ENVIRONMENTAL OPERATING REPORT

INDIANA & MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT UNIT 1
BRIDGMAN, MICHIGAN

July 1, 1976 through December 31, 1976

Docket No. 50-315
License No. DPR-58

Donald C. Cook Nuclear Plant Unit 1
Environmental Operating Report
July 1, 1976 through December 31, 1976

Contents

Contents

Appendices

I. Introduction

This is the fifth Environmental Operating Report for Unit No. 1 of the Donald C. Cook Nuclear Plant. During the period covered by this report (July 1, 1976 through December 31, 1976) the Unit continued to operate at 100% of full power. On December 24 the Unit was brought to cold shutdown for the start of the first refueling outage.

Although there were no changes to the Environmental Technical Specifications in the second half of 1976, Amendment 17 to the Operating License, dated January 6, 1977 revises Section 5.4, "Plant Reporting Requirements," such that this report will be the last semi-annual Environmental Operating Report for the Donald C. Cook Nuclear Plant. The radiological portions of the report will still be issued semi-annually but the remainder will be produced annually. The next report will cover all of 1977.

II. Abnormal Environmental Occurrences

The following abnormal environmental occurrences were reported during the second half of 1976.

Date	Number	Occurrence
7-9-76	50-315/76-04	High chlorine residual in the circulating water system.
8-20-76	50-315/76-05	Liquid release occurred in violation of Tech. Specs., Appendix B, Section 2.4.2.b
10-29-76	50-315/76-06	Total chlorine residual not determined during chlorination cycle.
11-20-76	50-315/76-07	Circulating water chlorine residual > .10 ppm.

III. Physical Observations

A. Underwater Observations

Fifteen dives were performed during the reporting period; five during July, five during August, four during September and one during October.

The riprap fields and structures appeared normal; no scour was observed. Some organic debris (leaves, sticks, dune grass, etc.) was seen, but appreciable or abnormal accumulations were not observed. Periphyton growth (described by length, luxuriance and percentage coverage of substrate) reached a seasonal maximum during the summer (June-July) and diminished during September-October. Snails (*Physa integra*) and fingernail clam shells were occasionally observed but numbers were low. Crayfish were observed regularly but were most abundant during July and August. During July, fish eggs were observed attached to various substrates (periphyton, loose algae, etc.) in the vicinity of the structures and lying loose at one north control station. The eggs were probably those of alewife or spottail shiner; most eggs were opaque, many were fungused, some were clear. During August, eggs were observed attached to periphyton growing on top of the south intake and south discharge structures; numbers were low, all eggs were opaque, most were fungused. Nine species of fish were observed and listed in descending frequency of observation are: alewife, sculpin, johnny darter, carp, spottail shiner, yellow perch, trout-perch, burbot and rainbow smelt. Schools of young-of-the-year alewife were observed during August and September. Small schools of carp were observed near the south discharge structure July-September; carp were not observed elsewhere.

See Appendix A to this report.

B. Scour and Erosion

The program of monitoring Lake Michigan bottom scour and shoreline erosion in the vicinity of the Donald C. Cook Nuclear Plant continued to be in effect during the period of 7/1/76-12/31/76. Additionally, a diving inspection of the underwater structures and bottom riprap cover was made in September, 1976.

1. Lake bottom profiles are found by monthly sounding normally during the period of April through October. These depth readings are taken within a grid of 13,000 ft. in a North-South direction and 3,000 ft. in an East-West direction. Due to poor weather conditions soundings were taken only in August, 1976. These soundings indicate progressive stabilization of the Lake Michigan bottom.

2. The aerial photographic survey of six miles of Lake Michigan shoreline (from one mile north to five miles south of the plant) continued on a monthly basis during the reporting period. The photography of September, 1976 was used to compile a set of maps for 2.46 miles of shoreline. The maps indicate that no appreciable change in beach-front has taken place since March, 1976.

3. Due to poor weather conditions the 1,400 ft. by 2,400 ft. grid within the area of circulating water intake and discharge pipes and structures was not sounded during the reporting period.

The above information with the exception of the shorefront aerial photos is available in the New York offices of AEPSC. The aerial photos can be found at the Cook Plant.

C. Groundwater Monitoring

Chemical Analysis was made of groundwater samples from wells 1A, 2,3,6,7,8,11, and 12. The samples were analyzed for the parameters of:

sodium	nitrate
sulfate	iron
phosphate	copper
pH	static water level elevation
conductivity	

Lake water, free of chlorination, was also analyzed for the same parameters.

The results of the sample analyses are presented in Appendix C.

Groundwater movement is determined annually and will be presented in the next Environmental Operating Report.

IV. Chemical Discharges

Actual quantities of chemicals released to the lake or the absorption field during the second half of 1976 are listed below arranged according to the relevant Technical Specifications.

A. Specification 2.2.1.2

Chlorination of the Circulating Water System was done throughout this period on a twice per day (20 minute feed) automatic program, except for unit outagės and during part of the period of deicing. Total chlorine residual is presently being measured at the condenser outlet by the amperometric method. Total chlorine residual is being measured every five minutes through each period of chlorination.

B. Specification 2.2.2.2

Amount Discharged - Lbs.

1. Phosphate 33.6 (heating boiler blowdown)

2. Morpholine 0

3. Ammonia 48.1

C. Specification 2.2.3.2

	Amount Discharged	Discharged To
1. Sodium Sulfate	52.66 Tons	Absorption Field
2. Boron	154.56 lbs.	Lake
3. Detergent*	171.6 lbs.	Lake

* Detergent used for decontamination of the aux. building with the majority of this material processed through the waste disposal system. Values reported are based from inventory control of the detergent with the assumption that all used was discharged to the lake. The material presently in the Spartan DC-13 cleaning compound has the following active ingredients:

Sodium Nitrite	Less than 0.5%
Phosphate	0.7% as P
Alkylaryl Polyethylene	
Glycol Ether	10%
Postassium Hydroxide	Less than 0.1%
Perfume	Less than 0.1%
Phodamine B Dye	
Basic (Violet #10)	3 ppm

D. Specification 2.2.3.2 - Discharge to Lake and Absorption Field

1. Turbine Room Sump Composite Data

Sodium	50,594 lbs.
Calcium	33,222 lbs.
Magnesium	11,285 lbs.
Sulfate	71,199 lbs.
Chloride	5,785 lbs.
Total Solids	236,352 lbs.

2. pH Values on Sump Discharge Composite

   Low - 6.7 High - 8.2

3. No chemicals other than spent regenerants were discharged to the absorption field.

V. Aquatic Studies

A. Zooplankton

Condenser-Passage Studies

This report includes condenser passage data for June through September 1976 and the results of preliminary statistical analyses of the preoperational and operational data. Total zooplankton mortalities for the period June to September 1976 were generally low and comparable with mortalities observed for the same period in 1975. Statistical analyses of zooplankton mortalities were performed for 25 taxon categories and for the three incubation times. A 20-month data set was used. Only eight significant differences ($p<.05$) were detected between intake and discharge water mortalities in the 75 analyses. Zooplankton mortalities were generally lower in the intake waters than in the discharge waters (53 out of 75 comparisons) but the differences in mortality were only a few percent. Zooplankton mortalities due to condenser passage were low averaging less than 15% for total zooplankton.

Zooplankton concentrations in the cooling waters were higher in the summer of 1976 than in 1975 and there was some evidence that the seasonal pattern of zooplankton composition was advanced by one month in 1976. The numbers and biomass of zooplankton passing through the plant and the maximum loss of zooplankton (at 0-hour) were calculated.

Some culturing experiments were conducted in June and July. The copepods used were *Cyclops bicuspidatus thomasi* and *Cyclops vernalis*. The results of these studies are presented.

Lake Surveys

Statistical analyses of several zooplankton taxa were made to compare abundances in the operational years with those observed in the preoperational years. Analyses were made by month and by zone for each taxon. The results of several analyses indicated that there were statistically significant differences ($p<.05$) in zooplankton abundances in the preoperational and operational years. Some of these differences may have been associated with undetermined variability in biological, chemical, physical, and climatic events which effect zooplankton population dynamics; this would appear to have particularly true to the zones located several kilometers from the discharge jets. The greatest number of significant differences were detected for zones 2 and 5 which are located closest to the discharge jets. The reasons for the greater number of significant differences occurring in these two zones is under investigation. Two important factors may be the relatively small size of zones 2 and 5 and the greater number of stations within these zones in comparison to the other six zones of the survey grid. These two factors probably resulted in a lower estimate of spatial variability within these zones and thus temporal variability was easier to detect than in the larger zones containing fewer stations.

A special study was conducted of zooplankton distributions over a 3.2 km^2 area centered on the discharge jets. Zooplankton were collected continuously at 2-minute intervals from 1-m along 12 transects. Water temperature was monitored continuously. Copepods generally occurred in higher concentrations in the plume than in the surrounding water while the reverse was observed for cladocerans. Several hypotheses are being considered to account for these differences.

See Appendix B-1 to this report.

B. Phytoplankton

ENTRAINMENT

A study of phytoplankton entrainment has been conducted on a regular basis since February 1975. Samples are collected each month from the intake forebay and from the discharge forebay of Unit #1 three times during a 42 hour period: before morning twilight, at noon, and after evening twilight. Samples are collected in triplicate for viability analysis and in duplicate for microscopic counts.

Chlorophyll and phaeophytin analyses are being used to determine phytoplankton viability. All of the 120 required viability samples for the period of July through November 1976 were collected. Three were lost during analysis. For the period of January through November 1976, all 132 required phytoplankton samples were collected. Counting is complete through May of 1976. One sample was lost during preparation of these samples for microscopic counting.

Phytoplankton densities in 1976 are lower than those of 1975. Since the lake warmed faster in 1976 than 1975, spring and particularly summer blooms of phytoplankton occurred one month earlier in 1976 than in 1975. A winter bloom of diatoms is documented. Diversity and numbers of forms both increased in 1976 relative to 1975. Some factors that may have contributed to this increase are the greater experience of our laboratory personnel, the early warming of the lake in 1976, or even a real increase in the number of forms present.

Samples for viability analysis showed statistically significant (0.05 level of significance) differences between intake and discharge on three occasions. On two occasions, plant passage appears to have decreased the viability of the phytoplankton population and on one occasion it increased the viability. These three occasions represent 15% of the samples collected for this period of time.

Because of short term variations in the phytoplankton population and problems with the completeness of extraction of the chlorophylls, no clearly defined plant impact on the phytoplankton was noted for the period of July through November 1976. A study of short term variations of phytoplankton viability showed such variations to occur within a five minute period. Comparison of sonification versus grinding for preparation of phytoplankton for extraction of the chlorophylls and phaeophytin showed grinding to increase the extractability of these. Beginning in 1977, all samples for viability studies will be ground instead of sonified.

LAKE SURVEYS

This report compares the dominant phytoplanktonic species and the abundances of ten categories of phytoplankton algae in the preoperational years of 1972 through 1974 to the same parameters in the operational year 1975. The three seasonal major surveys per year are used instead of the monthly short surveys which were employed in the second Environmental Operating Report of 1975. The major surveys cover the full 36-station sampling grid and are adapted to more complete analyses of both spatial and temporal variations than are the 11-station monthly short surveys.

The dominant and codominant species or forms of 1972 through 1975 show normal seasonal variation rather than any effect of Cook Plant's operation. Flagellates were dominants or codominants in spring (April surveys) summer (July surveys), and fall (October surveys) in the preoperational years and in operational 1975. Associated with the flagellate dominances were: diatoms in spring; green algae, decreasing diatoms, and increasing blue-greens in summer; and decreasing blue-greens and increasing diatoms in fall. In July 1975 the diatom population crashed a month earlier than usual, but it had also done so in July of preoperational 1972. In operational 1975 the combination of dominants and codominants in October was identical to that in preoperational October 1972.

The 36 stations of the seasonal major surveys permit stratification of the data into 3 zones by water depth and two categories by proximity to the plant. The depth zones are: zone 0 (0 - 8m), zone 1 (8 - 16m), and zone 2 (16 - 24 m); the proximity categories are "inner" (less than 2 miles from the plant) and "outer" or reference stations 2 miles or more from the plant. Time-plots by depth zones of the means and standard errors of the ten categories of phytoplankton at inner and outer station groups show pronounced parallelism between inner and outer stations, i.e. stations near the plant and stations away from the plant showed the same changes in abundances in all the years and (with two exceptions) in all the depth zones. In depth zone 2, well offshore from the plant, total algae and centric diatoms in April 1975 showed substantially greater abundances in the inner stations than in the outer; this did not happen in zones 0 or 1 much closer to the plant.

Filamentous blue-greens increased in all three depth zones in July of 1975, but in each case the increase was greater in the outer stations away from the plant. Except for July 1975, there was no consistent difference between means of inner and outer station groups in the preoperational years or in operational 1975.

There is no evidence from the spatial or temporal distributions of abundances of the phytoplankton categories that operation of the Cook Plant has had any adverse impact on the phytoplankton of the region.

See Appendix B-2 to this report.

C. Benthos

Entrainment

Concentrations of four species of macrocrustaceans, *Pontoporeia affinis, Mysis relicta, Gammarus* sp., and *Asellus* sp. in the cooling water which circulates through the Cook Plant were measured in the intake and discharge forebays, four times in a 24-hour period twice each month. These data, expressed as numbers per cubic meter, are given for each time, date, and location.

Entrained densities of *Pontoporeia* were lower than in the corresponding months of 1975, when it was determined that lake populations were unlikely to be harmed by losses through entrainment. No simple criterion exists for judging the harm which might be done to populations of the other three species, since they do not normally occur among the benthos of sandy bottoms which prevail in southeastern Lake Michigan, and we have no information on their abundances in other habitats occupied by these species near the Cook Plant (e.g., the riprap installed around intake and discharge structures). There is no evidence that the observed rates of entrainment represent a threat to their indigenous populations.

Impingement

An estimate is given for the quantities (number and weight) of the crayfish *Orconectes propinquus* impinged from January through October, 1976 (except data for May, which are missing). The projected, total impingement of crayfish for 1976 (120 kg) is slightly higher than estimated impingement in 1975 (90 kg). However, these crayfish live primarily on the riprap, and impingement losses of *Orconectes* are not considered harmful to indigenous benthic organisms.

