mean ± s.d.		1330±210	<0.4	<15	<18

[a] Composite of samples from locations D-72 and D-96.
[b] Composite of samples from locations D-102 and D-73 (before 12 May, 1981) and locations D-102 and D-105 (after 12 May, 1981).
[c] Ba-140 minimum sensitivity is at counting time.

Table 26A. Milk samples collected during the grazing season, analysis for strontium-89, strontium-90 and elemental calcium. Collection: (monthly composites May through September).

Location and Date Collected	Lab Code	Calcium g/l	Activity (pCi/l) Sr-89	Sr-90
Indicator				
D-63				
May Comp.	DMI-1381	1.1	<2.8	3.0±0.5[a]
June Comp.	1554	1.1	<1.1	3.4±0.7
July Comp.	1723,24	0.9	<2.4	1.5±0.7
Aug. Comp.	1833	1.0	<1.8	2.1±0.6
Sept. Comp.	2027	1.3	<3.2	1.7±0.7
Annual Mean ± s.d.		1.1±0.1	<3.2	2.3±0.8
D-72				
May Comp.	DMI-1382	1.1	<3.7	5.8±0.9[a]
June Comp.	1555	1.4	<1.2	4.5±0.8
July Comp.	1725	0.5	<2.0	2.0±0.6
Aug. Comp.	1834,35	1.4	<1.4	1.7±0.3
Sept. Comp.	2028	1.3	4.4±3.4	0.9±0.6
Annual Mean ± s.d.		1.1±0.4	4.4±3.4	3.0±2.1
D-93				
May Comp.	DMI-1383	1.4	7.6±3.5[b]	5.2±1.0[b]
June Comp.	1556	1.5	<5.6	5.8±1.5
July Comp.	1726	1.1	<1.8	4.3±1.6
Aug. Comp.	1836	1.4	<1.4	3.7±0.6
Sept. Comp.	2029	0.8	<3.3	5.5±0.8
Annual Mean ± s.d.		1.2±0.3	7.6±3.5	4.9±0.9

Table 26A. (continued)

Location and Date Collected	Lab Code	Calcium g/l	Activity (pCi/l) Sr-89	Sr-90
D-94				
May Comp.	DMI-1384	1.0	4.0±2.7[a]	4.8±0.7[a]
June Comp.	1557	1.1	1.6±1.6	4.5±0.8
July Comp.	1727	1.6	<1.8	2.8±0.9
Aug. Comp.	1837	1.3	<1.7	3.6±0.7
Sept. Comp	2030	1.4	<2.8	4.4±0.7
Annual Mean ± s.d.		1.3±0.2	2.8±1.7	4.0±0.81
D-96				
May Comp.	DMI-1385	1.1	<0.9	1.9±0.6
June Comp.	1558	0.9	<1.9	3.6±0.8
July Comp.	1728	1.1	<1.7	1.0±0.7
Aug. Comp.	1838	1.2	<1.5	0.8±0.5
Sept. Comp.	2031	1.0	<3.1	0.9±0.6
Annual Mean ± s.d.		1.1±0.1	<3.1	1.6±1.2

Table 26A. (continued)

Location and Date Collected	Lab Code	Calcium g/l	Activity (pCi/l) Sr-89	Sr-90
D-101				
May Comp.	DMI-1386	1.2	6.2±1.8[a]	3.2±0.5[a]
June Comp.	1559,60	0.9	5.1±2.3	2.6±0.8
July Comp.	1729	1.4	<1.7	2.8±0.6
Aug. Comp.	1839	1.0	<1.4	1.1±0.5
Sept. Comp.	2032	0.9	<3.7	1.8±0.8
Annual Mean ± s.d.		1.1±0.2	5.7±0.8	2.3±0.8
D-104				
May Comp.	DMI-1388	1.0	<0.9	4.4±0.8
June Comp.	1562	1.1	<2.5	10.6±1.9
July Comp.	1731	1.3	<1.9	6.8±1.7
Aug. Comp.	1841	1.2	<1.8	5.7±0.9
Sept. Comp.	2035	1.4	<3.9	6.0±0.9
Annual Mean ± s.d.		1.2±0.2	<3.9	6.7±2.4

Table 26A. (continued)

Location and Date Collected		Lab Code	Calcium g/l	Activity (pCi/l)	
				Sr-89	Sr-90
Control					
D-102					
May	Comp.	DMI-1387	1.1	<0.9	1.2±0.6
June	Comp.	1561	1.4	<1.8	2.8±0.9
July	Comp.	1730	1.2	<1.9	3.7±0.7
Aug.	Comp.	1840	1.2	<1.5	1.5±0.5
Sept.	Comp.	2033,34	1.2	<3.4	1.7±0.5
	Annual Mean ± s.d.		1.2±0.1	<3.4	2.2±1.0
D-105					
May	Comp.	DMI-1389,90	1.2	<0.9	1.4±0.5
June	Comp.	1563	0.8	<1.9	6.7±1.1
July	Comp.	1732	1.2	<3.8	1.7±0.9
Aug.	Comp.	1842	1.2	<1.7	1.6±0.6
Sept.	Comp.	2036	1.0	<3.8	2.9±0.7
	Annual Mean ± s.d.		1.1±0.2	<3.8	2.9±2.2

[a] Data represents the average of two analyses.
[b] Replaces the former result which was reported in error. Current data represents the average of replicate analyses.

Table 27. Well water samples, analysis for gross beta. Collection: Monthly

Location and Date Collected	Lab Code	Gross Beta (pCi/l)	Location and Date Collected	Lab Code	Gross Beta (pCi/l)
D-53			D-54		
Treated Municipal Water			Inlet to Municipal Water Treatment		
2-C3-81	DWW-1636	2.7±0.6	2-03-81	DWW-1637	3.0±0.6
2-27-81	1871,75	2.4±0.4	2-27-81	1872	3.8±0.7
3-81	2309	2.4±0.5	3-81	2310	2.2±0.6
4-81	2543	2.4±0.5	4-81	2544	2.2±0.6
5-81	2810	3.1±0.6	5-81	2811	2.2±0.5
6-81	3046	3.4±0.6	6-81	3047	2.9±0.5
7-81	3453	3.5±0.6	7-81	3454	3.1±0.5
8-81	3731	2.8±0.5	8-81	3732	2.7±0.6
9-81	3999	3.2±0.7	9-81	4000	3.3±0.7
10-81	4401	1.9±0.5	10-81	4402	3.6±0.5
11-81	4705	3.6±0.5	11-81	4706,7	3.4±0.4
12-81 (1-05-82)	5073	2.7±0.5	12-81 (1-05-82)	5074	3.7±0.5
Annual Mean ± s.d.		2.8±0.5	Annual Mean ± s.d.		3.0±0.6
D-55			D-56[a]		
On-Site Well			Test Well		
1-26-81	DWW-1629	1.8±0.5	2-03-81	DWW-1630	4.2±0.7
2-27-81	1865	2.1±0.4	2-27-81	1866	4.1±0.5
3-23-81	2127	<0.8	3-23-81	2128,29	2.4±0.4
4-29-81	2497	2.2±0.6	4-29-81	2498	5.2±0.7
5-29-81	2812	2.7±0.7	5-29-81	2813	3.3±0.5
6-29-81	3048	1.5±0.4	6-29-81	3049	3.9±0.6
7-29-81	3396	1.4±0.4	7-81 (8-07-81)	3499	6.2±0.7
8-81 (9-02-81)	3733	1.0±0.4			
9-28-81	3993	2.1±0.6			
10-31-81	4359	1.7±0.4			
11-30-81	4681	2.4±0.5			
12-81 (1-05-82)	5075	1.9±0.5			
Annual Mean ± s.d.		1.9±0.5	Annual Mean ± s.d.		4.2±1.2

Table 27. (continued)

Location and Date Collected	Lab Code	Gross Beta (pCi/l)	Location and Date Collected	Lab Code	Gross Beta (pCi/l)
D-57			D-58		
Bull			Franz		
1-26-81	DWW-1631	1.2±0.5	1-26-81	DWW-1632	4.4±0.7
2-27-81	1867	1.6±0.5	2-27-81	1868	4.9±0.5
3-23-81	2130	1.8±0.6	3-23-81	2131	3.7±0.6
4-29-81	2499	1.7±0.6	4-29-81	2500,1	5.7±0.7
5-29-81	2814	2.1±0.6	5-29-81	8215	5.6±0.8
6-29-81	3050	1.7±0.5	6-29-81	3051	6.3±0.7
7-29-81	3397	1.8±0.5	7-29-81	3398	4.8±0.7
8-81 (9-02-81)	3734	1.2±0.4	8-81 (9-02-81)	3735	5.4±0.7
9-28-81	3994	1.7±0.6	9-28-81	3995	6.5±0.8
10-31-81	4360	1.2±0.4	10-31-81	4361	3.7±0.6
11-30-81	4682	1.4±0.4	11-10-81	4683	5.3±0.6
12-81 (1-05-82)	5076	1.6±0.5	12-82 (1-05-82)	5077	5.1±0.7
Annual Mean ± s.d.		1.6±0.3	Annual Mean ± s.d.		5.1±0.9
D-59			D-60		
Frantz Cottage			Wiley		
1-26-81	DWW-1633	4.7±0.7	1-26-81	DWW-1634,35	1.0±0.2
2-27-81	1869	4.7±0.7	2-27-81	1870	1.2±0.3
3-23-81	2132	5.3±0.7	3-23-81	2133	0.9±0.5
4-29-81	2502	5.0±0.7	4-29-81	2503	1.1±0.5
5-29-81	2816	5.5±0.8	5-29-81	2817	1.9±0.5
6-29-81	3052	3.7±0.6	6-29-81	3053	1.7±0.4
7-29-81	3399	4.9±0.7	7-29-81	3400	1.0±0.4
8-81 (9-02-81)	3736	4.1±0.6	8-81 (9-02-81)	3737,38	2.0±0.3
9-28-81	3996	3.7±0.7	9-18-81	3997	0.7±0.4
10-31-81	4362	3.1±0.5	10-31-81	4363	0.4±0.3
11-30-81	4684,5	2.4±0.3	11-81[b]	--	--
12-81[b]	--	--	12-81[b]	--	--
Annual Mean ± s.d.		4.3±1.0	Annual Mean ± s.d.		1.2±0.5

[a] This location for ground water was dropped from the sampling program as of 2 September, 1981.
[b] This location is temporarily shut off for winter.