Lake Surveys

Two major surveys (July and October) were conducted. The prescribed plan of sampling by depth zones (0, 1, 2) and by distance from the plant (inner, outer) was followed except that one station could not be sampled on each of the two surveys. All benthos in the samples have been identified to the major taxon level.

With the October, 1976 survey, two years of seasonal surveys after the beginning of plant operation were completed, and sufficient data were accumulated for simple, preliminary statistical tests. A series of two-sample t-tests were performed on sets of zonal means to determine whether the ratio of inner to outer means was significantly different after the plant began operating from ratios calculated before operation began. Total animals and five major taxa (*Pontoporeia* *affinis, Stylodrilus heringianus, Pisidium* spp., Tubificidae and Chironomidae) were subjected to the comparison, and each depth zone and season was compared separately. The number of *t*-tests therefore equalled 6 categories of benthos x 3 depth zones x 3 seasons (54). Two tests gave values of *t* with probabilities less than .05: Chironomidae in autumn surveys in zone 2, and *Pontoporeia* in spring surveys in zone 2. In each case, the difference was due to an increase in the ratio of inner to outer means. Since these changes indicate an improved environment for the organisms concerned, they are not considered to represent a harmful effect on the benthos.

Lake survey data from the latter half of 1976 further show that apparent trends in *Pontoporeia* and *Pisidium* populations which were noted in the January-June, 1976 Environmental Operating Report did not continue, and that no detectable changes in fact occurred in the ratios of inner to outer populations in summer and autumn compared to preoperational populations.

See Appendix B-3 to this report.

D. Fish

Field Sampling of Adult Fish

Gill Nets. Standard series netting for July-December was complete except for no night gillnetting in October and no day or night gillnetting or night trawling in November. This period has been the worst weather-wise in the history of our sampling. Warm-water species alewives spottails and yellow perch dominated July-September catches, with October catches having modest numbers of alewives, spottails, gizzard shad and lake trout.

Trawls. Catches of July-October were mainly composed of the same species captured in gill nets -- alewives, yellow perch and spottails, with more smaller species such as johnny darters also present. Upwellings affected catches in that many cold-water species (smelt, coregonids) were also taken. In November numbers caught were small and were mainly alewives, spottails and smelt.

Seines. Seine catches were somewhat different from the previous two-year catches, in that smaller and different rare species were collected. However, July-September catches were mainly of alewives, spottails and perch. Some trout and shad were also caught. October seine hauls were unique in that many large adult lake trout were taken along with some alewives, spottails and emerald shiners. Nine fish (longnose dace, shiners and smelt) were taken in November.

Fish Larvae Samples

Field fish larvae samples. None of the 1976 field samples have been processed so that a brief discussion of 1973-75 data was given. The seasonal nature of larval abundance, being most prominent in summer, was noted. The smelt peak in April-May, perch peak in early June, alewife presence in June-August were all discussed. Various other larval species (i.e. trout-perch, carp, darters and sculpin) in previous catches were stated.

Entrainment samples. All samples required were collected; none has been analyzed. However the seasonal nature of the entrainment problem as reflected in field sampling was also seen in 1974 entrainment data which was discussed for perspective in lieu of unavailable 1976 data. Numbers of entrained larvae passing through the plant in 24 hours ranged from 1.3×10^5 to 2.5×10^6 for Unit 1 operation.

Forebay Visual Inspection

Fish observed in the intake forebay from June through November were mostly alewives, spottails and yellow perch. Some lake trout were seen in other months, but mostly during their spawning period in October. No fish were observed dead.

Impingement

Every fourth-day sampling was verified by statistical techniques and initiated March, 1976. During May, 1976, 16 species, with alewife the numerical dominant (7,125 of 11,656) were captured. In June, 32,671 fish representing 15 species were impinged. Alewives again were the dominant (29,092 of 32,671). July was the month of maximum catch (33,045) with 12 species represented. Alewives again dominated. Numbers impinged dropped in successive months to 6,404 for August, 16,346 for September and 10,463 for October. Numbers are not available for November or December. Alewives were dominant in October, yellow perch in September and perch and spottails dominated October catches. Total catch for the period May-October, 1976, was 110,585 fish.

See Appendix B-4 to this report.

VI. Terrestrial Studies

The Company's consultant for this program, Dr. Francis C. Evans, will be out of the country until May, 1977. At his request, Dr. John C. Ayers submits the following report on the terrestrial studies.

Dr. Evans' assistants, Alan Bady and Joseph Strauch Jr., have each made one or more visits to the plant site in the fall of 1976. Bady has made collections of insects and small mammals and has visited the marshes. Strauch has studied the bird populations on the plant site. Neither of them has seen any abnormal environmental occurences that might be due to plant operation. A detailed account of the terrestrial findings for the period July to December 1976 will appear in the next Environmental Operating Report.

VII. Thermal Plume Studies

No thermal plume studies were conducted during the period covered by this report. These studies will begin again after Unit No. 2 has reached at least 75% of rated thermal power.

VIII. Deicing Operation and Circulating Water Pump Operation

A. Specification 2.1.1.2

There were no circulating water pumps out of service due to malfunction during this operating period.

B. Specification 2.1.3

The deicing mode of operation was utilized from December 11, 1976 through December 23, 1976 when unit 1 came down for refueling. Deicing mode was again run starting December 27 although the unit remained in a shutdown condition.

A table of the daily totals of the deicing discharge flow through the middle intake appears near the end of Appendix B-4 to this report. Data for deicing during the first half of 1976 is included.

IX. Radioactive Release Data

The releases of radioactive materials from the Cook Nuclear Plant during the last half of 1976 are detailed in Appendix D to this report. This Appendix uses the same format as Appendix B Technical Specification 5.4. Releases were all less than one percent of applicable limits.

Corrections to the radioactive release data for the previous report appear at the end of Appendix D.

X. Environmental Radiation Monitoring

Appendix E to this report contains the results of the environmental radiation monitoring program for the last half of 1976. Samples were analyzed by the Eberline Instrument Corporation - Midwest Facility, except for those specifically identified as being done at the Cook Nuclear Plant.

The samples collected and analyzed during this period show low level activities consistent with those expected in environmental medial. No radioactivity attributable to plant operation was detected. Elevated concentrations of gross beta's in air particulate filters, taken during October, November and early December, resulted from the Chinese nuclear explosions in late September and mid-October.

Some samples were not analyzed in time for inclusion in this report. They will be issued as soon as available.

XI. Radiological Impact on Man

Dose calculations have been performed to evaluate the radiological impact on man of the releases of radionuclides to the atmosphere and lake by the Donald C. Cook Nuclear Plant. The doses for the last half of 1976 have remained low as in previous reports.

Liquid releases consisted of a large number of batch releases, at frequent intervals. These have been treated for the purpose of dose calculations as a continuous release, and a dilution factor of 10 has been used for all pathways of exposure.

The resulting doses are as follows:

Dose Location	Pathway of Exposure	Dose, mrem
Whole body	Drinking Water	2.01×10^{-4}
GI-LLI*	"	7.05×10^{-5}
Thyroid	"	1.28×10^{-3}
Bone	"	1.58×10^{-4}
Whole Body	Eating Fish	7.20×10^{-3}
GI-LLI*	"	6.69×10^{-4}
Thyroid	"	3.29×10^{-4}
Bone	"	5.79×10^{-3}
Whole Body	Swimming	1.51×10^{-5}
Skin	"	1.88×10^{-6}

There were twenty three batch releases of gaseous effluents during the last half of 1976. Doses for the larger of these releases were calculated based on the actual meteorology at the time of each release. Other releases were averaged over each quarter for the purpose of calculating doses.

*Gastro intestinal tract - Lower large intestine

The maximum doses to individuals occurred at the site boundary and are as follows:

Whole Body	1.21×10^{-2} mrem
Skin	3.14×10^{-2} mrem
Thyroid adult from eating vegetables	5.0×10^{-3} mrem
" from inhalation	4.7×10^{-4} mrem
infant from drinking cows milk	9.0×10^{-2} mrem
" from inhalation	5.4×10^{-4} mrem

The population doses are estimated to have been 2.41×10^{-2} man-rems (whole body), and 1.16×10^{-1} man-rems (skin).

Direct radiation from the Cook Nuclear Plant is not a significant source of exposure because the plant is visible only from the lake and limited portions of the beach.

Given the small doses reported above from all receiving-water-related pathways it is clear that the population doses are negligible.

XII. Meteorological Monitoring

The meteorological monitoring instruments at the Cook Nuclear Plant performed well during the last half of 1976. Data recovery was as follows:

Instrument	Data Recovery Percentage July-September	Data Recovery Percentage October-December
50' wind speed	99.7	99.4
50' wind direction	99.4	99.4
150' wind speed	99.1	99.3
150' wind direction	96.2	97.5
Temperature	100.0	100.0

Appendix F contains joint frequency distributions of wind speed,direction,and lapse rate during the last two quarters of 1976. Also included are the actual hour by hour data during the batch releases of radioactive gases.

XIII. Corrections and Additions to the Previous Report

The current meter data included in Appendix D of the previous semi-annual Environmental Operating Report was incomplete. The additional data required is attached to this report and is located immediately before Appendix A.

The last seven pages of Appendix E contain finalized tables and graphs which appeared as incomplete in Appendix F of the previous report.

A calibration error of the meteorological monitoring equipment at the Cook Nuclear Plant has been found which affects the meteorological data included as Appendix G to the Environmental Operating Report for the last half of 1975. Corrected joint frequency tables for this period are included at the end of Appendix F to this report.

Deicing occurred at the Cook Nuclear Plant for the first time in early 1976 and again during the end of 1976. Although the period during which deicing occurred in the first half of 1976 was given in the last report, quantities were not. A table entitled "Deicing Discharge Flow Through Middle Intake" appears near the end of Appendix B-4 and provides this information for all of 1976.

Errors in the calculations used to prepare the radioactive release data were brought to our attention during an inspection at the Cook Nuclear Plant by NRC Region III inspectors. By their request, as noted in the cover letter dated February 2, 1977 to IE Inspection Report No. 050-315/77-01, corrections to the previous report are included at the end of Appendix D.

Circulating Water System Chlorination Data for all of 1976 is included in table form at the end of Appendix B-4. This information for the first half of 1976 was not included in the previous report.

XIV. Summary

This Environmental Operating Report covers the first six month period during which there were no restrictions to operating the unit at 100% of full power. The operating record for this period indicates that Unit 1 produced power for 87.4% of the time and therefore any negative environmental affects from normal operation would tend to have been maximized during these six months. The text of this report shows that all such affects have remained small.

Radioactive releases are low as in previous reports and no site related radiation has been detected in the off-site environment. Ecological monitoring has not shown any adverse effects from the operation of the plant.

Two years of Unit 1 operation have now been completed without creating any significant hazard to the health and safety of the public and with only a very slight impact on the environment. We believe this performance indicates that both units can be operated in a safe manner as designed.

CURRENT METER DATA

Current Meter Data

The following is a tabulation of the lake current data obtained from the ENDECO ducted-propeller current meters located as shown in Figure 1. Meters 1N and 4S were located at a depth of 3.3 meters (11 feet) and meters 6N and 5S were located at a depth of 6.1 meters (20 feet).