Table 28. Well water samples, quarterly composites of monthly samples, analysis for gross beta and tritium.

Location and Date Collected	Lab Code	Activity (pCi/l) Gross Beta	H-3
D-53			
Treated Municipal Water			
1st Q, 1981	DWW-2311	3.1±0.5	<240
2nd Q, 1981	3189	2.6±0.4	420±160
3rd Q, 1981	4052	3.4±0.7	<320
4th Q, 1981	5003	3.1±0.5	<350
Annual Mean ± s.d.		3.1±0.3	420±160
D-54			
Inlet to Municipal Water Treatment			
1st Q, 1981	DWW-2312	1.9±0.4	140±120
2nd Q, 1981	3190,1	3.2±0.4	<330
3rd Q, 1981	4053	3.9±0.7	<320
4th Q, 1981	5004	4.5±0.6	<350
Annual Mean ± s.d.		3.4±1.1	140±120
D-55			
On-site Well			
1st Q, 1981	DWW-2147	1.8±0.5	<210
2nd Q, 1981	3192	1.9±0.5	<330
3rd Q, 1981	4054	2.2±0.6	<320
4th Q, 1981	5005	1.8±0.5	<350
Annual Mean ± s.d.		1.9±0.2	<350
D-56			
Test Well			
1st Q, 1981	DWW-2148	3.9±0.7	170±100
2nd Q, 1981	3193	2.6±0.6	<330
3rd Q, 1981	4055,56	10.9±1.0[a]	<330
4th Q, 1981[b]		--	--
Annual Mean ± s.d.		5.3±3.8	170±100

[a] Elevated activity due to discharge canal water which was used to prime portable pump

[b] This location for ground water was dropped from the sampling program as of 2 September 1981.

Table 28. (continued)

Location and Date Collected	Lab Code	Activity (pCi/l)	
		Gross beta	H-3
<u>D-57</u>			
Bull			
1st Q, 1981	DWW-2149	1.5±0.5	<210
2nd Q, 1981	3194	2.2±0.5	<330
3rd Q, 1981	4057	1.1±0.5	<320
4th Q, 1981	5006	1.6±0.5	300±170
Annual Mean ± s.d.		1.6±0.5	300±170
<u>D-58</u>			
Frantz			
1st Q, 1981	DWW-2150	6.4±0.8	<210
2nd Q, 1981	3195	6.0±0.7	<330
3rd Q, 1981	4058	6.7±0.9	<320
4th Q, 1981	5007	6.7±0.7	180±170
Annual Mean ± s.d.		6.5±0.3	180±170
<u>D-59</u>			
Frantz Cottage			
1st Q, 1981	DWW-2151	5.5±0.7	300±110
2nd Q, 1981	3196	3.4±0.6	140±140
3rd Q, 1981	4059	3.6±0.7	<320
4th Q, 1981	5008	3.6±0.6	<340
Annual Mean ± s.d.		4.0±1.0	220±110
<u>D-60</u>			
Willey			
1st Q, 1981	DWW-2152	1.4±0.4	<210
2nd Q, 1981	3197	1.3±0.5	<270
3rd Q, 1981	4060	0.8±0.5	<370
4th Q, 1981	5009[a]	0.4±0.3	370±100
Annual Mean ± s.d.		1.0±0.5	370±100

[a] Results represent October composite only. There were no collections for November and December bacause this location was temporarily shut off during winter.

Table 29. Vegetation samples (broad leaf), analysis for iodine-131.
Collection: annually.

Location and Date Collected		Lab Code	Activity (pCi/g) wet I-131
Indicator			
D-57	6-22-81	DG-131	<0.051
D-58	6-22-81	DG-132	<0.070
D-63	6-22-81	DG-133	<0.043
D-72	6-22-81	DG-134	<0.074
D-93	6-22-81	DG-135	<0.043
D-94	6-22-81	DG-136,7	<0.034
D-96	6-22-81	DG-138	<0.048
D-101	6-22-81	DG-139	<0.045
D-104	6-22-81	DG-141	<0.081
Control			
D-102	6-22-81	DG-140	<0.054
D-105	6-22-81	DG-142	<0.065

Table 30. Vegetation samples (oats, hay, and corn), analysis for strontium-90 and gamma-emitting isotopes. Collection: annually.

Sample Description and Activity (pCi/g wet)				
			Indicator	
Location	D-57	D-58	D-63	D-63
Date Collected	12-05-81	12-05-81	09-22-81	12-05-81
Type	Dried corn	Dried corn	Dried corn	Dried corn
Lab Code	DVE-143,144	DVE-145	DVE-109	DVE-153
Sr-90	<0.0042	<0.0045	0.347±0.025	<0.0091
K-40	2.23±0.33	2.37±0.54	16.70±2.80	2.40±0.56
Mn-54	<0.020	<0.029	<0.17	<0.033
Co-58	<0.047	<0.071	<0.33	<0.10
Co-60	<0.028	<0.023	<0.17	<0.013
Nb-95	<0.047	<0.036	<0.59	<0.099
Zr-95	<0.062	<0.048	<0.67	<0.16
Ru-103	<0.076	<0.060	<1.23	<0.12
Ru-106	<0.264	<0.30	<1.15	<0.23
Cs-134	<0.022	<0.025	<0.16	<0.029
Cs-137	<0.031	<0.031	<0.14	<0.026
Ce-141	<0.095	<0.15	<3.41	<0.53
Ce-144	<0.171	<0.15	<0.12	<0.28
Location	D-72	D-72	D-93	D-93
Date Collected	09-22-81	12-05-81	09-22-81	12-05-81
Type	Hay	Dried corn	Hay	Dried corn
Lab Code	DVE-110,11	DVE-146	DVE-112	DVE-147
Sr-90	0.254±0.023	<0.010	0.258±0.022	<0.0040
K-40	15.00±1.80	2.48±0.51	13.09±1.90	2.48±0.53
Mn-54	<0.12	<0.023	<0.090	<0.025
Co-58	<0.36	<0.029	<0.23	<0.048
Co-60	<0.088	<0.011	<0.089	<0.016
Nb-95	<0.45	<0.029	<0.40	<0.048
Zr-95	<0.082	<0.064	<0.56	<0.059
Ru-103	<1.32	<0.065	<1.21	<0.045
Ru-106	<0.74	<0.17	<0.68	<0.029
Cs-134	<0.12	<0.025	<0.060	<0.040
Cs-137	<0.076	<0.022	<0.059	<0.029
Ce-141	<2.2	<0.11	<2.79	<0.14
Ce-144	<0.97	<0.16	<0.94	<0.17

Table 30. (continued)

Sample Description and Activity (pCi/g wet)

Indicator

Location	D-94	D-94	D-96	D-96
Date Collected	09-22-81	12-05-81	09-22-81	12-05-81
Type	Hay	Dried corn	Hay	Dried corn
Lab Code	DVE-113	DVE-148	DVE-114	DVE-149
Sr-90	0.363±0.022	<0.0063	0.164±0.040	<0.0029
K-40	8.33±1.50	2.77±0.51	8.32±1.70	2.23±0.43
Mn-54	<0.078	<0.025	<0.12	<0.022
Co-58	<0.023	<0.034	<0.19	<0.031
Co-60	<0.073	<0.019	<0.076	<0.033
Nb-95	<0.26	<0.039	<0.56	<0.057
Zr-95	<0.53	<0.064	<0.60	<0.071
Ru-103	<0.60	<0.064	<0.59	<0.096
Ru-106	<0.82	<0.020	<0.74	<0.25
Cs-134	<0.065	<0.022	<0.091	<0.029
Cs-137	<0.090	<0.028	<0.054	<0.047
Ce-141	<2.64	<0.13	<2.79	<0.16
Ce-144	<0.71	<0.26	<1.02	<0.23