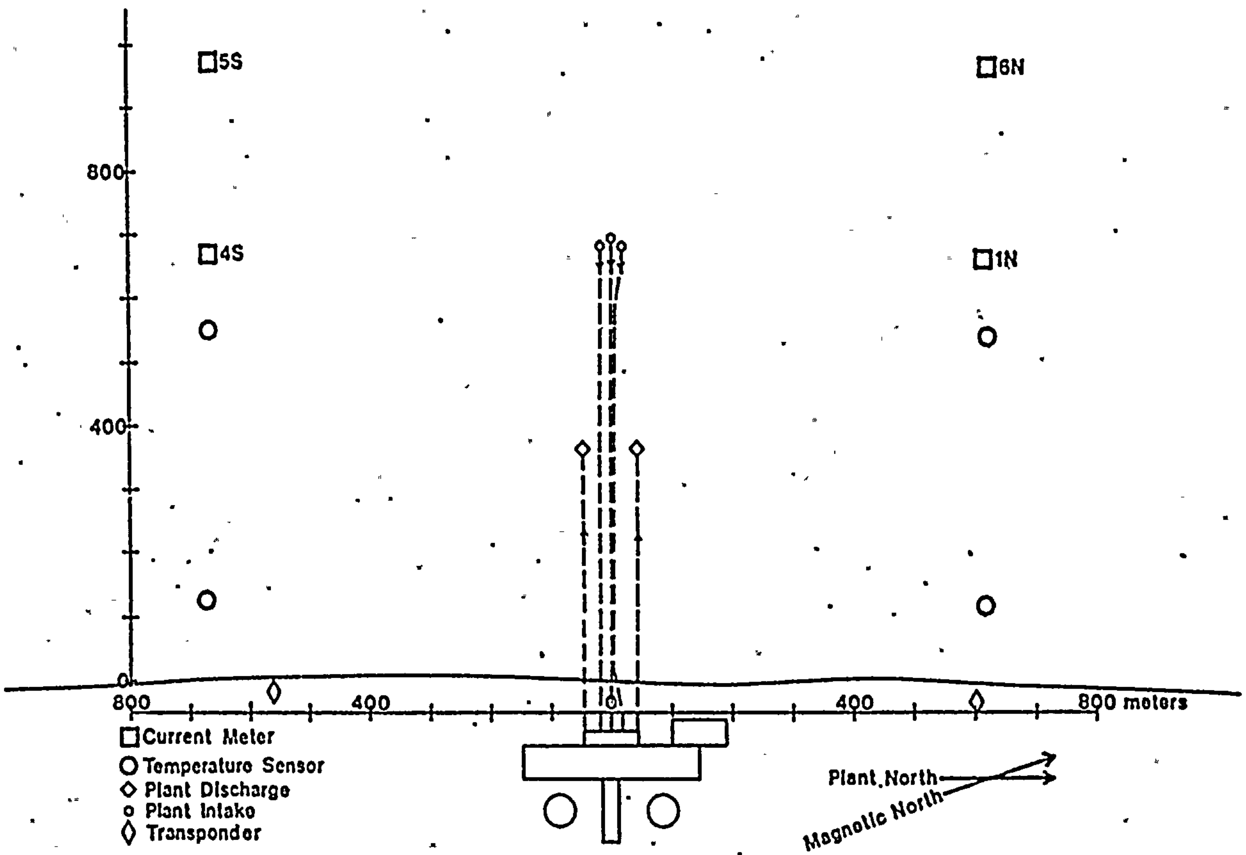

Figure 1: Locations of Current Meters and Temperature Sensors

STATION 1A

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

DATE	SPEEDS (F/S) 0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	DIRS (ROTO) NORTH	EAST	SOUTH	WEST	RDGS
11-24-75	88.5	11.5	0.0	0.0	0.0	0.0	0.0		0.03	0.0	7.7	92.3	0.0	26
11-25-75	4.2	83.3	12.5	0.0	0.0	0.0	0.0		0.21	8.3	56.3	33.3	2.1	48
11-26-75	22.9	72.9	4.2	0.0	0.0	0.0	0.0		0.17	91.7	8.3	0.0	0.0	48
11-27-75	14.6	47.9	22.9	14.6	0.0	0.0	0.0		0.26	100.0	0.0	0.0	0.0	48
11-28-75	20.8	18.8	41.7	18.8	0.0	0.0	0.0		0.33	100.0	0.0	0.0	0.0	48
11-29-75	27.1	37.5	18.8	16.7	0.0	0.0	0.0		0.26	81.3	18.8	0.0	0.0	48
11-30-75	2.1	0.0	0.0	56.3	25.0	16.7	0.0		1.18	43.8	0.0	0.0	56.3	48
12- 1-75	20.8	10.4	14.6	20.8	29.2	4.2	0.0		0.88	50.0	0.0	0.0	50.0	48
12- 2-75	72.9	27.1	0.0	0.0	0.0	0.0	0.0		0.07	68.8	4.2	18.8	8.3	48
12- 3-75	93.8	6.3	0.0	0.0	0.0	0.0	0.0		0.03	0.0	87.5	12.5	0.0	48
12- 4-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	2.1	97.9	0.0	0.0	48
12- 5-75	64.6	35.4	0.0	0.0	0.0	0.0	0.0		0.08	100.0	0.0	0.0	0.0	48
12- 6-75	41.7	12.5	6.3	20.8	18.8	0.0	0.0		0.43	10.4	18.8	64.6	6.3	48
12- 7-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	100.0	0.0	0.0	0.0	48
12- 8-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	100.0	0.0	0.0	0.0	48
12- 9-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	95.8	4.2	0.0	0.0	48
12-10-75	31.3	37.5	29.2	2.1	0.0	0.0	0.0		0.22	62.5	6.3	8.3	22.9	48
12-11-75	93.8	6.3	0.0	0.0	0.0	0.0	0.0		0.01	50.0	37.5	12.5	0.0	48
12-12-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	0.0	100.0	0.0	0.0	48
12-13-75	45.8	47.9	6.3	0.0	0.0	0.0	0.0		0.12	68.8	31.3	0.0	0.0	48
12-14-75	4.2	18.8	60.4	16.7	0.0	0.0	0.0		0.38	87.5	0.0	0.0	12.5	48
12-15-75	83.3	14.6	2.1	0.0	0.0	0.0	0.0		0.05	18.8	16.7	64.6	0.0	48
12-16-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	85.4	14.6	0.0	0.0	48
12-17-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	27.1	16.7	18.8	37.5	48
12-18-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	29.2	2.1	27.1	41.7	48
12-19-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	56.3	0.0	0.0	43.8	48
12-20-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	35.4	0.0	41.7	22.9	48
12-21-75	97.9	2.1	0.0	0.0	0.0	0.0	0.0		0.01	0.0	77.1	22.9	0.0	48
12-22-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	70.8	29.2	0.0	0.0	48
12-23-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	18.8	58.3	14.6	8.3	48
12-24-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	100.0	0.0	0.0	0.0	48
12-25-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	100.0	0.0	0.0	0.0	48
12-26-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	8.3	2.1	89.6	0.0	48
12-27-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	68.8	20.8	10.4	0.0	48
12-28-75	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	100.0	0.0	0.0	0.0	48
12-29-75	83.3	16.7	0.0	0.0	0.0	0.0	0.0		0.04	100.0	0.0	0.0	0.0	48
12-30-75	25.0	54.3	18.8	0.0	0.0	0.0	0.0		0.17	100.0	0.0	0.0	0.0	48
12-31-75	52.1	43.8	4.2	0.0	0.0	0.0	0.0		0.12	100.0	0.0	0.0	0.0	48

STATION 1N

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

	SPEEDS (F/S)									DIRS (ROTO)				
DATE	0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	NORTH	EAST	SOUTH	WEST	ROGS
1- 1-76	93.8	6.3	0.0	0.0	0.0	0.0	0.0		0.03	100.0	0.0	0.0	0.0	48
1- 2-76	33.3	12.5	10.4	43.8	0.0	0.0	0.0		0.38	66.7	0.0	0.0	33.3	43
1- 3-76	0.0	0.0	2.1	72.9	25.0	0.0	0.0		0.87	20.8	0.0	0.0	79.2	48
1- 4-76	0.0	39.6	52.1	8.3	0.0	0.0	0.0		0.34	20.8	0.0	0.0	79.2	48
1- 5-76	25.0	56.3	18.8	0.0	0.0	0.0	0.0		0.20	97.9	0.0	0.0	2.1	48
1- 6-76	47.9	52.1	0.0	0.0	0.0	0.0	0.0		0.09	100.0	0.0	0.0	0.0	48
1- 7-76	12.5	14.6	8.3	50.0	14.6	0.0	0.0		0.62	25.0	0.0	75.0	0.0	48
1- 8-76	6.3	39.6	6.3	18.8	29.2	0.0	0.0		0.63	4.2	0.0	29.2	66.7	48
1- 9-76	95.8	4.2	0.0	0.0	0.0	0.0	0.0		0.01	83.3	0.0	0.0	16.7	48
1-10-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	75.0	0.0	0.0	25.0	48
1-11-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	20.8	47.9	0.0	31.3	48
1-12-76	43.8	20.8	14.6	20.8	0.0	0.0	0.0		0.22	58.3	27.1	0.0	14.6	48
1-13-76	25.0	18.8	22.9	22.9	10.4	0.0	0.0		0.44	58.3	0.0	41.7	0.0	48
1-14-76	93.8	6.3	0.0	0.0	0.0	0.0	0.0		0.03	0.0	4.2	89.6	6.3	48
1-15-76	54.2	22.9	22.9	0.0	0.0	0.0	0.0		0.13	37.5	0.0	22.9	39.6	48
1-16-76	10.4	52.1	16.7	20.8	0.0	0.0	0.0		0.32	25.0	0.0	75.0	0.0	48
1-17-76	62.5	14.6	12.5	10.4	0.0	0.0	0.0		0.15	29.2	2.1	43.8	25.0	48
1-18-76	64.6	22.9	12.5	0.0	0.0	0.0	0.0		0.10	56.3	0.0	2.1	41.7	48
1-19-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	64.6	0.0	0.0	35.4	48
1-20-76	77.1	12.5	10.4	0.0	0.0	0.0	0.0		0.08	10.4	12.5	35.4	41.7	48
1-21-76	54.2	14.6	18.8	12.5	0.0	0.0	0.0		0.19	37.5	6.3	43.8	12.5	48
1-22-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	58.3	2.1	22.9	16.7	48
1-23-76	91.7	8.3	0.0	0.0	0.0	0.0	0.0		0.02	93.8	0.0	0.0	6.3	48
1-24-76	81.3	18.8	0.0	0.0	0.0	0.0	0.0		0.04	97.9	0.0	0.0	2.1	48
1-25-76	89.6	10.4	0.0	0.0	0.0	0.0	0.0		0.02	100.0	0.0	0.0	0.0	48
1-26-76	60.4	39.6	0.0	0.0	0.0	0.0	0.0		0.07	27.1	0.0	10.4	62.5	48
1-27-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	31.3	0.0	0.0	68.8	48
1-28-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	58.8	0.0	0.0	41.2	17
PERIOD AVGS:	66.4	16.8	7.3	6.9	2.3	0.3	0.0		0.15	56.4	12.6	15.1	15.9	3115

STATION 4S

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

DATE	SPEEDS (F/S) 0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	DIRS (ROTO) NORTH	EAST	SOUTH	WEST	RDGS
11-24-75	56.0	40.0	4.0	0.0	0.0	0.0	0.0		0.10	0.0	0.0	100.0	0.0	25
11-25-75	4.2	27.1	39.6	29.2	0.0	0.0	0.0		0.38	0.0	0.0	91.7	8.3	48
11-26-75	4.2	16.7	27.1	52.1	0.0	0.0	0.0		0.44	77.1	0.0	16.7	6.3	48
11-27-75	8.3	39.6	18.8	33.3	0.0	0.0	0.0		0.36	33.3	12.5	37.5	16.7	48
11-28-75	0.0	12.5	12.5	75.0	0.0	0.0	0.0		0.52	89.6	0.0	0.0	10.4	48
11-29-75	6.3	16.7	29.2	47.9	0.0	0.0	0.0		0.46	72.9	4.2	2.1	20.8	48
11-30-75	0.0	0.0	0.0	50.0	45.8	4.2	0.0		1.25	56.3	0.0	0.0	43.8	48
12- 1-75	0.0	0.0	0.0	56.3	43.8	0.0	0.0		1.07	58.3	0.0	0.0	41.7	48
12- 2-75	0.0	25.0	50.0	25.0	0.0	0.0	0.0		0.41	79.2	2.1	18.8	0.0	48
12- 3-75	14.6	31.3	50.0	4.2	0.0	0.0	0.0		0.28	2.1	18.8	79.2	0.0	48
12- 4-75	6.3	20.8	43.8	29.2	0.0	0.0	0.0		0.39	70.8	2.1	2.1	25.0	48
12- 5-75	0.0	0.0	58.3	41.7	0.0	0.0	0.0		0.47	100.0	0.0	0.0	0.0	48
12- 6-75	2.1	20.8	16.7	25.0	35.4	0.0	0.0		0.73	6.3	0.0	89.6	4.2	48
12- 7-75	18.8	43.8	6.3	31.3	0.0	0.0	0.0		0.30	43.8	8.3	33.3	14.6	48
12- 8-75	16.7	75.0	8.3	0.0	0.0	0.0	0.0		0.17	4.2	0.0	52.1	43.8	48
12- 9-75	6.3	64.6	29.2	0.0	0.0	0.0	0.0		0.23	2.1	2.1	89.6	6.3	48
12-10-75	0.0	2.1	18.8	79.2	0.0	0.0	0.0		0.59	91.7	0.0	0.0	8.3	48
12-11-75	2.1	47.9	45.8	4.2	0.0	0.0	0.0		0.29	41.7	4.2	54.2	0.0	48
12-12-75	4.2	83.3	12.5	0.0	0.0	0.0	0.0		0.23	0.0	0.0	100.0	0.0	48
12-13-75	16.7	16.7	29.2	37.5	0.0	0.0	0.0		0.38	64.6	12.5	12.5	10.4	48
12-14-75	0.0	0.0	12.5	87.5	0.0	0.0	0.0		0.67	100.0	0.0	0.0	0.0	48
12-15-75	0.0	27.1	41.7	31.3	0.0	0.0	0.0		0.42	16.7	4.2	79.2	0.0	48
12-16-75	0.0	16.7	20.8	62.5	0.0	0.0	0.0		0.49	91.7	0.0	4.2	4.2	48
12-17-75	0.0	39.6	54.2	6.3	0.0	0.0	0.0		0.34	22.9	0.0	10.4	66.7	48
12-18-75	0.0	14.6	31.3	54.2	0.0	0.0	0.0		0.52	22.9	0.0	54.2	22.9	48
12-19-75	0.0	4.2	25.0	64.6	6.3	0.0	0.0		0.68	100.0	0.0	0.0	0.0	48
12-20-75	0.0	2.1	22.9	70.8	4.2	0.0	0.0		0.65	41.7	0.0	56.3	2.1	48
12-21-75	20.8	39.6	16.7	22.9	0.0	0.0	0.0		0.27	14.6	12.5	66.7	6.3	48
12-22-75	0.0	16.7	60.4	22.9	0.0	0.0	0.0		0.41	91.7	4.2	4.2	0.0	48
12-23-75	20.8	72.9	6.3	0.0	0.0	0.0	0.0		0.17	0.0	6.3	66.7	27.1	48
12-24-75	8.3	4.2	29.2	58.3	0.0	0.0	0.0		0.48	93.8	0.0	2.1	4.2	48
12-25-75	27.1	45.8	22.9	4.2	0.0	0.0	0.0		0.21	27.1	2.1	20.8	50.0	48
12-26-75	2.1	0.0	29.2	66.7	2.1	0.0	0.0		0.60	0.0	0.0	100.0	0.0	48
12-27-75	4.2	14.6	43.8	37.5	0.0	0.0	0.0		0.41	64.6	4.2	27.1	4.2	48
12-28-75	22.9	18.8	45.8	12.5	0.0	0.0	0.0		0.29	66.7	0.0	12.5	20.8	48
12-29-75	54.2	45.8	0.0	0.0	0.0	0.0	0.0		0.11	0.0	2.1	91.7	6.3	48
12-30-75	29.2	4.2	41.7	25.0	0.0	0.0	0.0		0.32	68.8	20.8	8.3	2.1	48
12-31-75	14.6	37.5	33.3	14.6	0.0	0.0	0.0		0.30	54.2	0.0	31.3	14.6	48

STATION 45

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

DATE	SPEEDS (F/S.) 0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	DIRS (ROTO) NORTH	EAST	SOUTH	WEST	RDGS
1- 1-76	16.7	81.3	2.1	0.0	0.0	0.0	0.0		0.17	0.0	0.0	100.0	0.0	48
1- 2-76	10.4	14.6	20.8	45.8	0.0	0.0	0.0		0.45	83.3	0.0	12.5	4.2	48
1- 3-76	0.0	0.0	0.0	64.6	35.4	0.0	0.0		0.95	85.4	0.0	0.0	14.6	48
1- 4-76	2.1	0.0	18.8	79.2	0.0	0.0	0.0		0.55	52.1	0.0	0.0	47.9	48
1- 5-76	0.0	16.7	52.1	31.3	0.0	0.0	0.0		0.43	100.0	0.0	0.0	0.0	48
1- 6-76	25.0	72.9	2.1	0.0	0.0	0.0	0.0		0.15	85.4	4.2	10.4	0.0	48
1- 7-76	8.3	10.8	4.2	58.0	18.8	0.0	0.0		0.69	20.8	0.0	72.9	6.3	48
1- 8-76	0.0	31.3	16.7	22.9	29.2	0.0	0.0		0.64	56.3	0.0	33.3	10.4	48
1- 9-76	62.5	12.5	0.0	8.3	16.7	0.0	0.0		0.30	33.3	31.3	33.3	2.1	48
1-10-76	93.8	6.3	0.0	0.0	0.0	0.0	0.0		0.01	0.0	6.3	93.8	0.0	48
1-11-76	93.8	6.3	0.0	0.0	0.0	0.0	0.0		0.02	12.5	8.3	33.3	45.8	48
1-12-76	33.3	4.2	8.3	52.1	2.1	0.0	0.0		0.44	70.8	2.1	2.1	25.0	48
1-13-76	20.8	14.6	18.8	33.3	12.5	0.0	0.0		0.52	50.0	4.2	45.8	0.0	48
1-14-76	56.3	2.1	10.4	31.3	0.0	0.0	0.0		0.25	2.1	0.0	75.0	22.9	48
1-15-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	60.4	6.3	20.8	12.5	48
1-16-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	22.9	2.1	62.5	12.5	48
1-17-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	2.1	33.3	54.2	10.4	48
1-18-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	83.3	16.7	0.0	0.0	48
1-19-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	91.7	8.3	0.0	0.0	48
1-20-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.00	70.8	12.5	14.6	2.1	48
1-21-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	35.4	2.1	58.3	4.2	48
1-22-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	2.1	0.0	91.7	6.3	48
1-23-76	72.9	20.8	6.3	0.0	0.0	0.0	0.0		0.07	0.0	12.5	81.3	6.3	48
1-24-76	72.9	25.0	2.1	0.0	0.0	0.0	0.0		0.06	10.4	2.1	87.5	0.0	48
1-25-76	66.7	27.1	4.2	2.1	0.0	0.0	0.0		0.09	52.1	0.0	39.6	8.3	48
1-26-76	8.3	77.1	14.6	0.0	0.0	0.0	0.0		0.20	20.8	0.0	52.1	27.1	48
1-27-76	58.3	16.7	25.0	0.0	0.0	0.0	0.0		0.14	70.8	6.3	8.3	14.6	48
1-28-76	4.2	2.1	10.4	83.3	0.0	0.0	0.0		0.55	100.0	0.0	0.0	0.0	48
1-29-76	83.3	8.3	6.3	2.1	0.0	0.0	0.0		0.07	20.8	4.2	62.5	12.5	48
1-30-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	37.5	0.0	47.9	14.6	48
1-31-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	87.1	6.5	3.2	3.2	31
PERIOD AVGS:	30.9	20.9	18.5	25.9	3.7	0.1	0.0		0.34	46.4	4.2	37.6	11.8	3272

STATION 55

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

DATE	SPEEDS (F/S) 0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	DIRS (ROTO) NORTH	EAST	SOUTH	WEST	RDGS
4- 3-76	47.1	41.2	8.8	2.9	0.0	0.0	0.0		0.15	85.3	0.0	0.0	14.7	34
4- 4-76	4.2	33.3	16.7	43.8	2.1	0.0	0.0		0.43	2.1	0.0	95.8	2.1	48
4- 5-76	4.2	14.6	68.8	12.5	0.0	0.0	0.0		0.36	91.7	2.1	6.3	0.0	48
4- 6-76	56.3	37.5	6.3	0.0	0.0	0.0	0.0		0.12	100.0	0.0	0.0	0.0	48
4- 7-76	4.2	37.5	25.0	33.3	0.0	0.0	0.0		0.38	16.7	0.0	81.3	2.1	48
4- 8-76	0.0	41.7	58.3	0.0	0.0	0.0	0.0		0.32	0.0	0.0	100.0	0.0	48
4- 9-76	70.8	29.2	0.0	0.0	0.0	0.0	0.0		0.07	0.0	0.0	100.0	0.0	48
4-10-76	43.8	41.7	12.5	2.1	0.0	0.0	0.0		0.15	75.0	0.0	14.6	10.4	48
4-11-76	0.0	0.0	6.3	75.0	18.8	0.0	0.0		0.85	0.0	0.0	100.0	0.0	48
4-12-76	8.3	52.1	39.6	0.0	0.0	0.0	0.0		0.26	68.8	2.1	29.2	0.0	48
4-13-76	37.5	37.5	25.0	0.0	0.0	0.0	0.0		0.17	64.6	0.0	35.4	0.0	48
4-14-76	29.2	68.8	2.1	0.0	0.0	0.0	0.0		0.15	12.5	0.0	87.5	0.0	48
4-15-76	0.0	14.6	66.7	18.8	0.0	0.0	0.0		0.39	100.0	0.0	0.0	0.0	48
4-16-76	0.0	0.0	10.4	89.6	0.0	0.0	0.0		0.61	100.0	0.0	0.0	0.0	48
4-17-76	0.0	0.0	35.4	64.6	0.0	0.0	0.0		0.53	100.0	0.0	0.0	0.0	48
4-18-76	0.0	2.1	54.2	43.8	0.0	0.0	0.0		0.47	100.0	0.0	0.0	0.0	48
4-19-76	25.0	58.3	14.6	2.1	0.0	0.0	0.0		0.20	100.0	0.0	0.0	0.0	48
4-20-76	14.6	62.5	20.8	2.1	0.0	0.0	0.0		0.23	0.0	0.0	97.9	2.1	48
4-21-76	31.3	10.4	12.5	45.8	0.0	0.0	0.0		0.40	68.8	0.0	27.1	4.2	48
4-22-76	27.1	10.4	8.3	54.2	0.0	0.0	0.0		0.43	100.0	0.0	0.0	0.0	48
4-23-76	50.0	50.0	0.0	0.0	0.0	0.0	0.0		0.09	79.2	0.0	20.8	0.0	48
4-24-76	25.0	72.9	2.1	0.0	0.0	0.0	0.0		0.13	0.0	0.0	93.8	6.3	48
4-25-76	0.0	0.0	22.9	58.3	18.8	0.0	0.0		0.70	0.0	0.0	100.0	0.0	48
4-26-76	0.0	0.0	18.8	81.3	0.0	0.0	0.0		0.57	0.0	0.0	100.0	0.0	48
4-27-76	0.0	0.0	89.6	10.4	0.0	0.0	0.0		0.43	0.0	0.0	100.0	0.0	48
4-28-76	10.4	64.6	25.0	0.0	0.0	0.0	0.0		0.21	0.0	0.0	100.0	0.0	48
4-29-76	95.8	4.2	0.0	0.0	0.0	0.0	0.0		0.03	0.0	0.0	100.0	0.0	48
4-30-76	16.7	81.3	2.1	0.0	0.0	0.0	0.0		0.16	50.0	0.0	43.8	6.3	48
5- 1-76	2.1	81.3	16.7	0.0	0.0	0.0	0.0		0.22	100.0	0.0	0.0	0.0	48
5- 2-76	37.5	62.5	0.0	0.0	0.0	0.0	0.0		0.12	41.7	0.0	54.2	4.2	48
5- 3-76	4.2	29.2	56.3	10.4	0.0	0.0	0.0		0.35	85.4	0.0	10.4	4.2	48
5- 4-76	0.0	2.1	75.0	22.9	0.0	0.0	0.0		0.44	100.0	0.0	0.0	0.0	48
5- 5-76	0.0	10.4	10.4	79.2	0.0	0.0	0.0		0.70	95.8	0.0	0.0	4.2	48
5- 6-76	2.1	37.5	60.4	0.0	0.0	0.0	0.0		0.30	0.0	0.0	95.8	4.2	48
5- 7-76	50.0	47.9	2.1	0.0	0.0	0.0	0.0		0.11	18.8	8.3	60.4	12.5	48
5- 8-76	25.0	64.6	10.4	0.0	0.0	0.0	0.0		0.17	93.8	6.3	0.0	0.0	48
5- 9-76	0.0	27.1	58.3	14.6	0.0	0.0	0.0		0.36	100.0	0.0	0.0	0.0	48
5-10-76	0.0	25.0	70.8	4.2	0.0	0.0	0.0		0.33	100.0	0.0	0.0	0.0	48
5-11-76	10.4	29.2	50.0	10.4	0.0	0.0	0.0		0.32	12.5	0.0	81.3	6.3	48
5-12-76	77.8	22.2	0.0	0.0	0.0	0.0	0.0		0.08	0.0	77.8	0.0	22.2	18
PERIOD AVGS:	19.1	32.7	27.1	20.0	1.0	0.0	0.0		0.31	52.1	1.2	44.4	2.2	1876

STATION 6N

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

DATE	SPEEDS (F/S) 0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	DIRS (ROTD) NORTH	EAST	SOUTH	WEST	RDGS
11-24-75	12.0	84.0	4.0	0.0	0.0	0.0	0.0		0.28	0.0	0.0	100.0	0.0	25
11-25-75	2.1	19.8	60.4	18.0	0.0	0.0	0.0		0.39	0.0	0.0	100.0	0.0	48
11-26-75	8.3	45.8	45.8	0.0	0.0	0.0	0.0		0.26	75.0	2.1	16.7	6.3	48
11-27-75	10.4	62.5	20.8	6.3	0.0	0.0	0.0		0.25	37.5	0.0	43.8	18.8	48
11-28-75	0.0	41.7	52.1	6.3	0.0	0.0	0.0		0.32	95.8	0.0	0.0	4.2	48
11-29-75	8.3	64.6	20.8	6.3	0.0	0.0	0.0		0.25	45.8	22.9	2.1	29.2	48
11-30-75	0.0	0.0	2.1	52.1	45.8	0.0	0.0		1.10	97.9	2.1	0.0	0.0	48
12- 1-75	0.0	2.1	25.0	22.9	47.9	2.1	0.0		1.01	100.0	0.0	0.0	0.0	48
12- 2-75	31.3	43.8	25.0	0.0	0.0	0.0	0.0		0.19	64.6	8.3	27.1	0.0	48
12- 3-75	8.3	50.0	39.6	2.1	0.0	0.0	0.0		0.25	0.0	0.0	95.8	4.2	48
12- 4-75	20.8	77.1	2.1	0.0	0.0	0.0	0.0		0.15	66.7	10.4	0.0	22.9	48
12- 5-75	2.1	43.8	50.0	4.2	0.0	0.0	0.0		0.31	100.0	0.0	0.0	0.0	48
12- 6-75	0.0	29.2	10.4	41.7	18.8	0.0	0.0		0.63	6.3	0.0	91.7	2.1	48
12- 7-75	8.3	79.2	12.5	0.0	0.0	0.0	0.0		0.19	33.3	0.0	10.4	56.3	48
12- 8-75	25.0	62.5	12.5	0.0	0.0	0.0	0.0		0.16	50.0	0.0	35.4	14.6	48
12- 9-75	2.1	77.1	20.8	0.0	0.0	0.0	0.0		0.23	0.0	0.0	97.9	2.1	48
12-10-75	2.1	29.2	16.7	52.1	0.0	0.0	0.0		0.45	83.3	4.2	12.5	0.0	48
12-11-75	4.2	83.3	12.5	0.0	0.0	0.0	0.0		0.22	50.0	8.3	41.7	0.0	48
12-12-75	2.1	81.3	16.7	0.0	0.0	0.0	0.0		0.26	0.0	0.0	100.0	0.0	48
12-13-75	18.8	39.6	33.3	8.3	0.0	0.0	0.0		0.25	64.6	0.0	25.0	10.4	48
12-14-75	0.0	0.0	12.5	87.5	0.0	0.0	0.0		0.63	39.6	0.0	0.0	60.4	48
12-15-75	0.0	47.9	50.0	2.1	0.0	0.0	0.0		0.30	18.8	0.0	81.3	0.0	48
12-16-75	10.4	22.9	35.4	31.3	0.0	0.0	0.0		0.37	83.3	2.1	8.3	6.3	48
12-17-75	0.0	56.3	37.5	6.3	0.0	0.0	0.0		0.30	37.5	0.0	0.0	62.5	48
12-18-75	2.1	43.8	14.6	39.6	0.0	0.0	0.0		0.43	0.0	0.0	20.8	79.2	48
12-19-75	0.0	10.4	27.1	60.4	2.1	0.0	0.0		0.61	64.6	0.0	0.0	35.4	48
12-20-75	0.0	8.3	41.7	50.0	0.0	0.0	0.0		0.49	41.7	2.1	56.3	0.0	48
12-21-75	14.6	64.6	14.6	6.3	0.0	0.0	0.0		0.24	25.0	2.1	56.3	16.7	48
12-22-75	6.3	31.3	52.1	10.4	0.0	0.0	0.0		0.34	100.0	0.0	0.0	0.0	48
12-23-75	14.6	75.0	10.4	0.0	0.0	0.0	0.0		0.18	2.1	4.2	37.5	56.3	48
12-24-75	14.6	79.2	6.3	0.0	0.0	0.0	0.0		0.16	75.0	0.0	0.0	25.0	48
12-25-75	60.8	31.3	0.0	0.0	0.0	0.0	0.0		0.08	33.3	0.0	41.7	25.0	48
12-26-75	0.0	8.3	37.5	54.2	0.0	0.0	0.0		0.52	0.0	0.0	100.0	0.0	48
12-27-75	6.3	27.1	37.5	29.2	0.0	0.0	0.0		0.37	20.8	0.0	25.0	54.2	48
12-28-75	18.8	35.4	45.8	0.0	0.0	0.0	0.0		0.24	62.5	0.0	6.3	31.3	48
12-29-75	6.3	79.2	14.6	0.0	0.0	0.0	0.0		0.21	0.0	8.3	89.6	2.1	48
12-30-75	14.6	70.8	14.6	0.0	0.0	0.0	0.0		0.20	45.8	2.1	4.2	47.9	48
12-31-75	12.5	66.7	10.0	2.1	0.0	0.0	0.0		0.22	47.9	0.0	14.6	37.5	48