Location	D-101	D-104	D-104
Date Collected	09-22-81	09-22-81	12-05-81
Type	Hay	Hay	Dried corn
Lab Code	DVE-115	DVE-117	DVE-151
Sr-90	0.263±0.030	0.773±0.055	<0.030
K-40	13.53±1.50	17.04±1.90	2.09±0.31
Mn-54	<0.070	<0.098	<0.020
Co-58	<0.37	<0.33	<0.033
Co-60	<0.082	<0.15	<0.19
Nb-95	<0.28	<0.91	<0.023
Zr-95	<0.67	<0.47	<0.054
Ru-103	<0.60	<0.79	<0.079
Ru-106	<0.74	<1.15	<0.171
Cs-134	<0.067	<0.11	<0.017
Cs-137	<0.096	<0.11	<0.022
Ce-141	<2.64	<2.33	<0.12
Ce-144	<0.54	<1.26	<0.19

Table 30. (continued)

Sample Description and Activity (pCi/g wet)		
	Control	
Location	D-105	D-105
Date Collected	09-22-81	12-05-81
Type	Hay	Dried corn
Lab Code	DVE-118	DVE-152
Sr-90	0.206±0.023	<0.0036
K-40	10.24±1.80	2.10±0.51
Mn-54	<0.067	<0.025
Co-58	<0.37	<0.026
Co-60	<0.067	<0.023
Nb-95	<0.36	<0.036
Zr-95	<0.70	<0.059
Ru-103	<0.71	<0.065
Ru-106	<0.087	<0.30
Cs-134	<0.10	<0.036
Cs-137	<0.12	<0.039
Ce-141	<1.86	<0.17
Ce-144	<0.67	<0.19
Location	D-102	D-102
Date Collected	09-22-81	12-05-81
Type	Hay	Dried corn
Lab Code	DVE-116	DVE-150
Sr-90	0.318±2.50	<0.0094
K-40	17.54±2.50	1.84±0.38
Mn-54	<0.16	<0.013
Co-58	<0.57	<0.026
Co-60	<0.10	<0.020
Nb-95	<0.45	<0.042
Zr-95	<0.67	<0.070
Ru-103	<1.41	<0.065
Ru-106	<1.30	<0.14
Cs-134	<0.098	<0.031
Cs-137	<0.10	<0.019
Ce-141	<2.63	<0.091
Ce-144	<0.91	<0.19

Table 31. Meat and poultry samples, analysis of edible portion for gamma-emitting isotopes. Collection: Annually.

	Sample Description and Activity (pCi/g wet)
Location	D-94
Date Collected	9-08-81
Type	Chicken
Lab Code	DMe-40
K-40	<1.04
Mn-54	<0.039
Co-58	<0.085
Co-60	<0.016
Nb-95	<0.062
Zr-95	<0.16
Ru-103	<0.20
Ru-106	<0.19
Cs-134	<0.034
Cs-137	<0.024
Ce-141	<0.40
Ce-144	<0.20
Location	D-102
Date Collected	9-08-81
Type	Chicken
Lab Code	DME-41
K-40	2.31±0.38
Mn-54	<0.025
Co-58	<0.051
Co-60	<0.017
Nb-95	<0.071
Zr-95	<0.14
Ru-103	<0.31
Ru-106	<0.25
Cs-134	<0.034
Cs-137	<0.029
Ce-141	<0.40
Ce-144	<0.25

Table 31. Continued

Sample Description and Activity (pCi/g wet)		
	Outside 10 Miles of Plant	
Location	Carlson Farm	Alden Farm
Date Collected	9-14-81	9-25-81
Type	Beef	Pork
Lab Code	DME-45	DME-47
K-40	2.99±1.10	1.94±0.79
Mn-54	<0.079	<0.073
Co-58	<0.16	<0.17
Co-60	<0.050	<0.064
Nb-95	<0.15	<0.30
Zr-95	<0.60	<0.042
Ru-103	<0.64	<0.37
Ru-106	<0.84	<0.73
Cs-134	<0.057	<0.099
Cs-137	<0.10	<0.060
Ce-141	<1.29	<0.67
Ce-144	<0.67	<0.39
	Inside 10 Miles of Plant	
Location	Burger	Siech
Date Collected	10-02-81	10-16-81
Type	Beef	Pork
Lab Code	DME-43,4	DME-46
K-40	2.13±0.23	3.00±0.87
Mn-54	<0.023	<0.071
Co-58	<0.066	<0.20
Co-60	<0.029	<0.053
Nb-95	<0.057	<0.19
Zr-95	<0.077	<0.20
Ru-103	<0.14	<0.33
Ru-106	<0.16	<0.56
Cs-134	<0.026	<0.093
Cs-137	<0.19	<0.078
Ce-141	<0.17	<0.57
Ce-144	<0.13	<0.45

Table 32. Wildlife samples, analysis for gamma-emitting isotopes.
Collection: annually.

Sample Description and Activity (pCi/g wet)	
Location	Inside 10 Miles of Plant
Date Collected	3-15-81
Type	Muskrat
Lab Code	DWL-14
K-40	3.55±0.46
Mn-54	<0.030
Co-58	<0.12
Co-60	<0.043
Nb-95	<0.11
Zr-95	<0.26
Ru-103	<0.45
Ru-106	<0.32
Cs-134	<0.045
Cs-137	<0.033
Ce-141	<1.40
Ce-144	<0.23

Table 33. Soil samples, analysis for strontium-90 and gamma-emitting isotopes. Collection: tri-annually.

Sample Description and Activity (pCi/g dry)

	Indicator		
Location	D-15	D-15	D-15
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-69	DSO-110	DSO-146
Sr-90	0.08±0.01	0.04±0.01	0.13±0.02
K-40	19.4±1.1	10.26±2.6	19.9±2.2
Mn-54	<0.042	<0.051	<0.110
Co-58	<0.057	<0.056	<0.073
Co-60	<0.071	<0.034	<0.083
Nb-95	0.38±0.06	0.77±0.06	<0.23
Zr-95	<0.13	0.38±0.07	<0.23
Ru-103	<0.087	<0.065	<0.25
Ru-106	<0.36	<0.50	<0.90
Cs-134	0.14±0.04	<0.030	<0.14
Cs-137	0.30±0.05	<0.053	0.61±0.10
Ce-141	<0.17	<0.095	<0.37
Ce-144	<0.39	0.45±0.13	1.63±0.54
Location	D-16	D-16	D-16
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-70	DSO-111	DSO-147
Sr-90	0.03±0.01	0.11±0.01	0.13±0.01
K-40	19.3±1.1	12.94±0.73	15.85±1.40
Mn-54	<0.039	<0.028	<0.068
Co-58	<0.067	<0.028	<0.084
Co-60	<0.065	<0.040	<0.068
Nb-95	<0.067	0.22±0.04	<0.10
Zr-95	<0.15	<0.074	<0.15
Ru-103	<0.056	<0.057	<0.17
Ru-106	<0.36	<0.32	<0.52
Cs-134	<0.070	<0.048	<0.088
Cs-137	<0.046	0.45±0.04	0.74±0.08
Ce-141	<0.14	<0.12	<0.36
Ce-144	<0.25	<0.22	<0.48

Table 33. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-57	D-57	D-57
Date Collected	6-22-81	10-12-81	NC[a]
Lab Code	DSO-112	DSO-148	
Sr-90	0.12±0.01	0.13±0.02	
K-40	20.00±1.30	19.71±2.10	
Mn-54	<0.048	<0.099	
Co-58	<0.073	<0.16	
Co-60	<0.054	<0.087	
Nb-95	0.38±0.07	0.44±0.10	
Zr-95	<0.15	<0.30	
Ru-103	<0.12	<0.17	
Ru-106	<0.81	<1.04	
Cs-134	<0.043	<0.081	
Cs-137	0.56±0.06	0.61±0.09	
Ce-141	<0.25	<0.33	
Ce-144	<0.43	<0.62	
Location	D-58	D-58	D-58
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-71	DSO-113	DSO-149
Sr-90	0.14±0.02	0.02±0.01	0.12±0.01
K-40	20.40±0.75	20.32±1.30	18.91±1.60
Mn-54	<0.048	<0.050	<0.068
Co-58	<0.033	<0.053	<0.090
Co-60	<0.059	<0.050	<0.10
Nb-95	0.17±0.05	0.48±0.07	<0.15
Zr-95	<0.099	0.33±0.08	<0.19
Ru-103	<0.067	<0.082	<0.19
Ru-106	<0.29	<0.39	<0.82
Cs-134	0.10±0.02	<0.037	<0.13
Cs-137	0.69±0.04	0.74±0.07	0.51±0.08
Ce-141	<0.17	<0.20	<0.33
Ce-144	<0.19	<0.46	<0.43

Table 33. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-63	D-63	D-63
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-72	DSO-114	DSO-150
Sr-90	0.12±0.01	0.17±0.01	0.12±0.02
K-40	14.25±0.88	21.56±1.20	20.9±1.80
Mn-54	<0.082	<0.039	<0.13
Co-58	<0.067	<0.053	<0.10
Co-60	<0.054	<0.039	<0.088
Nb-95	<0.11	0.35±0.05	<0.20
Zr-95	<0.25	0.30±0.08	<0.21
Ru-103	<0.16	<0.093	<0.29
Ru-106	<0.53	<0.45	<1.1
Cs-134	<0.051	<0.033	<0.12
Cs-137	0.32±0.04	0.69±0.06	0.45±0.08
Ce-141	<0.23	<0.19	<0.37
Ce-144	<0.28	<0.34	<0.57
Location	D-72	D-72	D-72
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-73,74	DSO-115	DSO-151,2
Sr-90	0.11±0.01	0.17±0.01	0.12±0.02
K-40	18.63±1.20	20.63±1.50	19.46±1.60
Mn-54	<0.050	<0.062	<0.096
Co-58	<0.10	<0.071	<0.098
Co-60	<0.055	0.28±0.08	<0.093
Nb-95	<0.12	0.28±0.08	<0.16
Zr-95	<0.19	<0.17	<0.19
Ru-103	<0.11	<0.15	<0.20
Ru-106	<0.54	<0.53	<0.81
Cs-134	<0.037	<0.096	<0.095
Cs-137	0.50±0.06	0.69±0.08	0.40±0.06
Ce-141	<0.28	<0.25	<0.48
Ce-144	<0.29	<0.57	<0.40

Table 33. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-93	D-93	D-93
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-76	DSO-116	DSO-153
Sr-90	0.22±0.02	0.17±0.02	0.04±0.02
K-40	26.12±1.30	19.17±1.20	17.68±1.30
Mn-54	<0.071	<0.047	<0.037
Co-58	<0.063	<0.042	<0.084
Co-60	<0.098	<0.064	<0.056
Nb-95	0.30±0.08	0.19±0.05	<0.090
Zr-95	<0.20	<0.13	<0.15
Ru-103	<0.19	<0.12	<0.099
Ru-106	<0.54	<0.36	<0.51
Cs-134	<0.078	<0.051	<0.053
Cs-137	0.79±0.07	0.51±0.05	0.59±0.06
Ce-141	<0.26	<0.16	<0.19
Ce-144	<0.33	<0.22	<0.28
Location	D-94	D-94	D-94
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-77	DSO-117,8	DSO-154
Sr-90	0.13±0.01	0.28±0.01	0.22±0.03
K-40	23.16±1.40	21.01±0.93	14.73±1.70
Mn-54	<0.062	<0.047	<0.045
Co-58	<0.054	<0.070	<0.11
Co-60	<0.071	<0.048	<0.12
Nb-95	<0.074	<0.10	<0.12
Zr-95	<0.091	<0.12	<0.23
Ru-103	<0.057	<0.12	<0.17
Ru-106	<0.59	0.64±0.15	<0.64
Cs-134	<0.037	<0.026	<0.073
Cs-137	0.60±0.07	0.39±0.04	1.16±0.12
Ce-141	<0.068	<0.19	<0.31
Ce-144	<0.31	<0.22	<0.60

Table 33. (continued)

Sample Description and Activity (pCi/g dry)

	Indicator		
Location	D-96	D-96	D-96
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-78	DSO-119	DSO-155
Sr-90	0.17±0.01	0.20±0.02	0.09±0.01
K-40	23.83±1.20	19.50±1.30	22.85±1.28
Mn-54	<0.071	<0.064	<0.070
Co-58	<0.056	<0.054	<0.012
Co-60	<0.081	<0.062	<0.056
Nb-95	0.24±0.07	0.51±0.08	0.29±0.08
Zr-95	<0.20	<0.20	<0.22
Ru-103	<0.13	<0.14	<0.19
Ru-106	<0.42	<0.45	<0.58
Cs-134	<0.73	<0.045	<0.084
Cs-137	0.62±0.06	0.65±0.07	0.62±0.06
Ce-141	<0.25	<0.22	<0.37
Ce-144	<0.29	<0.43	<0.40
Location	D-101	D-101	D-101
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-79	DSO-120	DSO-156
Sr-90	0.14±0.01	0.13±0.01	0.11±0.01
K-40	16.78±0.93	17.12±1.20	15.59±1.32
Mn-54	<0.065	<0.062	<0.054
Co-58	<0.047	<0.046	<0.081
Co-60	<0.073	<0.053	<0.11
Nb-95	<0.093	0.26±0.06	<0.12
Zr-95	<0.16	0.36±0.10	<0.19
Ru-103	<0.011	<0.12	<0.26
Ru-106	<0.37	<0.37	<0.63
Cs-134	<0.047	<0.036	<0.071
Cs-137	0.60±0.05	0.48±0.06	0.71±0.08
Ce-141	<0.14	<0.23	<0.42
Ce-144	<0.23	<0.39	<0.51

Table 33. (continued)

Sample Description and Activity (pCi/g dry)			
	Indicator		
Location	D-104	D-104	D-104
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-81	DSO-122	DSO-158
Sr-90	0.06±0.01	0.15±0.01	0.03±0.01
K-40	11.77±0.85	16.81±3.1	15.17±1.20
Mn-54	<0.036	<0.034	<0.033
Co-58	<0.037	<0.023	<0.088
Co-60	<0.045	<0.031	<0.050
Nb-95	0.14±0.04	0.10±0.02	<0.065
Zr-95	<0.098	<0.078	<0.18
Ru-103	<0.074	<0.030	<0.16
Ru-106	<0.26	<0.28	<0.37
Cs-134	<0.034	<0.030	<0.059
Cs-137	0.59±0.05	0.31±0.03	0.18±0.05
Ce-141	<0.12	<0.059	<0.22
Ce-144	<0.19	<0.19	<0.28

Table 33. (continued)

Sample Description and Activity (pCi/g dry)	Control		
Location	D-73	D-105[b]	D-105
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-75	DSO-123	DSO-159
Sr-90	0.12±0.07	0.21±0.02	0.16±0.02
K-40	15.49±0.77	25.6±1.53	23.81±2.10
Mn-54	<0.039	<0.070	<0.10
Co-58	<0.039	<0.067	<0.13
Co-60	<0.034	<0.076	<0.093
Nb-95	0.28±0.05	0.27±0.08	<0.28
Zr-95	<0.12	<0.15	<0.33
Ru-103	<0.096	<0.12	<0.54
Ru-106	<0.25	<0.79	<1.09
Cs-134	<0.25	0.20±0.05	<0.13
Cs-137	0.30±0.04	1.1±0.1	0.77±0.11
Ce-141	<0.14	<0.17	<0.60
Ce-144	<0.23	<0.40	<0.79
Location	D-102	D-102	D-102
Date Collected	3-20-81	6-22-81	10-12-81
Lab Code	DSO-80	DSO-121	DSO-157
Sr-90	0.07±0.01	0.05±0.02	0.11±0.02
K-40	16.30±1.10	13.12±0.85	16.85±1.50
Mn-54	<0.051	<0.050	<0.11
Co-58	<0.062	<0.050	<0.12
Co-60	<0.071	<0.037	<0.072
Nb-95	<0.11	<0.060	<0.18
Zr-95	<0.19	<0.11	<0.33
Ru-103	<0.15	<0.065	<0.28
Ru-106	<0.37	<0.25	<0.79
Cs-134	<0.034	<0.031	<0.077
Cs-137	0.38±0.05	0.23±0.03	0.59±0.08
Ce-141	<0.22	<0.12	<0.59
Ce-144	<0.28	<0.19	<0.56

[a] NC = No collection for the month of March because of frozen ground.
[b] Location D-105 replaced D-73 on 5-12-81.

Table 33A. Special soil samples, analysis for strontium-90 and gamma-emitting isotopes (special collection).

Sample Description and Activity (pCi/g dry)

Location	North Change House	SW Machine Shop 300'
Date Collected	8-19-81	8-19-81
Lab Code	DSO-133	DSO-134
Sr-90	0.06±0.01	0.12±0.01
K-40	23.20±1.80	25.38±1.50
Mn-54	<0.079	<0.091
Co-58	<0.096	<0.073
Co-60	<0.079	<0.12
Nb-95	0.32±0.07	0.31±0.07
Zr-95	<0.15	<0.17
Ru-103	<0.064	<0.076
Ru-106	<0.49	<0.50
Cs-134	<0.11	<0.084
Cs-137	0.28±0.06	0.73±0.07
Ce-141	<0.186	<0.17
Ce-144	1.50±0.40	<0.39
Location	W of Cooling Tower 200'	W Turbine Bldg. 300'
Date Collected	8-19-81	8-19-81
Lab Code	DSO-135	DSO-136
Sr-90	0.01±0.01	0.14±0.01
K-40	13.66±1.10	21.95±1.20
Mn-54	<0.048	<0.064
Co-58	<0.040	<0.073
Co-60	<0.058	<0.081
Nb-95	0.23±0.04	<0.11
Zr-95	<0.13	<0.12
Ru-103	<0.054	<0.11
Ru-106	<0.047	<0.39
Cs-134	<0.059	<0.071
Cs-137	0.13±0.04	0.56±0.06
Ce-141	<0.084	<0.12
Ce-144	<0.45	<0.36

Table 34. Surface water samples, analysis for gamma-emitting isotopes.
Collection: Monthly