S T A T I O N   6H

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

DATE	SPEEDS (F/S) 0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	DIRS (ROTO) NORTH	EAST	SOUTH	WEST	RDGS
1- 1-76	6.3	91.7	2.1	0.0	0.0	0.0	0.0		0.19	2.1	0.0	97.9	0.0	48
1- 2-76	12.5	45.8	12.5	29.2	0.0	0.0	0.0		0.33	20.8	6.3	35.4	37.5	48
1- 3-76	0.0	0.0	0.0	50.0	50.0	0.0	0.0		0.99	0.0	0.0	0.0	100.0	48
1- 4-76	0.0	0.0	14.6	66.7	18.8	0.0	0.0		0.76	0.0	0.0	0.0	100.0	48
1- 5-76	0.0	29.2	66.7	4.2	0.0	0.0	0.0		0.33	66.7	0.0	0.0	33.3	48
1- 6-76	77.1	22.9	0.0	0.0	0.0	0.0	0.0		0.07	16.7	10.4	60.4	12.5	48
1- 7-76	12.5	16.7	10.4	58.3	2.1	0.0	0.0		0.53	0.0	0.0	95.8	4.2	48
1- 8-76	0.0	25.0	16.7	33.3	25.0	0.0	0.0		0.68	0.0	0.0	22.9	77.1	48
1- 9-76	0.0	0.0	2.1	72.9	25.0	0.0	0.0		0.93	56.3	0.0	0.0	43.8	48
1-10-76	16.7	43.8	8.3	31.3	0.0	0.0	0.0		0.33	60.4	12.5	27.1	0.0	48
1-11-76	22.9	66.7	10.4	0.0	0.0	0.0	0.0		0.15	14.6	2.1	22.9	60.4	48
1-12-76	2.1	31.3	16.7	50.0	0.0	0.0	0.0		0.46	95.8	2.1	0.0	2.1	48
1-13-76	22.9	31.3	14.6	25.0	6.3	0.0	0.0		0.38	45.8	10.4	43.8	0.0	48
1-14-76	2.1	39.6	27.1	31.3	0.0	0.0	0.0		0.39	0.0	0.0	29.2	70.8	48
1-15-76	6.3	62.5	20.8	10.4	0.0	0.0	0.0		0.27	79.2	0.0	0.0	20.8	48
1-16-76	8.3	12.5	6.3	62.5	10.4	0.0	0.0		0.61	12.5	0.0	81.3	6.3	48
1-17-76	4.2	50.0	31.3	14.6	0.0	0.0	0.0		0.31	56.3	6.3	25.0	12.5	48
1-18-76	16.7	45.8	37.5	0.0	0.0	0.0	0.0		0.24	95.8	0.0	4.2	0.0	48
1-19-76	37.5	41.7	20.8	0.0	0.0	0.0	0.0		0.17	62.5	22.9	6.3	8.3	48
1-20-76	14.6	0.0	85.4	0.0	0.0	0.0	0.0		0.32	35.4	0.0	0.0	64.6	48
1-21-76	25.0	39.6	6.3	27.1	2.1	0.0	0.0		0.33	29.2	0.0	50.0	20.8	48
1-22-76	0.0	33.3	22.9	43.8	0.0	0.0	0.0		0.48	0.0	0.0	100.0	0.0	48
1-23-76	10.4	70.8	16.7	2.1	0.0	0.0	0.0		0.21	0.0	4.2	95.8	0.0	48
1-24-76	52.1	39.6	8.3	0.0	0.0	0.0	0.0		0.12	0.0	0.0	97.9	2.1	48
1-25-76	70.8	29.2	0.0	0.0	0.0	0.0	0.0		0.06	0.0	0.0	100.0	0.0	48
1-26-76	20.8	43.8	31.3	4.2	0.0	0.0	0.0		0.21	58.3	2.1	37.5	2.1	48
1-27-76	0.0	16.7	81.3	2.1	0.0	0.0	0.0		0.37	100.0	0.0	0.0	0.0	48
1-28-76	0.0	0.0	39.6	60.4	0.0	0.0	0.0		0.52	100.0	0.0	0.0	0.0	48
1-29-76	8.3	35.4	29.2	27.1	0.0	0.0	0.0		0.35	22.9	2.1	72.9	2.1	48
1-30-76	2.1	56.3	41.7	0.0	0.0	0.0	0.0		0.27	58.3	0.0	37.5	4.2	48
1-31-76	4.2	29.2	22.9	43.8	0.0	0.0	0.0		0.42	81.3	0.0	6.3	12.5	48
2- 1-76	6.3	10.4	47.9	35.4	0.0	0.0	0.0		0.42	87.5	0.0	2.1	10.4	48
2- 2-76	8.3	70.8	20.8	0.0	0.0	0.0	0.0		0.22	100.0	0.0	0.0	0.0	48
2- 3-76	37.5	62.5	0.0	0.0	0.0	0.0	0.0		0.11	8.3	33.3	58.3	0.0	48
2- 4-76	70.8	29.2	0.0	0.0	0.0	0.0	0.0		0.06	0.0	0.0	100.0	0.0	48
2- 5-76	83.3	16.7	0.0	0.0	0.0	0.0	0.0		0.06	0.0	0.0	100.0	0.0	48
2- 6-76	12.5	87.5	0.0	0.0	0.0	0.0	0.0		0.15	77.1	0.0	22.9	0.0	48
2- 7-76	25.0	75.0	0.0	0.0	0.0	0.0	0.0		0.12	62.5	0.0	37.5	0.0	48
2- 8-76	100.0	0.0	0.0	0.0	0.0	0.0	0.0		0.01	0.0	0.0	100.0	0.0	48
2- 9-76	22.9	54.2	10.4	12.5	0.0	0.0	0.0		0.22	18.8	0.0	75.0	6.3	48
2-10-76	0.0	10.4	29.2	54.2	6.3	0.0	0.0		0.60	100.0	0.0	0.0	0.0	48
2-11-76	8.3	70.8	20.8	0.0	0.0	0.0	0.0		0.19	91.7	0.0	0.0	8.3	48
2-12-76	0.0	2.1	8.3	75.0	14.6	0.0	0.0		0.74	97.9	0.0	0.0	2.1	48
2-13-76	6.3	35.4	56.3	2.1	0.0	0.0	0.0		0.32	37.5	2.1	60.4	0.0	48
2-14-76	35.4	47.9	16.7	0.0	0.0	0.0	0.0		0.16	14.6	0.0	81.3	4.2	48
2-15-76	0.0	10.4	52.1	37.5	0.0	0.0	0.0		0.46	95.8	0.0	0.0	4.2	48
2-16-76	13.0	69.6	17.4	0.0	0.0	0.0	0.0		0.19	100.0	0.0	0.0	0.0	23
PERIOD AVGS:	14.6	40.5	22.9	18.7	3.3	0.0	0.0		0.34	43.8	2.3	36.7	17.2	4832

S T A T I O N   6N

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

	SPEEDS (F/S)									DIRS (RDTD)				
DATE	0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	NORTH	EAST	SOUTH	WEST	RDGS
2-16-76	87.8	12.2	0.0	0.0	0.0	0.0	0.0		0.08	0.0	0.0	100.0	0.0	25
2-17-76	6.3	62.5	18.8	12.5	0.0	0.0	0.0		0.26	50.0	2.1	27.1	20.8	48
2-18-76	0.0	27.1	60.4	12.5	0.0	0.0	0.0		0.35	95.8	0.0	0.0	4.2	48
2-19-76	0.0	12.5	75.0	12.5	0.0	0.0	0.0		0.41	97.9	0.0	0.0	2.1	48
2-20-76	47.9	27.1	16.7	8.3	0.0	0.0	0.0		0.20	91.7	0.0	0.0	8.3	48
2-21-76	8.3	62.5	8.3	8.3	12.5	0.0	0.0		0.35	60.4	0.0	31.3	8.3	48
2-22-76	2.1	52.1	8.3	18.8	18.8	0.0	0.0		0.49	2.1	4.2	68.8	25.0	48
2-23-76	0.0	6.3	31.3	62.5	0.0	0.0	0.0		0.50	93.8	4.2	2.1	0.0	48
2-24-76	0.0	25.0	62.5	12.5	0.0	0.0	0.0		0.37	100.0	0.0	0.0	0.0	48
2-25-76	0.0	10.4	70.8	18.8	0.0	0.0	0.0		0.40	100.0	0.0	0.0	0.0	48
2-26-76	0.0	52.1	47.9	0.0	0.0	0.0	0.0		0.30	100.0	0.0	0.0	0.0	48
2-27-76	0.0	41.7	56.3	2.1	0.0	0.0	0.0		0.33	100.0	0.0	0.0	0.0	48
2-28-76	18.8	62.5	14.6	4.2	0.0	0.0	0.0		0.18	100.0	0.0	0.0	0.0	48
2-29-76	14.6	31.3	39.6	14.6	0.0	0.0	0.0		0.32	43.8	0.0	25.0	31.3	48
3- 1-76	31.3	68.8	0.0	0.0	0.0	0.0	0.0		0.12	0.0	0.0	100.0	0.0	48
3- 2-76	6.3	33.3	52.1	8.3	0.0	0.0	0.0		0.30	91.7	0.0	2.1	6.3	48
3- 3-76	6.3	56.3	37.5	0.0	0.0	0.0	0.0		0.24	100.0	0.0	0.0	0.0	48
3- 4-76	22.9	35.4	18.8	18.8	4.2	0.0	0.0		0.31	100.0	0.0	0.0	0.0	48
3- 5-76	0.0	0.0	2.1	47.9	37.5	12.5	0.0		1.15	39.6	0.0	0.0	60.4	48
3- 6-76	0.0	0.0	18.8	72.9	8.3	0.0	0.0		0.73	50.0	0.0	0.0	50.0	48
3- 7-76	0.0	16.7	62.5	20.8	0.0	0.0	0.0		0.39	52.1	0.0	25.0	22.9	48
3- 8-76	45.8	45.8	8.3	0.0	0.0	0.0	0.0		0.13	0.0	81.3	18.8	0.0	48
3- 9-76	91.7	8.3	0.0	0.0	0.0	0.0	0.0		0.04	0.0	100.0	0.0	0.0	48
3-10-76	33.3	52.1	10.4	4.2	0.0	0.0	0.0		0.15	77.1	20.8	0.0	2.1	48
3-11-76	77.1	22.9	0.0	0.0	0.0	0.0	0.0		0.08	100.0	0.0	0.0	0.0	48
3-12-76	18.8	14.6	8.3	41.7	16.7	0.0	0.0		0.56	64.6	2.1	0.0	33.3	48
3-13-76	0.0	14.6	25.0	31.3	29.2	0.0	0.0		0.69	16.7	4.2	66.7	12.5	48
3-14-76	0.0	12.5	25.0	62.5	0.0	0.0	0.0		0.57	56.3	6.3	35.4	2.1	48
3-15-76	0.0	20.8	29.2	50.0	0.0	0.0	0.0		0.50	100.0	0.0	0.0	0.0	48
3-16-76	0.0	47.9	47.9	4.2	0.0	0.0	0.0		0.32	2.1	4.2	93.8	0.0	48
3-17-76	0.0	31.3	10.4	58.3	0.0	0.0	0.0		0.45	0.0	0.0	100.0	0.0	48
3-18-76	0.0	22.9	62.5	14.6	0.0	0.0	0.0		0.37	50.0	0.0	43.8	6.3	48
3-19-76	0.0	41.7	33.3	25.0	0.0	0.0	0.0		0.37	100.0	0.0	0.0	0.0	48
3-20-76	0.0	22.9	45.8	31.3	0.0	0.0	0.0		0.43	100.0	0.0	0.0	0.0	48
3-21-76	0.0	2.1	29.2	68.8	0.0	0.0	0.0		0.59	100.0	0.0	0.0	0.0	48
3-22-76	2.1	22.9	50.0	25.0	0.0	0.0	0.0		0.38	25.0	2.1	50.0	22.9	48
3-23-76	14.6	45.8	37.5	2.1	0.0	0.0	0.0		0.26	95.8	4.2	0.0	0.0	48
3-24-76	0.0	39.6	45.8	14.6	0.0	0.0	0.0		0.33	100.0	0.0	0.0	0.0	48
3-25-76	0.0	0.0	16.7	70.8	12.5	0.0	0.0		0.71	77.1	0.0	0.0	22.9	48
3-26-76	27.1	29.2	35.4	8.3	0.0	0.0	0.0		0.24	100.0	0.0	0.0	0.0	48
3-27-76	0.0	33.3	12.5	54.2	0.0	0.0	0.0		0.49	100.0	0.0	0.0	0.0	48
3-28-76	6.3	41.7	18.8	33.3	0.0	0.0	0.0		0.36	20.8	25.0	52.1	2.1	48
3-29-76	0.0	50.0	47.9	2.1	0.0	0.0	0.0		0.30	97.9	2.1	0.0	0.0	48
3-30-76	87.5	4.2	8.3	0.0	0.0	0.0	0.0		0.05	100.0	0.0	0.0	0.0	48
3-31-76	8.3	4.2	20.8	35.4	31.3	0.0	0.0		0.73	47.9	0.0	0.0	52.1	48

S T A T I O N   64

PERCENT DISTRIBUTION OF CURRENT SPEED AND DIRECTION

PREPARED FOR AMERICAN ELECTRIC BY ENDECO

	S P E E D S (F/S)									D I R S (ROTO)				
DATE	0	0.1	0.3	0.5	1.0	2.0	4.0	MAX	AVG	NORTH	EAST	SOUTH	WEST	RDGS
4- 1-76	0.0	0.0	52.1	47.9	0.0	0.0	0.0		0.50	100.0	0.0	0.0	0.0	48
4- 2-76	0.0	39.6	31.3	29.2	0.0	0.0	0.0		0.37	60.4	0.0	10.4	29.2	48
4- 3-76	20.8	52.1	20.8	6.3	0.0	0.0	0.0		0.22	100.0	0.0	0.0	0.0	48
4- 4-76	70.8	18.8	10.4	0.0	0.0	0.0	0.0		0.09	100.0	0.0	0.0	0.0	48
4- 5-76	4.2	31.3	20.8	43.8	0.0	0.0	0.0		0.44	2.1	25.0	66.7	6.3	48
4- 6-76	0.0	0.0	37.5	62.5	0.0	0.0	0.0		0.49	97.9	2.1	0.0	0.0	48
4- 7-76	64.6	8.3	20.8	6.3	0.0	0.0	0.0		0.16	100.0	0.0	0.0	0.0	48
4- 8-76	22.9	25.0	27.1	25.0	0.0	0.0	0.0		0.32	52.1	0.0	45.8	2.1	48
4- 9-76	12.5	68.8	18.8	0.0	0.0	0.0	0.0		0.21	0.0	0.0	100.0	0.0	48
4-10-76	85.4	14.6	0.0	0.0	0.0	0.0	0.0		0.04	0.0	0.0	100.0	0.0	48
4-11-76	33.3	16.7	22.9	27.1	0.0	0.0	0.0		0.28	68.8	0.0	29.2	2.1	48
4-12-76	0.0	4.2	4.2	79.2	12.5	0.0	0.0		0.84	0.0	0.0	97.9	2.1	48
4-13-76	31.3	39.6	14.6	14.6	0.0	0.0	0.0		0.23	70.8	2.1	27.1	0.0	48
4-14-76	85.4	14.6	0.0	0.0	0.0	0.0	0.0		0.05	100.0	0.0	0.0	0.0	48
4-15-76	70.8	16.7	12.5	0.0	0.0	0.0	0.0		0.08	100.0	0.0	0.0	0.0	48
4-16-76	0.0	39.6	58.3	2.1	0.0	0.0	0.0		0.31	100.0	0.0	0.0	0.0	48
4-17-76	0.0	0.0	45.8	54.2	0.0	0.0	0.0		0.50	100.0	0.0	0.0	0.0	48
4-18-76	0.0	6.3	43.8	50.0	0.0	0.0	0.0		0.49	100.0	0.0	0.0	0.0	48
4-19-76	0.0	27.1	33.3	39.6	0.0	0.0	0.0		0.42	100.0	0.0	0.0	0.0	48
4-20-76	81.3	16.7	2.1	0.0	0.0	0.0	0.0		0.07	100.0	0.0	0.0	0.0	48
4-21-76	97.9	2.1	0.0	0.0	0.0	0.0	0.0		0.04	100.0	0.0	0.0	0.0	48
4-22-76	31.3	4.2	29.2	35.4	0.0	0.0	0.0		0.35	100.0	0.0	0.0	0.0	48
4-23-76	33.3	4.2	27.1	35.4	0.0	0.0	0.0		0.33	100.0	0.0	0.0	0.0	48
4-24-76	89.6	10.4	0.0	0.0	0.0	0.0	0.0		0.04	100.0	0.0	0.0	0.0	48
4-25-76	83.3	16.7	0.0	0.0	0.0	0.0	0.0		0.06	100.0	0.0	0.0	0.0	48
4-26-76	0.0	6.3	22.9	52.1	18.8	0.0	0.0		0.67	4.2	2.1	93.8	0.0	48
4-27-76	0.0	4.2	14.6	81.3	0.0	0.0	0.0		0.57	0.0	0.0	100.0	0.0	48
4-28-76	0.0	10.4	83.3	6.3	0.0	0.0	0.0		0.38	0.0	0.0	100.0	0.0	48
4-29-76	41.7	47.9	10.4	0.0	0.0	0.0	0.0		0.13	0.0	0.0	100.0	0.0	48
4-30-76	97.9	2.1	0.0	0.0	0.0	0.0	0.0		0.02	0.0	0.0	100.0	0.0	48
5- 1-76	75.0	18.8	6.3	0.0	0.0	0.0	0.0		0.07	0.0	0.0	100.0	0.0	16
PERIOD AVGS:	22.7	25.0	26.7	22.6	2.7	0.2	0.0		0.34	66.2	3.9	24.0	5.9	3593

Appendix A

Visual Observations of the Intake and Discharge Structures

Environmental Operating Report - July-December 1976

DIVING John A. Dorr III

The underwater observation program has been designed to facilitate first-hand monitoring of the study area. The program should enable divers to adequately assess the non-pelagic/nektonic macroscopic biological condition of at least eight locations within one-quarter of a mile of the intake and discharge structures. Observational methodologies have been designed to allow divers to detect the previously itemized conditions which might indicate a change in the existing ecological system at the monitoring locations. Certain limitations are inherent in most underwater observational programs. Observations are primarily macroscopic and may inadequately monitor highly motile segments of the biological populations, and operational logistics limit both the duration of the observational period and the number of locations monitored. However, these limitations neither preclude nor undermine the value of data which may be obtained through the existing observational program.

Following each dive, a report of observations is compiled. These reports and the data gathered during the dives, along with laboratory analysis of samples collected, are then used to write the reports on underwater operations. Regular sampling of periphyton growing on the top of the south intake and discharge structures and adjacent riprap, initiated during 1975, continues. These samples will be analyzed qualitatively and estimates of percent species composition made. A continuing attempt is made to quantify observations in terms of numbers/unit area, in order that estimates and comparisons of density and distribution among various biota may be made.

The Technical Specifications require a schedule which includes five dives each month at standard locations. These locations and dive times are: one day dive in the area of the intake structures, one day dive in the area of the discharge structures, one night dive in the area of the intake structures, and two dives in control areas outside the riprap. A total of 15 dives were performed; five during July, five during August, four during September, and one during October. Illness of one of the divers forced cancellation of the scheduled fifth September dive. Adverse weather conditions prevented completion of the October diving schedule.

The riprap fields and structures appeared normal; scour was not observed. Although organic debris (leaves, sticks and branches, wood chips, dune grass, etc.) and occasional dead fish (alewife) were noted, appreciable or abnormal accumulations were not observed. Periphyton (primarily *Cladophora*) attained a seasonal peak length (10-13 cm) on top of the south intake structure and on the surrounding riprap (1-2 cm) during July. Peak length (2-8 cm) of periphyton on top of the south discharge structure had been attained during June, but length remained near 2.5-5.0 cm during July. Periphyton length decreased steadily August-

September at all stations. Molluscs (snails) were seen occasionally but numbers were low. Crayfish were abundant during July and August but were less frequently observed during September and October. Results of the microscopic analysis of periphyton samples collected by divers in 1975 will appear in the diving annual report for that year, which will be issued in spring 1977.

Stations were routinely examined for the presence of fish eggs. When eggs are found, the divers often take samples for later laboratory analysis. Opaque or fungused eggs are not expected to be viable. A discussion of the topic of egg condition will appear in the forthcoming major report of 1975 diving results.

Fish eggs (attached to periphyton) were abundant on top of the south intake structure during July; many eggs were clear and perhaps viable. A few eggs (attached to periphyton) were observed on top of the south discharge structure and on the surrounding riprap during July; all eggs were opaque, many were fungused. Loose eggs were abundant at several north and south control stations during July; all eggs were opaque, many were fungused. A few eggs (attached to periphyton) were present during August on top of both the south intake and south discharge structures; all eggs were opaque, most were fungused.

Nine species of fish were observed, and listed in order of descending frequency of observation are: alewife, sculpin, johnny darter, carp, spottail shiner, yellow perch, trout-perch, burbot and rainbow smelt. Schools of young-of-the-year alewife were observed during August and September near both the intake and discharge structures, and at one control station during August. Small schools (6-20 fish) of carp were observed near the south discharge structure July-September; carp were not observed elsewhere.

A list of the July-October 1976 dives appears in Table 1; details of each dive are given in the Observations section that follows Table 1. In the Observations section, the numbers of organisms are defined in the following way: few = 1-10, many = 11-50, numerous = 51-100, abundant = more than 100. Table 2 presents the record of completion of dives required by the Technical Specifications.

TABLE 1. Summary of the 1976 diving activities at the Donald C. Cook Nuclear Plant. July through December.

Dive no.	Date	Location	Depth (m)	Day (D) or night (N)	Starting time of dive (EST)	Under-water time (min)	No. of obser-vers
17	Jul 15	S. discharge structure	6	D	1350	55	2
18	Jul 15	S. intake structure	9	D	1705	55	2
19	Jul 15	N. control stations	4-6	D	1820	30	2
20	Jul 15	S. control stations	5-6	D	1910	30	2
21	Jul 15	S. intake structure	9	N	2020	70	2
22	Aug 3	S. intake structure	9	D	1535	65	2
23	Aug 3	S. discharge structure	6	D	1710	40	2
24	Aug 3	S. intake structure	9	N	2310	50	2
25	Aug 4	N. control stations	4-6	D	1123	30	2
26	Aug 4	S. control stations	5-6	D	1221	30	2
27	Sep 24	M. intake structure	9	N	2030	65	2
28	Sep 25	N. control stations	4-6	D	1105	30	2
29	Sep 25	S. discharge structure	6	D	1230	40	2
30	Sep 25	S. intake structure	9	D	1355	35	2
31	Oct 12	S. intake structure	9	N	2300	50	2

Month	DAYLIGHT No. of dives	DAYLIGHT Time	NIGHT No. of dives	NIGHT Time	TOTAL Dives	TOTAL Time
July	4	170 min	1	70 min	5	240 min
August	4	165 min	1	50 min	5	215 min
September	3	105 min	1	65 min	4	170 min
October	0	0	1	50 min	1	50 min
Total	11	440 min	4	235 min	15	675 min

(N = north, M = middle, S = south)

TABLE 2. Record of completion of dives required by the Technical Specifications. The number of each completed dive is shown.

1976	DAY DIVES				NIGHT DIVES
Month	South intake	South discharge	North control	South control	South intake
July	18	17	19	20	21
August	22	23	25	26	24+
September	30	29	28	*	27+
October	31	*	*	*	*

* Dive missed
\+ Middle intake structure

OBSERVATIONS

Dive No. 17

Date:	15 July 1976	Duration:	55 min
Time:	1350-1445 hrs	Visibility:	1.5 m
Location:	south discharge structure	Bottom temp.:	22.7°C
Depth:	6 m	Current:	running S

Scour: none observed
Attached algae/periphyton: algae (primarily *Cladophora*) 2.5-5.0 cm in length (occasionally 150-200 cm) covered 75% area of top of structure, 1-2.5 cm long on riprap surrounding structure. Periphyton sampled from top of structure and riprap.
Decaying material: abundant sticks and branches
Macrophytes: none observed
Molluscs: few *Physa integra*
Crayfish: many live, few dead
Fish: carp = 6-10, yellow perch = few, johnny darter = few, sculpin = 2
Comment: Few fish eggs attached to periphyton (top of structure and riprap), all eggs opaque (not viable), many fungused.

Dive No. 18

Date:	15 July 1976	Duration:	55 min
Time:	1705-1800 hrs	Visibility:	1.5-2.0 m
Location:	south discharge structure	Bottom temp.:	22.6°C
Depth:	9 m	Current:	running SE

Scour: none observed
Attached algae/periphyton: algae 10.0-13.0 cm in length covered 70-80% area of top of structure, 1-2 cm in length covering nearly 100% of upper surfaces of riprap. Periphyton sampled from top of structure and riprap.
Decaying material: very little observed
Macrophytes: none observed
Molluscs: none observed
Crayfish: many, under riprap
Fish: sculpin = few, 2 dead, yellow perch = 1, alewife = abundant (schooling), johnny darter = few
Comment: fish eggs abundant, attached to periphyton, eggs appeared to be of 2 size classes, many eggs clear. Freshwater sponge abundant, attached to riprap.

Dive No. 19

Date:	15 July 1976	Duration:	30 min
Time:	1820-1900 hrs	Visibility:	1.0-2.0 m
Location:	north control stations	Bottom temp.:	23.4°C
Depth:	4-6 m	Current:	running N near discharge, negligible away from discharge

Scour: not applicable
Attached algae/periphyton: none observed
Decaying material: numerous sticks and pieces of wood at one location
Macrophytes: none observed
Molluscs: none observed
Crayfish: portions of 1 dead animal
Fish: none observed
Comment: loose fish eggs (abundant) observed at one location, resting in troughs of ripple marks.

Dive No. 20

Date:	15 July 1976	Duration:	30 min
Time:	1910-1955 hrs	Visibility:	2.0 m
Location:	south control stations	Bottom temp.:	22.7°C
Depth:	5-6 m	Current:	running N, slowly

Scour: not applicable
Attached algae/periphyton: none observed
Decaying material: few dead alewife
Macrophytes: none observed
Molluscs: few broken shells (gastropod) observed at one location
Crayfish: none observed
Fish: none observed

Comment: many clumps (1-2 cm diameter) of loose algae observed at one location. Loose fish eggs abundant but in clumps, resting in troughs of ripple marks. Fish feces (probably alewife) abundant. Abundant dead alewife floating on surface of lake.

Dive No. 21

Date:	15 July 1976	Duration:	70 min
Time:	2020-2130 hrs	Visibility:	2.5 m with lights
Location:	south intake structure	Bottom temp.:	22.5°C
Depth:	9 m	Current:	running SE, noticeable

Scour: none observed
Attached algae/periphyton: as described in Dive No. 18. No samples taken.
Decaying material: none observed
Macrophytes: none observed
Molluscs: none observed
Crayfish: abundant, alert and active, often resting on top of riprap
Fish: sculpin = many, alewife = numerous, spottail shiner = few, yellow perch = few. Fish larvae (probably alewife) observed swimming just below surface. Alewife not schooling.
Comment: none

Dive No. 22

Date:	3 August 1976	Duration:	65 min
Time:	1535-1640 hrs	Visibility:	2.5-3.0 m
Location:	south intake structure	Bottom temp.:	21.7°C
Depth:	9 m	Current:	running N

Scour: none observed
Attached algae/periphyton: algae 5-10 cm in length covered nearly 100% of top of structure, 0.2-0.5 mm in length covering approximately 25% of upper surfaces of riprap. Periphyton sampled from top of structure and riprap.
Decaying material: few sticks
Macrophytes: none observed
Molluscs: numerous *Physa integra*
Crayfish: many
Fish: sculpin = few, johnny darter = few
Comment: occasional fish eggs (probably alewife, possibly spottail shiner) were observed, all were opaque, many were fungused. Freshwater sponge abundant, covering much of riprap.