Location	Sample Description and Activity (pCi/l)			
Lewis Access				
Control				
D-49	Date Collected	1-26-81	6-01-81	9-28-81
	Lab Code	DSW-1622	DSW-2802	DSW-3985
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-49	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1858	DSW-3038	DSW-4351
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<19	<15
	Zr-95	<15	<28	<26
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-49	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2122	DSW-3388	DSW-4673,4
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<20[a]	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-49	Date Collected	4-29-81	9-02-81	12-81
	Lab Code	DSW-2489,90	DSW-3723	NS
	Mn-54	<15	<15	
	Co-58	<15	<15	
	Co-60	<15	<15	
	Nb-95	<15	<15	
	Zr-95	<15	<15	
	Cs-134	<15	<15	
	Cs-137	<15	<15	

Table 34. (continued)

Location	Sample Description and Activity (pCi/l)			
Plant Intake				
Indicator				
D-50	Date Collected	1-26-81	6-01-81	9-28-82
	Lab Code	DSW-1623	DSW-2803	DSW-3986,7
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<20
	Zr-95	<15	<15	<28
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-50	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1859	DSW-3039	DSW-4352
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<26
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-50	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2123	DSW-3389	DSW-4675
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<17
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-50	Date Collected	4-29-81	9-02-81	1-05-82
	Lab Code	DSW-2491	DSW-3724	DSW-5066
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<20
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 34. (continued)

Sample Description and Activity (pCi/l)

Plant Discharge

Indicator

D-51	Date Collected	1-26-81	6-01-81	9-28-81
	Lab Code	DSW-1624	DSW-2804	DSW-3988
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<21
	Zr-95	<15	<15	<27
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-51	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1860	DSW-3040	DSW-4353
	Mn-54	<15	<15	<15
	Co-58	<15	<18	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<22	<15
	Zr-95	<15	<26	<25
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-51	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2124	DSW-3390	DSW-4676
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<22	<16
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-51	Date Collected	4-29-81	9-02-81	1-05-82
	Lab Code	DSW-2492	DSW-2725,26	DSW-5067,8
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<17	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 34. (continued)

Sample Description and Activity (pCi/l)

Cedar Rapids
City Park

Indicator

D-52	Date Collected	1-26-81	6-01-81	9-28-81
	Lab Code	DSW-1625	DSW-2805	DSW-3989
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<18
	Zr-95	<15	<15	<25
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-52	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1861,74	DSW-3041	DSW-4354,55
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<24	<15
	Zr-95	<15	<31	<20
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-52	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2125	DSW-3391	DSW-4677
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-52	Date Collected	4-29-81	9-02-81	1-05-82
	Lab Code	DSW-2492	DSW-3727	DSW-5069
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<17	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 34. (continued)

Location		Sample Description and Activity (pCi/l)		
Farm Pond				
Control				
D-73	Date Collected	1-26-81	6-01-81	9-28-81
	Lab Code	DSW-1626	DSW-2806	DSW-3990
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-73	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1862	DSW-3042	DSW-4356
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<17	<16
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-73	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2126	DSW-3392	DSW-4678
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<17	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-73	Date Collected	4-29-81	9-02-81	5-05-82
	Lab Code	DSW-2494	DSW-3728	DSW-5070
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 34. (continued)

Location	Sample Description and Activity (pCi/l)			
Pleasant Creek				
Indicator				
D-99	Date Collected	1-26-81	6-01-81	9-28-81
	Lab Code	DSW-1627	DSW-2807,8	DSW-3991
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<25
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-99	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1863	DSW-3043	DSW-4357
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<16	<20
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-99	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2134	DSW-3393	DSW-4679
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<20	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-99	Date Collected	4-29-81	9-02-81	1-05-82
	Lab Code	DSW-2495	DSW-3729	DSW-5071
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

Table 34. (continued)

Location	Sample Description and Activity (pCi/l)			
Park Pond				
Indicator				
D-103	Date Collected	1-26-81	6-01-81	9-28-81
	Lab Code	DSW-1628	DSW-2809	DSW-3992
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<16
	Zr-95	<15	<15	<24
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-103	Date Collected	2-27-81	6-29-81	10-31-81
	Lab Code	DSW-1864	DSW-3044,5	DSW-4358
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<21	<15
	Zr-95	<15	<29	<26
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-103	Date Collected	3-23-81	7-29-81	11-30-81
	Lab Code	DSW-2135	DSW-3394,5	DSW-4680
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<15
	Zr-95	<15	<15	<16
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15
D-103	Date Collected	4-29-81	9-02-81	1-05-82
	Lab Code	DSW-2496	DSW-3730	DSW-5072
	Mn-54	<15	<15	<15
	Co-58	<15	<15	<15
	Co-60	<15	<15	<15
	Nb-95	<15	<15	<19
	Zr-95	<15	<15	<15
	Cs-134	<15	<15	<15
	Cs-137	<15	<15	<15

NS = No sample. Access to location 49 was blocked.

Table 35. Surface water samples, quarterly composites of monthly samples, analysis for gross beta, tritium, strontium-89, and strontium-90.

Location and Period Collected	Lab Code	Gross Beta	H-3	Sr-89	Sr-90
Indicator					
D-50					
1st Q, 1981	DSW-2142	4.3±0.7	220±100	<10	<2
2nd Q, 1981	3213	6.4±0.8	260±140	<10	<2
3rd Q, 1981	4062	6.4±0.7	<320	<10	<2
4th Q, 1981	5011	2.9±0.6	210±170	<10	<2
Annual Mean ± s.d.		5.0±1.7	230±30	<10	<2
D-51					
1st Q, 1981	DSW-2143	4.5±0.7	<210	<10	<2
2nd Q, 1981	3214	7.5±0.9	<270	<10	<2
3rd Q, 1981	4063	6.4±0.8	<320	<10	<2
4th Q, 1981	5012,13	3.2±0.4	<270	<10	<2
Annual Mean ± s.d.		5.4±1.9	<340	<10	<2
D-52					
1st Q, 1981	DSW-2144	5.6±0.8	170±130	<10	<2
2nd Q, 1981	3215	6.3±0.8	<270	<10	<2
3rd Q, 1981	4064	6.2±0.7	<320	<10	<2
4th Q, 1981	5014	4.1±0.7	300±140	<10	<2
Annual Mean ± s.d.		5.6±1.0	240±90	<10	<2
D-99					
1st Q, 1981	DSW-2145	7.0±0.8	190±100	<10	<2
2nd Q, 1981	3216	7.9±0.9	<270	<10	<2
3rd Q, 1981	4065	7.1±0.8	<330	<10	<2
4th Q, 1981	5015	7.4±0.8	<270	<10	<2
Annual Mean ± s.d.		7.4±0.4	190±100	<10	<2
Control					
D-49					
1st Q, 1981	DSW-2141	5.3±0.7	170±100	<10	<2
2nd Q, 1981	3212	6.7±0.8	<270	<10	<2
3rd Q, 1981	4061	5.1±0.7	310±270	<10	<2
4th Q, 1981	5010	5.3±0.8	<270	<10	<2
Annual Mean ± s.d.		5.6±0.7	240±100	<10	<2

Table 36. Fish samples, analysis of edible portion for gamma-emitting isotopes. Collection: semi-annually.

Sample Description and Activity (pCi/g wet)

Indicator

Location	D-61	D-61	D-61
Date Collected	6-02-81	6-02-81	11-17-81
Type	1 Carp	3 River Carpsuckers	5 Carp
Lab Code	DF-93	DF-94[a]	DF-234
K-40	2.23±0.39	2.67±0.45	3.09±0.59
Mn-54	<0.029	<0.019	<0.029
Co-58	<0.037	<0.042	<0.040
Co-60	<0.019	<0.023	<0.017
Nb-95	<0.057	<0.034	<0.031
Zr-95	<0.074	<0.10	<0.079
Ru-103	<0.090	<0.056	<0.056
Ru-106	<0.17	<0.25	<0.28
Cs-134	<0.019	<0.025	<0.029
Cs-137	<0.028	<0.022	<0.023
Ce-141	<0.12	<0.12	<0.095
Ce-144	<0.14	<0.20	<0.17

Location	D-61	D-61	D-61
Date Collected	11-17-81	11-17-81	11-17-81
Type	1 Big Mouth Buffalo	7 River Carpsucker	4 Carp
Lab Code	DF-235	DF-236	DF-237
K-40	3.06±0.93	2.32±0.48	3.01±0.57
Mn-54	<0.071	<0.17	<0.025
Co-58	<0.090	<0.048	<0.042
Co-60	<0.096	<0.017	<0.016
Nb-95	<0.10	<0.031	<0.039
Zr-95	<0.310	<0.070	<0.076
Ru-103	<0.23	<0.047	<0.053
Ru-106	<0.56	<0.26	<0.20
Cs-134	<0.060	<0.043	<0.02[illegible]
Cs-137	<0.090	<0.031	<0.020
Ce-141	<0.31	<0.099	<0.087
Ce-144	<0.62	<0.17	<0.25

[a] Samples DF-94, 98, and 99 were combined for analysis (under the lab code DF-94) because the volume of each sample alone was insufficient for gamma analysis.

Table 36. (continued)

Sample Description and Activity (pCi/g wet)		
	Indicator	
Location	D-61	D-61
Date Collected	11-17-81	11-17-81
Type	5 Big Mouth Buffalo	9 River Carpsucker
Lab Code	DF-238	DF-239,40
K-40	3.04±0.59	2.97±0.32
Mn-54	<0.015	<0.023
Co-58	<0.025	<0.059
Co-60	<0.037	<0.034
Nb-95	<0.034	<0.040
Zr-95	<0.091	<0.095
Ru-103	<0.073	<0.20
Ru-106	<0.23	<0.22
Cs-134	<0.025	<0.037
Cs-137	<0.025	<0.017
Ce-141	<0.13	<0.22
Ce-144	<0.23	<0.25
	Control	
Location	D-49	D-49
Date Collected	6-02-81	6-02-81
Type	Carp	2 River Carpsuckers
Lab Code	DF-95	DF-96[b]
K-40	4.26±0.74	2.05±0.29
Mn-54	<0.037	<0.028
Co-58	<0.071	<0.039
Co-60	<0.029	<0.022
Nb-95	<0.087	<0.048
Zr-95	<0.10	<0.071
Ru-103	<0.079	<0.057
Ru-106	<0.23	<0.25
Cs-134	<0.025	<0.028
Cs-137	<0.026	<0.019
Ce-141	<0.16	<0.11
Ce-144	<0.28	<0.11

[b] Samples DF-96 and 100 were combined for analysis (under the lab code DF-96) because the volume of each sample alone was insufficient for gamma analysis.

Table 37. Periphyton samples, analysis for gamma-emitting isotopes.
Collection: Quarterly.

Sample Description and Activity (pCi/g wet)

Indicator

Location	D-61	D-61
Date Collected	2-20-81	5-20-81
Lab Code	DBO-26[a]	DBO-31
K-40	<17.40	4.31±1.60
Mn-54	<0.60	<0.16
Co-58	<1.01	<0.34
Co-60	<0.57	<0.099
Nb-95	<1.55	0.84±0.20
Zr-95	<2.79	<0.76
Ru-103	<2.32	<0.45
Ru-106	<6.66	<1.05
Cs-134	<0.53	<0.17
Cs-137	<0.76	<0.10
Ce-141	<4.96	<0.65
Ce-144	<2.48	<0.79

Location	D-61	D-61
Date Collected	8-18-31	11-16-81
Lab Code	DBO-41	DBO-51
K-40	6.28±1.20	2.17±1.80
Mn-54	<0.11	<0.16
Co-58	<0.14	<0.23
Co-60	<0.12	<0.14
Nb-95	<0.23	<0.33
Zr-95	<0.45	<0.50
Ru-103	<0.31	<0.36
Ru-106	<1.16	<1.71
Cs-134	<0.084	<0.19
Cs-137	<0.11	<0.19
Ce-141	<0.81	<0.79
Ce-144	<0.48	<0.56

Table 37. (continued)

Sample Description and Activity (pCi/g wet)		
	Control	
Location	D-49	D-49
Date Collected	2-20-81	5-20-81
Lab Code	DBO-25[a]	DBO-30
K-40	9.61±6.20	2.61±0.99
Mn-54	<0.78	<0.096
Co-58	<1.22	<0.13
Co-60	<0.98	<0.11
Nb-95	<2.64	0.68±0.15
Zr-95	<2.79	<0.39
Ru-103	<3.10	<0.31
Ru-106	<5.58	<0.65
Cs-134	<0.96	<0.087
Cs-137	2.94±0.59	<0.071
Ce-141	<5.74	<0.87
Ce-144	<4.34	<0.62
Location	D-49	D-49
Date Collected	8-18-81	11-16-81
Lab Code	DBO-40	DBO-50
K-40	2.97±0.68	3.57±1.20
Mn-54	<0.050	<0.11
Co-58	<0.068	<0.16
Co-60	<0.056	<0.096
Nb-95	0.24±0.05	<0.26
Zr-95	<0.13	<0.26
Ru-103	<0.068	<0.28
Ru-106	<0.32	<0.95
Cs-134	<0.043	<0.11
Cs-137	<0.074	<0.12
Ce-141	<0.094	<0.43
Ce-144	<0.29	<0.65

[a] Elevated LLDs are due to a small volume of sample that was available for analysis. Results were excluded in the evaluation of annual average.

Table 38. River sediment samples, analysis for strontium-90 and gamma-emitting isotopes. Collection: semi-annually.

Sample Description and Activity (pCi/g dry)		
	Indicator	
Location	D-50	D-51
Date Collected	5-20-81	5-20-81
Lab Code	DBS-90	DBS-91
Sr-90	<0.014	<0.010
K-40	11.74±0.81	11.28±0.80
Mn-54	<0.043	<0.031
Co-58	<0.034	<0.037
Co-60	<0.039	<0.033
Nb-95	0.085±0.024	<0.045
Zr-95	<0.073	<0.067
Ru-103	<0.046	<0.034
Ru-106	<0.19	<0.19
Cs-134	<0.022	<0.019
Cs-137	<0.033	<0.031
Ce-141	<0.079	<0.090
Ce-144	<0.22	<0.14
Location	D-50	D-51
Date Collected	11-18-81	11-18-81
Lab Code	DBS-169	DBS-170
Sr-90	<0.015	<0.040
K-40	12.69±0.94	10.68±1.10
Mn-54	<0.029	<0.050
Co-58	<0.031	<0.039
Co-60	<0.067	<0.043
Nb-95	<0.068	<0.048
Zr-95	<0.099	<0.096
Ru-103	<0.056	<0.064
Ru-106	<0.34	<0.31
Cs-134	<0.036	<0.034
Cs-137	<0.045	<0.050
Ce-141	<0.088	<0.186
Ce-144	<0.25	<0.26

Table 38. (continued)

Sample Description and Activity (pCi/g dry)		
	Indicator	Control
Location	D-61	D-49
Date Collected	5-20-81	5-20-81
Lab Code	DBS-92	DBS-89
Sr-90	<0.010	0.008±0.006
K-40	10.65±0.64	11.62±0.60
Mn-54	<0.029	<0.033
Co-58	<0.029	<0.025
Co-60	<0.031	<0.034
Nb-95	<0.081	<0.031
Zr-95	<0.11	<0.073
Ru-103	<0.078	<0.028
Ru-106	<0.25	<0.23
Cs-134	<0.040	<0.023
Cs-137	<0.032	<0.025
Ce-141	<0.23	<0.057
Ce-144	<0.20	<0.12
Location	D-61	D-49
Date Collected	11-19-81	11-19-81
Lab Code	DBS-171,2	DBS-168
Sr-90	<0.024	0.062±0.019
K-40	15.90±0.89	10.90±1.20
Mn-54	<0.047	<0.039
Co-58	<0.059	<0.034
Co-60	<0.064	<0.042
Nb-95	<0.082	<0.071
Zr-95	<0.073	<0.079
Ru-103	<0.079	<0.057
Ru-106	<0.28	<0.37
Cs-134	<0.039	<0.028
Cs-137	<0.051	<0.051
Ce-141	<0.19	<0.14
Ce-144	<0.36	<0.31

Table 39. Precipitation samples, analysis for gross beta and tritium.
Collection: Monthly.

Collection Date	Lab Code	pCi/l Gross Beta	pCi/l H-3
2-02-81	DP-46	42.9±2.8	540±120
2-27-81	48	46.9±1.8	280±120
3-30-81	62	49.8±8.7	310±110
4-81	-	NS[a]	NS
6-01-81[b]	70	179.5±10.6[c]	320±110
6-29-81	82,83	21.4±0.9	210±150
7-29-81	100	--[d]	320±160
8-81(9-02-81)	134	5.9±0.9	<370
9-28-81	141	2.6±0.5	<370
10-31-81	163	1.3±0.5	190±130
11-30-81	177	6.5±0.6	260±100
12-81(1-05-82)	192,3	22.9±2.3	<340

[a] NS = Precipitation not collected for April.
[b] Sample for May.
[c] Recount of this sample yielded an activity of 185.2±10.6.
[d] Not enough sample was collected to analyze for gross beta.

Appendix A

Crosscheck Program Results

Appendix A

Crosscheck Program Results

The Nuclear Sciences Department of Hazleton Environmental Sciences has participated in interlaboratory comparison (crosscheck) programs since the formulation of its quality control program in December 1971. These programs are operated by agencies which supply environmental-type samples (e.g., milk or water) containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on the laboratory's analytical procedures and to alert it to any possible problems.

Participant laboratories measure the concentrations of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk and water samples during the period 1975 through 1981. This program has been conducted by the U. S. Environmental Protection Agency Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, Las Vegas, Nevada.

The results in Table A-2 were obtained for thermoluminescent dosimeters (TLD's) during the period 1976, 1977, 1979, 1980, and 1981 through participation in the Second, Third, Fourth, and Fifth International Intercomparison of Environmental Dosimeters under the sponsorships listed in Table A-2.

Table A-1. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and Hazleton ES results for milk and water samples, 1975 through 1981[a].