Dive No. 23

Date:	3 August 1976	Duration:	40 min
Time:	1710-1750 hrs	Visibility:	2.0-3.0 m
Location:	south discharge structure	Bottom temp.:	21.4°C
Depth:	6 m	Current:	running north

Scour: none observed
Attached algae/periphyton: algae 2-5 cm in length covered nearly 100% of the top of the structure, 0.1-0.3 cm long on only a few pieces of the riprap.
Decaying material: sticks and branches abundant on riprap adjacent to north side of structure.
Macrophytes: none observed
Molluscs: few broken shells
Crayfish: abundant
Fish: sculpin = few (juveniles), johnny darter = few, carp = one school of 8-10 fish observed
Comment: a few fish eggs observed attached to periphyton, all eggs opaque

Dive No. 24

Date:	3 August 1976	Duration:	50 min
Time:	2310-2400 hrs	Visibility:	4 m with lights
Location:	south intake structure	Bottom temp.:	20.5°C
Depth:	9 m	Current:	running N

Scour: none observed
Attached algae/periphyton: same as Dive No. 22
Decaying material: same as Dive No. 22
Macrophytes: none observed
Molluscs: none observed
Crayfish: many to abundant
Fish: sculpin = abundant, spottail shiner = few, johnny darter = few, rainbow smelt = one young-of-the-year, burbot = 1, trout-perch = few, alewife = few adults, young-of-the-year abundant throughout water column, solitary and in large schools
Comment: fish numbers, activity and species diversity unusually high compared with observations during other dives.

Dive No. 25

Date:	4 August 1976	Duration:	30 min
Time:	1123-1212 hrs	Visibility:	3.0 m
Location:	north control stations	Bottom temp.:	21.6-22.5°C
Depth:	4-6 m	Current:	running N

Scour: not applicable
Attached algae/periphyton: none observed

Decaying material: few pieces of wood
Macrophytes: none observed
Molluscs: broken shells observed
Crayfish: none observed
Fish: alewife = school of 100 or more young-of-the-year observed 1-2 m off bottom at one location
Comment: none

Dive No. 26

Date:	4 August 1976	Duration:	30 min
Time:	1221-1355 hrs	Visibility:	2.5-3.0 m
Location:	south control stations	Bottom temp.:	21.6°C
Depth:	5-6 m	Current:	running N

Scour: not applicable
Attached algae/periphyton: none observed
Decaying material: twigs and small pieces of wood at one location
Macrophytes: none observed
Molluscs: none observed
Crayfish: none observed
Fish: none observed
Comment: none

Dive No. 27

Date:	24 September 1976	Duration:	65 min
Time:	2030-2135 hrs	Visibility:	1.5-2.0 m
Location:	middle intake structure	Bottom temp.:	16.8°C
Depth:	9 m	Current:	present, direction not determined

Scour: none observed
Attached algae/periphyton: algae 5-8 cm in length covered 90% area of top of structure but some spots length only 2.5-4.0 cm with 50% coverage. Periphyton sampled from top of structure and riprap.
Decaying material: few pieces of wood on riprap
Macrophytes: none observed
Molluscs: none observed
Crayfish: abundant
Fish: sculpin = few, spottail shiner = few, some juveniles, yellow perch = 1, alewife = few adults, young-of-the-year abundant, solitary and in schools of 50-100 fish
Comment: divers failed to locate scheduled dive site (south intake structure), dive performed on adjacent middle intake structure.

Dive No. 28

Date:	25 September 1976	Duration:	30 min
Time:	1105-1158 hrs	Visibility:	1-2 m
Location:	north control stations	Bottom temp.:	17.8-18.5°C
Depth:	4-6 m	Current:	none observed

Scour: not applicable
Attached algae/periphyton: none observed
Decaying material: few branches and sticks observed at one location
Macrophytes: none observed
Molluscs: none observed
Crayfish: none observed
Fish: none observed
Comment: none

Dive No. 29

Date:	25 September 1976	Duration:	40 min
Time:	1230-1310 hrs	Visibility:	2-2.5 m
Location:	south discharge structure	Bottom temp.:	17.5°C
Depth:	6 m	Current:	running NE

Scour: none observed
Attached algae/periphyton: algae 1-3 cm in length covering 70% area of top of structure, 0.2-0.3 mm in length covering nearly 100% of upper surfaces of riprap. Periphyton sampled from top of structure and riprap.
Decaying material: numerous sticks, few tree branches, one large tree trunk
Macrophytes: none observed
Molluscs: few sphaeriid shells
Crayfish: few
Fish: carp = few schools of 6-20 fish observed, alewife = few schools of 100-200 juveniles, few schools of several hundred to 1000 young-of-the-year
Comments: difficult to separate fish schools or distinguish between them, repeat observations of same school may have occurred.

Dive No. 30

Date:	25 September 1976	Duration:	35 min
Time:	1355-1430 hrs	Visibility:	2 m
Location:	south intake structure	Bottom temp.:	17.8°C
Depth:	9 m	Current:	present, direction not determined

Scour: none observed
Attached algae/periphyton: algae 2-4 cm in length covering 50% area of

top of structure, 0.2-0.4 cm in length covering 75% of upper surfaces of riprap. Periphyton longer in spots.
Decaying material: very little
Macrophytes: none observed
Molluscs: few *Physa integra*
Crayfish: few, adults and juveniles
Fish: sculpin = 1
Comments: Bryophytes and freshwater sponge present on portions of riprap.

Dive No. 31

Date:	12 October 1976	Duration:	50 min
Time:	2300-2350 hrs	Visibility:	approximately 2 m
Location:	south intake structure	Bottom temp.:	15°C
Depth:	9 m	Current:	direction not determined

Scour: none observed
Attached algae/periphyton: very little. Periphyton sampled from top of structure and riprap.
Decaying material: little
Macrophytes: none observed
Molluscs: none observed
Crayfish: few
Fish: few
Comment: none

Appendix B-1

Zooplankton

Environmental Operating Report - July-December 1976

ZOOPLANKTON   Marlene S. Evans

Condenser-Passage Studies

Introduction

Data from these studies provide information on the percent of zooplankton killed by condenser passage. Zooplankton are collected monthly in the intake and discharge waters of the power plant. Two samples are collected from each location after sunrise but before noon. Sampling times vary from one to three minutes depending on the concentration of zooplankton in the cooling waters. Each sample is divided into a series of subsamples each containing a few hundred organisms and visual examinations for dead zooplankton are made at 0, 6, and 24 hours after collection. Only freshly-killed zooplankton are included in the 'dead' count and decaying zooplankton are not enumerated. Live zooplankton are preserved and later counted and identified in Ann Arbor. Each month a total of 24 subsamples are visually examined.

For the 6-month period July to December, a total of 144 samples were collected. At the time of this writing (December) samples up to and including September have been processed. This report includes these data and the June 1976 data which were not processed in time for the last semiannual report.

A. Mortality Studies (Tables 1-8, Figures 1-6)

June 1976

Zooplankton mortalities were low averaging 2.2% in the intake waters (20.0°C) and 5.2% in the discharge waters (30.8°C) at 0 hours. Zooplankton mortalities increased by 1-4% with incubation time. Mortalities were somewhat lower than in June 1975 although water temperatures were higher in 1976 and presumably closer to the upper lethal limits of the zooplankton. *Asplanchna* spp., *Bosmina longirostris*, nauplii, and immature *Cyclops* spp. and *Diaptomus* spp. copepodites accounted for most of the dead zooplankton.

July 1976

Zooplankton mortalities were low averaging 8.7% in the intake waters (13.7°C) and 10.2% in the discharge waters (21.0°C). *Bosmina longirostris* and immature *Diaptomus* spp. copepodites accounted for most of the dead zooplankton. Mortalities in the intake and discharge waters increased by less than 3% with incubation time. Zooplankton mortalities after 24 hours of incubation (11%) were approximately one-third of those in June 1975 after the same period of incubation.

August 1976

Zooplankton mortalities in August were higher at 0-hour than after 24 hours of incubation possibly due to errors associated with sample variability. At 0-hour, mean mortalities were 13.5% in the intake waters (20.2°C) and 15.1% in the discharge waters (31.5°C); these values were comparable to the 1975 values. Immature *Cyclops* spp. and *Diaptomus* spp. copepodites and *Bosmina longirostris* accounted for most of the dead zooplankton.

September 1976

Zooplankton mortalities at 0-hours were 8.3% in the intake waters (18.3°C) and 15.3% in the discharge waters (28.8°C). *Bosmina longirostris* and *Eubosmina coregoni* accounted for most of the dead zooplankton. Mortalities increased approximately 5% with incubation time and were slightly higher than in September 1975.

We now have a 20-month data base for zooplankton mortalities in the intake and discharge waters at 0, 6, and 24 hours after collection. Since most zooplankton taxa occur seasonally in the cooling waters, the data base for most taxa is smaller. Table 9 shows the mean mortalities of 24 zooplankton taxa and of total zooplankton by location and by incubation time over the 20-month sampling period. Certain features emerge from these data sets.

For the most part, zooplankton taxon mortalities in the intake and discharge waters varied by only a few percent and total zooplankton by less than 2%. Differences of this magnitude are difficult to detect with any degree of accuracy particularly for the rare taxa (less than 10% of the sample). However, despite this limitation in accuracy, zooplankton mortalities were generally higher in the discharge water samples than in the intake water samples (53 comparisons out of 75). There appears to be a great deal of evidence that a large fraction of the mortality which we observed was due to mortality inflicted on the zooplankton during collection and subsequent handling. Taxa such as immature *Diaptomus* spp. copepodites, immature *Epischura lacustris* copepodites, *Daphnia galeata mendotae*, *Daphnia retrocurva*, and *Holopedium gibberum* all had mean intake mortalities of over 20%. Since none of these dead zooplankton were decaying (and thus dead prior to collection) or diseased (and thus not healthy) we believe that these high mortalities must be due to our collection techniques rather than to natural mortality.

The median test was used to determine whether the median difference between intake and discharge mortalities was significantly different from zero. Parametric procedures which test hypotheses regarding the mean difference between two sets of paired measurements could not be used as the data did not meet the necessary assumptions for those methods. The test was performed on the 0, 6, and 24-hour incubation samples from the 20-month (February 1975 to September 1976) data base. The number of pairs of samples on which the test was performed is shown in Table 9.

Only complete, non-tied pairs were used in the test.

The results of these tests were, for the most part, not significant. Significant differences ($p<.05$) were obtained only for *Cyclops bicuspidatus thomasi* adults (0 and 24 hours), immature *Diaptomus* spp. copepodites (6, 24 hours), adult *D. minutus* (6 hours), adult *D. oregonensis* (6, 24 hours), and total zooplankton (6 hours). Thus only 8 significant differences were detected from the 75 analyses. All of these differences indicated that mortalities were higher in the discharge waters than in the intake waters. The converse was not demonstrated although in 22 of the 75 data sets of mean mortalities (Table 9), mean discharge mortalities were lower than mean intake mortalities.

There are various ways of interpreting the mortality data. Generally, the data indicate that condenser passage does kill zooplankton. We cannot detect statistically significant differences for the most part because of the large amount of variability in the data. Much of this variability may be due to variability in the mortality inflicted on the zooplankton by the collecting and handling processes. However, since zooplankton mortalities are generally low (<15%) it is probably not worthwhile to spend added effort in increasing the number of sample replicates in order to statistically detect differences between intake and discharge water samples. Rather, the zooplankton mortalities in the discharge waters should be taken as the estimate of the maximum fraction of zooplankton killed by condenser passage. We have no evidence to suggest that damage inflicted on zooplankton by the collecting and handling techniques and damage inflicted on the zooplankton by condenser passage are additive, and it is incorrect to subtract the mortalities to give an estimate of mortality due to condenser passage alone.

Conclusions

Zooplankton mortalities due to condenser passage were low averaging less than 15%. For the most part it was not possible to statistically detect differences in zooplankton mortalities in the intake and discharge waters due to the high variability of the data. Most of the observed mortality in the intake waters appear to be due to damage inflicted on the zooplankton during collection. Zooplankton mortalities increased slightly with incubation time but this increase appears to be related to culturing techniques and delayed mortality from collection, since both intake and discharge water zooplankton exhibit similar increases in mortality with time. Mortalities in the summer of 1976 were low despite the high discharge-water temperatures and did not approach the large mortalities associated with recirculation (February, March 1975) and storms (January 1976).

B. Entrainment Abundance Samples

Zooplankton abundance samples are collected monthly from the intake and discharge waters. Two 5-minute replicate samples are collected at sunset, midnight, sunrise, and at noon from each location providing a total of 16 samples for a complete series. Data from these samples provide information of the concentration and composition of zooplankton in the cooling waters.

For the 6-month period July to December 1976 a complete series of 96 samples were collected. At the time of this writing, samples up to and including September have been counted and processed. Extra samples were collected at 2-week intervals during some of the summer months in order to provide better information of the seasonal dynamics of zooplankton distributions in the survey area; these samples have not yet been processed. This report includes the required data set (July to September) and data from May and June 1976 which were not processed in time for the last semiannual report.

Results (Tables 10-19)

May 1976

Zooplankton were approximately three times as abundant in May 1976 ($3,553/m^3$) as in 1975 ($1,275/m^3$). The dominant taxa were nauplii and immature *Cyclops* spp. and *Diaptomus* spp. copepodites.

June 1976

Zooplankton were approximately 50% more abundant in June 1976 ($21,484/m^3$) than in 1975 ($15,670/m^3$). In 1975, the dominant categories were immature *Cyclops* spp. and *Diaptomus* spp. copepodites and adult *C. bicuspidatus thomasi*. In 1976, nauplii, *Bosmina longirostris*, and immature *Cyclops* spp. and *Eurytemora affinis* copepodites were the numerically dominant taxa.

July 1976

Zooplankton were nearly five times as abundant in July 1976 ($152,024/m^3$) than in 1975 ($31,756/m^3$). *Bosmina longirostris* was the numerically dominant taxon.

August 1976

Zooplankton were over seven times as abundant in August 1976 ($47,548/m^3$) than in 1975 ($8,503/m^3$). *Daphnia retrocurva* and immature *Diaptomus* spp. copepodites were dominant in both years. Adult *D. minutus* were also dominant in 1975 while immature *Diaptomus* spp. copepodites were dominant in 1976.