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ[c]	EPA Result ±3σ, n=1[d]
STM-40	Milk	Jan. 1975	Sr-89	<2	0±15
			Sr-90	73±2.5	75±11.4
			I-131	99±4.2	101±15.3
			Cs-137	76±0.0	75±15
			Ba-140	<3.7	0±15.0
			K(mg/l)	1470±5.6	1510±228
STW-45	Water	Apr. 1975	Cr-51	<14	0
			Co-60	421±6	425±63.9
			Zn-65	487±6	497±74.7
			Ru-106	505±16	497±74.7
			Cs-134	385±3	400±60.0
			Cs-137	468±3	450±67.5
STW-47	Water	Jun. 1975	H-3	1459±144	1499±1002
STW-48	Water	Jun. 1975	H-3	2404±34	2204±1044
STW-49	Water	Jun. 1975	Cr-51	<14	0
			Co-60	344±1	350±53
			Zn-65	330±5	327±49
			Ru-106	315±7	325±49
			Cs-134	291±1	304±46
			Cs-137	387±2	378±57
STW-53	Water	Aug. 1975	H-3	3317±64	3200±1083
STW-54	Water	Aug. 1975	Cr-51	223±11	225±38
			Co-60	305±1	307±46
			Zn-65	289±3	281±42
			Ru-106	346±5	279±57
			Cs-134	238±1	256±38
			Cs-137	292±2	307±46
STW-58	Water	Oct. 1975	H-3	1283±80	1203±938
STM-61	Milk	Nov. 1975	Sr-90	68.9±2.1	74.6±11.2
			I-131	64.6±3.8	75±15
			Cs-137	75.6±20	75±15
			Ba-140	<3.7	0
			K(Mg/l)	1435±57	1549±233

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2 σ[c]	EPA Result ±3σ, n=1[d]
STW-63	Water	Dec. 1975	H-3	1034±39	1002±972
STW-64	Water	Dec. 1975	Cr-51	<14	0
			Co-60	221±1	203±30.5
			Zn-65	215±6	201±30.2
			Ru-106	171±9	181±27.2
			Cs-134	198±2	202±30.3
			Cs-137	152±4	151±22.7
STW-68	Water	Feb. 1976	H-3	1124±31	1080±978
STW-78	Water	Jun. 1976	H-3	2500±44	2502±1056
STW-84	Water	Aug. 1976	H-3	3097±21	3100±1080
STM-86	Milk	Sep. 1975	Sr-89	29±2.0	45±15
			Sr-90	30±1.0	30±4.5
			I-131	100±8.6	120±18
			Ba-140	50±10.1	85±15
			Cs-137	17±1.5	20±15
			K(mg/l)	-	1540±231
STM-91	Milk	Nov. 1976	I-131	83±0.6	85±15
			Ba-140	<4	0
			Cs-137	12±1.7	11±15
			K(mg/l)	1443±31	1510±228
STW-93	Water	Dec. 1976	Cr-51	105±15	104±15
			Co-60	<4	0
			Zn-65	97±4	102±15
			Ru-106	87±3	99±15
			Cs-134	85±4	93±15
			Cs-137	103±4	101±15
STW-94	Water	Dec. 1976	H-3	2537±15	2300±1049
STM-97	Milk	Mar. 1977	I-131	55±2.5	51±15
			Ba-140	<6	0
			Cs-137	34±1	29±15
			K(mg/l)	1520±35	1550±233
STW-101	Water	Apr. 1977	H-3	1690±62	1760±1023

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2 σ[c]	EPA Result ±3 σ, n=1[d]
STM-130	Milk	May 1977	Sr-89	38±2.6	44±15
			Sr-90	12±2.1	10±4.5
			I-131	59±2.1	50±15
			Ba-140	53±4.4	72±15
			Cs-137	14±1.2	10±15
			K(mg/l)	1533±21	1560±234
STW-105	Water	Jun. 1977	Cr-51	<14	0
			Co-60	29±1	29±15
			Zn-65	74±7	74±15
			Ru-106	64±8	62±15
			Cs-134	41±1	44±15
			Cs-137	35±3	35±15
STW-107	Water	Jun. 1977	Ra-226	4.7±0.3	5.1±2.42
STW-113	Water	Aug. 1977	Sr-89	13±0[e]	14±15
			Sr-90	10±2[e]	10±4.5
STW-116	Water	Sep.1977	Gross Alpha	12±6	10±15
			Gross Beta	32±6	30±15
STW-118	Water	Oct. 1977	H-3	1475±29	1650±1017
STW-119	Water	Oct. 1977	Cr-51	132±14	153±24
			Co-60	39±2	38±15
			Zn-65	51±5	53±15
			Ru-106	63±6	74±15
			Cs-134	30±3	30±15
			Cs-137	26±1	25±15
STW-136	Water	Feb. 1978	H-3	1690±270	1680±1020
STW-137	Water	Feb. 1978	Cr-51	<27	0
			Co-60	36±2	34±15
			Zn-65	32±4	29±15
			Ru-106	41±2	36±15
			Cs-134	47±2	52±15
			Cs-137	<2	0

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ[c]	EPA Result ±3σ, n=1[d]
STW-138g	Water	Mar. 1978	Ra-226	5.4±0.1	5.5±0.6
			Ra-228	NA[f]	16.7±2.5
STW-150	Water	Apr. 1978	H-3	1250±220	[illegible]220±1047
STW-151	Water	Apr. 1978	Gross Alpha	20±1	20±15
			Gross Beta	56±4	59±15
			Sr-89	19±2	21±15
			Sr-90	8±1	10±4.5
			Ra-226	NA[f]	-
			Ra-228	NA[f]	-
			H-3	112±12	0
			Co-60	19±3	20±15
			Cs-134	16±1	15±15
			Cs-137	<2	0
STM-152	Milk	Apr.1978	Sr-89	85±4	101±15
			Sr-90	8±1	9±4.5
			I-131	78±1	82±15
			Cs-137	29±3	23±15
			Ba-140	<11	0
			K(mg/l)	1503±90	1500±225
STW-154g	Water	May 1978	Gross Alpha	12±1	13±15
			Gross Beta	21±4	18±15
STW-157g	Water	Jun. 1978	Ra-226	4.0±1.0	3.7±0.6
			Ra-228	NA[f]	5.6±0.8
STW-159g	Water	Jul. 1978	Gross Alpha	19±3	22±6
			Gross Beta	28±3	30±5
STW-162	Water	Aug. 1978	H-3	1167±38	1230±990
STW-165g	Water	Sep. 1978	Gross Alpha	4±1	5±5
			Gross Beta	13±1	10±5

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ[c]	EPA Result ±3σ, n=1[d]
STW-167	Water	Oct. 1978	Gross Alpha	19±2	19±15
			Gross Beta	36±2	34±15
			Sr-89	9±1	10±15
			Sr-90	4±0	5±2.4
			Ra-226	5.5±0.3	5.0±2.4
			Ra-228	NA[f]	5.4±2.4
			Cs-134	10±1	10±15
			Cs-137	15±1	13±15
STW-170	Water	Dec. 1978	Ra-226	11.5±0.6	9.2±1.4
			Ra-228	NAlefld	8.9±4.5
STW-172	Water	Jan. 1979	Sr-89	11±2	14±15
			Sr-90	5±2	6±4.5
STW-175	Water	Feb. 1979	H-3	1344±115	1280±993
STW-176	Water	Feb. 1979	Cr-51	<22	0
			Co-60	10±2	9±15
			Zn-65	26±5	21±15
			Rn-106	<16	0
			Cs-134	8±2	6±15
			Cs-137	15±2	12±15
STW-178	Water	Mar. 1979	Gross Alpha	6.3±3	10±15
			Gross Beta	15±4	16±15
STW-195g	Water	Aug. 1979	Gross Alpha	6.3±1.2	5±5
			Gross Beta	42.7±7.0	40±4
STW-193	Water	Sep. 1979	Sr-89	5.0±1.2	3.0±1.5
			Sr-90	25.0±2.7	28.0±4.5
STW-196	Water	Oct. 1979	Cr-51	135±5.0	113±18
			Co-60	7.0±1.0	6±5
			Cs-134	7.3±0.6	7±15
			Cs-137	12.7±1.2	11±15
STW-198	Water	Oct. 1979	H-3	1710±140	1560±1111

Table 5.3. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ[c]	EPA Result ±3σ, n=1[d]
STW-199	Water	Oct. 1979	Gross Alpha	16.0±3.6	21±15
			Gross Beta	36.3±1.2	49±15
			Sr-89	10.7±0.6	12±15
			Sr-90	5.7±0.6	7±15
			Ra-226	11.1±0.3	11±5
			Ra-228	1.6±0.7	0
			Co-60	35.0±1.0	33±15
			Cs-134	50.7±2.3	56±15
			Cs-137	<3	0
STW-206	Water	Jan. 1980	Gross Alpha	19.0±2.0	30.0±8.0
			Gross Beta	48.0±2.0	45.0±5.0
STW-208	Water	Jan. 1980	Sr-89	6.1±1.2	10.0±0.5
			Sr-90	23.9±1.1	25.5±1.5
STW-209	Water	Feb. 1980	Cr-51	112±14	101±5.0
			Co-60	12.7±2.3	11±5.0
			Zn-65	29.7±2.3	25±5.0
			Ru-106	71.7±1.5	51±5
			Cs-134	12.0±2.0	10±5.0
			Cs-137	30.0±2.7	30±5.0
STW-210	Water	Feb. 1980	H-3	1800±120	1750±340
STW-211	Water	March 1980	Ra-226	15.7±0.2	16.0±2.4
			Ra-228	3.5±0.3	2.6±0.4
STW-215	Water	April 1980	Gross Alpha	NA[f]	98.0±24.5
			Gross Beta	NA[f]	100.0±5.0
			Sr-89	3.7±0.6	4±5.0
			Sr-90	<1.0	0.001±0.1
			Ra-226	NA[f]	16.0±2.4
			Ra-228	NA[f]	21.3±3.2
			Co-60	10.0±1.0	6±5
			Cs-134	14.0±1.0	8±5
			Cs-137	21.7±1.5	18±5
STM-217	Milk	May 1980	Sr-89	4.4±2.6[g]	5±5
			Sr-90	10.0±1.0	12±1.5
STW-221	Water	June 1980	Ra-226	2.0±0.0	1.7±0.8
			Ra-228	1.6±0.1	1.7±0.8

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ[c]	EPA Result ±3σ, n=1[d]
STW-223	Water	July 1980	Gross Alpha	31±3.0	38±5.0
			Gross Beta	44±4	35±5.0
STW-224	Water	July 1980	Cs-137	33.9±0.4	35±5.0
			Ba-140	<12	0
			K-40	1350±60	1550±78
			I-131	<5.0	0
STW-225	Water	Aug. 1980	H-3	1280±50	1210±329
STW-226	Water	Sept. 1980	Sr-89	22±1.2	24±8.6
			Sr-90	12±0.6	15±2.6
STW-228	Water	Sept. 1980	Gross Alpha	NA[f]	32.0±8.0
			Gross Beta	22.5±0.0	21.0±5.0
STW-231	Water	Oct. 1980	Sr-89	17.0±1.7	23±8.6
			Sr-90	1.67±0.6	-
			I-131	-	18±8.6
			Cs-137	26±1.0	21±8.6
			Ba-140	<39	0
			K-40	1310±100	1700±85
STW-235	Water	Dec. 1980	H-3	2420±30	2240±604
STW-237	Water	Jan. 1981	Sr-89	13.0±1.0	16±8.7
			Sr-90	24.0±0.6	34±2.9
STM-239	Milk	Jan. 1981	Sr-89	<210	0
			Sr-90	15.7±2.6	20±3.0
			I-131	30.9±4.8	26±10.0
			Cs-137	46.9±2.9	43±9.0
			Ba-140	<21	0
			K-40	1330±53	1550±134
STW-240	Water	Jan. 1981	Gross alpha	7.3±2.0	9±5.0
			Gross beta	41.0±3.1	44±5.0
STW-243	Water	Mar. 1981	Ra-226	3.5±0.06	3.4±0.5
			Ra-228	6.5±2.3	7.3±1.1

Table A-1. (continued)

Lab Code	Sample Type	Date Coll.	Analysis	Concentration in pCi/l[b] HES Result ±2σ [c]	EPA Result ±3σ, n=1[d]
STW-245	Water	Apr. 1981	H-3	3210±115	2710±355
STW-249	Water	May 1981	Sr-89	51±3.6	36±8.7
			Sr-90	22.7±0.6	22±2.6
STW-251	Water	May 1981	Gross alpha	24.0±5.29	21±5.25
			Gross beta	16.1±1.9	14±5.0
STW-252	Water	Jun. 1981	H-3	2140±95	1950±596
STW-255	Water	Jul. 1981	Gross alpha	20±1.5	22±9.5
			Gross beta	13.0±2.0	15±8.7
STW-259	Water	Sep. 1981	Sr-89	16.1±1.0	23±5
			Sr-90	10.3±0.9	11±1.5
STW-265	Water	Oct. 1981	Gross alpha	71.2±19.1	80±20
			Gross beta	123.3±16.6	111±5.6
			Sr-89	14.9±2.0	21±5
			Sr-90	13.1±1.7	14.4±1.5
			Ra-226	13.0±2.0	12.7±1.9
STW-267	Water	Nov. 1981	Gross alpha	15.7±4.3	
			Gross beta	7.3±0.9	
STW-269	Water	Dec. 1981	H-3	2516±181	2700±355

[a]Results obtained by the Nuclear Sciences Department of Hazleton Environmental Sciences as a participant in the environmental sample crosscheck program operated by the Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, (EPA), Las Vegas, Nevada.

[b]All results are in pCi/l, except for elemental potassium (K) data which are in mg/l.

[c]Unless otherwise indicated, the HES results given as the mean ±2 standard deviations for three determinations.

[d]USEPA results are presented as the known values ± control limits of 3 for n=1.

[e]Mean ± 2 standard deviations of two determinations.

[f]NA = Not analyzed.

[g]Analyzed but not reported to the EPA.

Table A-2. Crosscheck program results, thermoluminescent dosimeters (TLD's).

Lab Code	TLD Type	Measurement	mR: Hazleton Result ±2 σ [a]	mR: Known Value	mR: Average ±2 σ [d] (all participants)
2nd International Intercomparison[b]					
115-2[b]	CaF_2:Mn Bulb	Gamma-Field	17.0±1.9	17.1[c]	16.4±7.7
		Gamma-Lab	20.8±4.1	21.3[c]	18.8±7.6
3rd International Intercomparison[e]					
115-3[e]	CaF_2:Mn Bulb	Gamma-Field	30.7±3.2	34.9±4.8[f]	31.5±3.0
		Gamma-Lab	89.6±6.4	91.7±14.6[f]	86.2±24.0
4th International Intercomparison[g]					
115-4[g]	CaF_2:Mn Bulb	Gamma-Field	14.1±1.1	14.1±1.4[f]	16.09.0
		Gamma-Lab (Low)	9.3±1.3	12.2±2.4[f]	12.0±7.6
		Gamma-Lab (High)	40.4±1.4	45.8±9.2[f]	43.9±13.2
5th International Intercomparison[h]					
115-5A[h]	CaF_2:Mn Bulb	Gamma-Field	31.4±1.8	30.0±6.0[i]	30.2±14.6
		Gamma-Lab at beginning	77.4±5.8	75.2±7.6[i]	75.8±40.4
		Gamma-Lab at the end	96.6±5.8	88.4±8.8[i]	90.7±31.2

Table A-2. (Continued)

Lab Code	TLD Type	Measurement	mR: Hazleton Result ±2σ[a]	Known Value	Average ± 2σ[d] (all participants)
115-5B[h]	LiF-100 Chips	Gamma-Field	30.3±4.8	30.0±6[i]	30.2±14.6
		Gamma-Lab at beginning	81.1±7.4	75.2±7.6[i]	75.8±40.4
		Gamma-Lab at the end	85.4±11.7	88.4±8.8[i]	90.7±131.2

[a]Lab result given is the mean ± 2 standard deviations of three determinations.
[b]Second International Intercomparison of Environmental Dosimeters conducted in April of 1976 by the Health and Safety Laboratory (GASL), New York, New York, and the School of Public Health of the University of Texas, Houston, Texas.
[c]Value determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.
[d]Mean ± 2 standard deviations of results obtained by all laboratories participating in the program.
[e]Third International Intercomparison of Environmental Dosimeters conducted in summer of 1977 by Oak Ridge National Laboratory and the School of Public Health of the University of Texas, Houston, Texas.
[f]Value ± 2 standard deviations as determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.
[g]Fourth International Intercomparison of Environmental Dosimeters conducted in summer of 1979 by the School of Public Health of the University of Texas, Houston, Texas.
[h]Fifth International Intercomparison of Environmental Dosimeter conducted in fall of 1980 at Idaho Falls, Idaho and sponsored by the School of Public Health of the University of Texas, Houston, Texas and Environmental Measurements Laboratory, New York, New York, U.S. Department of Energy.
[i]Value determined by sponsor of the intercomparison using continuously operated pressurized ion chamber.

Appendix B

Data Reporting Conventions

Data Reporting Conventions

1. All activities are corrected to collection time.

2. Single Measurements

Each single measurement is reported as follows:

$$x \pm s$$

where x = value of the measurement;

s = 2σ counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is found to be below the lower limit of detection L it is reported as

$$<L .$$

Detection limits are based on 4.66σ background counting uncertainties.

3. Duplicate measurements, the average result is reported as follows:

a. Individual results: $x_1 \pm s_1$
$x_2 \pm s_2$

Reported result: $x \pm s$

where $x = (1/2)\ (x_1 + x_2)$

$$s = (1/2)\sqrt{s_1^2 + s_2^2}$$

b. Individual results: $<L_1$

$<L_2$

Reported result: $<L$

where L = lower of L_1 and L_2

c. Individual results: $x \pm s$

$<L$

Reported result: $x \pm s$ if $x \leq L$;

$<L$ otherwise

4. Unless otherwise indicated, the "cumulative average" for a location is the average of all measurements from the beginning of the current year through the date of the last entered result. "Less-than" values are ignored in the computation of the average. If all results are less-than values, the highest value is reported.
5. Unless otherwise indicated, the "previous average" for a location is the average obtained during the previous year.
6. In rounding off, the following rules are followed:
   a. If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded of to 11.44.
   b. If the figure following those to be retained is greater than 5, the figure is dropped, and the last retained figure is raised by 1. As an example, 11.446 is rounded of to 11.45.
   c. If the figure following those to be retained is 5, and if there are no figures other than zeros beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by 1 if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded of to 11.44, while 11.425 is rounded of to 11.42.

Sulphuric Acid Usage

1981

2.565 E6 lbs. (1282 1/2 tons)