September 1976

Zooplankton were somewhat less abundant in September 1976 ($39,597/m^3$) than in 1975 ($53,221/m^3$). The dominant taxa in 1976 were *Bosmina* *longirostris* and *Eubosmina coregoni* while in 1975 *Bosmina longirostris* and immature *Cyclops* spp. copepodites were dominant.

Conclusions

Zooplankton concentrations in the cooling waters were higher in the summer of 1976 than in 1975. There were minor differences in the composition of the numerically dominant zooplankton. There was some evidence that the seasonal pattern of zooplankton composition was advanced by one month in 1976.

C. <u>Determination of the Maximum Numbers and Biomass of Zooplankton Killed Due to Condenser Passage (at 0 hour)</u>

Data on the percent of dead zooplankton in the discharge waters and on the concentration of zooplankton in the cooling waters are combined with data on the power plant's pumping rate and the monthly biomass estimates for the various zooplankton taxa to:

(1) estimate the numbers and biomass of zooplankton passing through the power plant each month

(2) estimate the maximum loss of zooplankton due to condenser passage.

The maximum loss estimates are derived by applying the percent mortality estimates of zooplankton in the discharge waters at 0-hours to the data on the numbers and biomass of zooplankton passing through the plant.

The above calculations are not part of the Technical Specifications. Data are presented up to and including August 1976. Biomass determinations for zooplankton in September have not yet been made.

The number of zooplankton which passed through the power plant (Fig. 7) varied from a low of 125 billion in February to a high of 18,312 billion in July. The maximum loss was estimated as varying between 8 billion in February to a high of 1703 billion in July. Values were higher than in 1975 due to the larger concentrations of zooplankton in the cooling waters in 1976 and to the fact that the plant was operational through most of July 1976 while in the previous year it was out of service for most of the month. Nauplii and immature *Cyclops* spp. copepodites accounted for the largest numbers of zooplankton lost in each month although *Bosmina longirostris* in July and *Daphnia retrocurva* in August were lost in large numbers.

The biomass of zooplankton passing through the plant each month varied from a low of 317 kg. dry wt. in May to a high of 8485 kg. dry wt. in July (Fig. 8). The maximum loss was estimated as varying from a low of 29 kg. dry wt. (132 lb. fresh wt.) to a high of 1022 kg. dry wt. (4,644 lb. fresh wt.) in July. The maximum loss was most commonly due to

immature *Cyclops* and *Diaptomus* spp. copepodites, adult *Limnocalanus macrurus*, *C. bicuspidatus thomasi* adults, *D. oregonensis* adults, *D. ashlandi* adults and, in July and August, *Bosmina longirostris* and *Eubosmina coregoni*.

D. Culturing Experiments

Culturing experiments are not required by the Technical Specifications. However, we have initiated these studies in order to determine whether or not zooplankton which have been subjected to condenser passage exhibit sublethal damage. These studies are still in the developmental stage but initial results have failed to demonstrate any such damage.

We have cultured zooplankton collected from the intake and discharge waters over a period of weeks in order to determine whether or not the longevity of condenser-passed zooplankton is reduced. Figure 9 shows the results of a series of *Cyclops vernalis* cultures set up from living zooplankton samples collected during the June entrainment study, a second culture series set up two weeks later from living zooplankton remaining in the midJune samples, and a *Cyclops bicuspidatus* culture set up from living zooplankton collected during the July entrainment study. No consistent differences were noted in the mortalities of *C. vernalis* cultures set up from the intake and discharge-water cultures. Discharge-water mortalities appeared to be slightly higher than intake-water mortalities for the *C. bicuspidatus thomasi* cultures.

The *Cyclops vernalis* cultures initially contained late stage copepodites. These completed development in culture and adult females became ovigerous. These females were removed to Petri dishes and when they released their eggs were returned to the main cultures. The development of the eggs was then followed. Over 12 cultures were set up for intake and for discharge eggs. Figure 10 shows the pattern of development for four of these intake cultures and one of the discharge cultures. Culturing and staging of living zooplankton was extremely time-consuming. In addition, certain technical difficulties were encountered when nauplii were retained in the small Petri dishes for easier counting and rapid water evaporation occurred. The general results of the culturing studies suggest that condenser-passed *C. vernalis* can complete their development, reproduce and produce viable eggs in culture, and that these eggs can mature to the adult stage. The data are not quantitative and a great deal of added effort would be required to make them so.

Attempts were made to culture some species of Clodocera. These met with no success. Cladocerans became trapped on the water surface within a few days and died.

Lake Surveys

Lake surveys are conducted once a month from April to November. Major surveys (30 stations) are conducted in April, July, and October. Short surveys (14 stations) are conducted in the intervening months. Three replicate samples are collected at each station from the lake bottom to the surface. Two of these three samples are examined (as required by the Technical Specifications). The third sample is occasionally examined when there is poor agreement between the first two samples.

For the period June to November, a total of 198 samples were collected of the required 232. In October, poor weather conditions prevented stations NDC 4-4, DC-6, and SDC 4-4 from being occupied. No cruise was conducted in November due to unfavorable lake conditions. This semi-annual includes the May 1976 short survey cruise data (Table 20) which were not presented in the previous report. At the time of this writing samples (144) up to and including September have been examined and the data processed (Tables 21-24).

Statistical analyses of the preoperational and operational data have been performed. As was discussed in the previous semi-annual report, the survey grid was subdivided into eight zones (Fig. 11). For the major survey cruises, it was possible to compare data from before and after the start of plant operation (Jan. 1, 1975) for all eight zones. However, for the short survey cruises, such comparisons could be made only for zone 2. Although the preoperational zooplankton data base includes zooplankton abundance information from as early as 1970, the analyses employed data collected beginning in 1971. Samples collected prior to 1971 were collected with a number 5 net (275 μ) while beginning in 1971 a number 10 mesh (156 μ) net was used. The 1970 data were excluded from the analyses because the samples were not comparable to later collections where larger numbers of organisms and smaller zooplankton were collected with the finer net.

Generally, in the earlier years of the preoperational study (prior to 1972) the taxonomic resolution employed in counting zooplankton was low, particularly for the copepods. Cyclopoid copepods were counted as a group in 1971 and adults were not distinguished to the genus level until 1973; immatures were not distinguished until 1974. Nauplii were not counted until 1972. Apart from the cladocerans, little preoperational information exists for zooplankton species composition prior to 1974. Information on copepod species composition prior to 1974 was not suitable for the statistical analysis used in this semiannual report.

Two sets of analyses were performed for each comparison of preoperational and operational abundances. In the first set, comparisons were made at the order level (Cladocera, Copepoda nauplii) or sub-order level (Calanoida, Cyclopoida); most of these analyses employed data from as early as 1971 for the major surveys and 1972 for the short surveys. In the second set of analyses, comparisons were made at the genus or species level except for immature cyclopoid copepods which were not routinely distinguished to the genus level until 1974. Except for the cladocerans, these analyses employed only the 1973 and 1974 pre-operational data.

The data set was stratified into preoperational and operational data blocks as one of the primary analytical procedures for detecting changes attributed to plant operation. The multi-year data blocks were necessary because the estimated zooplankton densities regularly varied 1 to 5 fold (in the same month) between successive years. Part of this variation was due to the fact that zooplankton were sampled only once a month providing little resolution of the magnitude of cyclic events. In one year, a population abundance peak might have been sampled while in another year a trough might have been sampled. Part of the variation was also due to naturally occurring year-to-year variations in response to environmental fluctuations.

In order to minimize temporal and spatial variability, the zooplankton density estimates were stratified by month and by zone. The statistical tests for detection of changes compared zooplankton monthly density estimates between the preoperational and operational years for 8 taxon categories in April, 10 in May, June, and July, and 11 in August, September, and October. Except for October, the operational data base included data from 1975 and 1976; data from 1975 alone was used in the October analyses. No analyses were performed on the November monthly cruises since a November cruise has yet to be taken in the operational period.

The mean densities of zooplankton before and after the start of plant operation were compared using the Mann-Whitney U-test. The null hypothesis was that the zooplankton densities were equal before and after the start of plant operation.

Some assumptions underlying the Man-Whitney U-test are that the samples are independent and randomly drawn (Conover 1971 and Siegal 1956). The density estimates can be treated as continuous random variables. The third assumption is that the control and experimental sampling distributions differed only in the location of their mean. The power efficiency of the Mann-Whitney U-test is at least 86% that of the parametric *t*-test and is generally higher.

Parametric tests for detecting differences between population means such as student's *t*-test and the analysis of variance were not used. Their assumption of normality and/or equality of variance could not be met by all the data. Both log (x+1) and square root transformation of the density estimates failed in most cases to result in normality and equality of variance.

Results

April (Table 25, Figures 12-17)

Of the 64 preoperational vs. operational comparisons which were performed, 20 indicated that zooplankton distributions in 1975 and 1976 were significantly ($p<.05$) different from the preoperational years. Five of these significant differences were associated with zooplankton distributions in zone 2, and four with zone 5; these two zones were closest to the thermal discharge. Most of the differences were associated with high concentrations of nauplii in 1976 and high concentrations of immature and adult *Diaptomus* spp. copepods in the two operational years. Many of these differences, particularly in zones away from the thermal discharge, probably were associated with naturally occurring variability. April 1976 was an atypically warm spring and the large numbers of nauplii and immature calanoid copepods may have been associated with this climatic variability.

May (Table 26, Figures 18-25)

Calanoid copepods were more abundant in 1975 and 1976 in comparison to their concentrations in the 1972 to 1974 preoperational period. However, when the calanoid data were subdivided into immature and adult *Diaptomus* spp. copepodites (the dominant calanoid in this month) and the preoperational data base limited to 1973 and 1974, these differences were no-longer significant.

June (Table 26, Figures 18-25)

Nauplii, cyclopoid copepods (C1-C6), immature cyclopoid copepods, and calanoid copepods (C1-C6) were all more abundant in the operational years than in the preoperational years in zone 2. The greatest increase in concentration was associated with cyclopoid copepods in 1975.

July (Table 27, Figures 26-31)

Of the 80 preoperational vs. operational comparisons which were made, 17 resulted in statistically significant differences. The largest number of differences were associated with zone 2 (5 differences), zone 8 (5 differences) and zone 5 (3 differences). Cyclopoid copepods (C1-C6, C1-C5, C-6) occurred in lower concentrations in 1975 and 1976 than in the preoperational years as did immature and adult *Diaptomus* spp. copepodites. Cladocerans and *Bosmina longirostris* were also less abundant in the operational years although significant differences were noted only for zone 8, far away from the area of the plant's effect.

August (Table 26, Figures 18-25)

Diaptomus spp. adults were more abundant in zone 2 in 1975 and 1976 than in 1973 and 1974.

September (Table 26, Figures 18-25)

Cyclopoid copepods (C1-C6, C1-C5) were more abundant in the operational years as were immature *Diaptomus* spp. copepodites. Nauplii and calanoid copepods were also more abundant. Cladocerans occurred in similar concentrations before and after the start of plant operation.

October (Table 27, Figures 18-25)

Of the 77 comparisons between mean zooplankton concentrations in 1975 with the preoperational years, 17 were significant ($p<.05$). The greatest number of differences were associated with zone 1 (4 differences), zone 2 (3 differences) and zone 3 (4 differences). *Daphnia* spp. were less abundant in 1975 than in the preoperational years in several zones. Cladocerans (dominated by *Bosmina longirostris*) were less abundant in zones 2 and 3 than in the preoperational years. Cyclopoid copepods (C1-C6, C1-C5) significant differences were associated with increased concentrations of immatures in 1975. *Cyclops* spp. adults were less abundant in zone 2 in 1975 than in the preoperational years. There were no consistent trends for calanoid copepods and immature *Diaptomus* spp. copepodites; significant differences were associated both with increased and decreased concentrations in the various regions in 1975.

Discussion

For information purposes, the percent of positive outcomes of some of the tests is tabulated below. These percentages must be interpreted with caution, since the tests are not independent statistically. Correlations undoubtedly exist among the abundances. Moreover, the taxonomic categories used are not all mutually exclusive.

A total of 221 comparisons were made of taxon abundances in the three major survey cruises; of these 54 (24%) indicated that zooplankton taxon abundances were significantly ($p<.05$) different before and after the start of plant operation. Thirteen (24%) of these differences were associated with zone 2, eight (15%) with zone 5, and lesser numbers with the remaining zones. A total of 42 comparisons were made for the four short survey cruises for zooplankton taxon abundances in zone 2; eleven (26%) of these comparisons indicated that zooplankton mean abundances were different in the preoperational and operational years. Most of these significant differences were associated with increased concentrations of cyclopoid and calanoid copepods in the operational years.

Interpretation of these results are still in process and several factors need to be considered. Naturally occurring zooplankton variability may be associated with climatic events, as in April, timing of the cruises relative to zooplankton population cycles, and zooplankton interactions with fish and phytoplankton.

One observation requires further investigation. The greatest number of significant differences were detected for zone 2 which is in the discharge area, and for zone 5 which is offshore of the discharge jets. The possibility exists that some of these effects were plant-related. The actual mechanism is not obvious. We believe that the residence time of zooplankton in these regions is in the order of hours and is thus too short for zooplankton to increase in numbers due to reproductive processes. Increased numbers may occur if zooplankton are damaged by condenser passage and plume entrainment and thus are less able to avoid net capture than zooplankton in the other zones. Since copepods are particularly strong swimmers, these are the taxa most likely to show this effect. Low numbers of zooplankton in zones 2 and 3 (as in July) may be associated with fish predation if large numbers of planktivores are attracted to the thermal plume.

Other factors may be responsible for the observation that a greater number of statistically significant differences were detected in zones 2 and 5 than in the boundary zones 1, 3, 4, and 6. These factors are associated with the design of the survey grid. Zones 2 and 5 extend over a smaller area than zones 1, 3, 4, and 6; spatial variability within these two smaller zones is likely to be less than in the boundary zones which extend over a wider area and have a greater probability of containing different water masses. This increased spatial variability reduces the ability to detect temporal variability. In addition zone 2 contains a maximum of 7 stations and zone 5 a maximum of 4 stations while zones 1, 3, 4, and 6 contain a maximum of 3 stations. The larger number of stations in zones 2 and 5 provide better estimates of the zone means and lower error estimates. Finally, zone 2 was heavily dredged in the preoperational years and zooplankton distributions in this disturbed region may have been atypical.

Plume Study

While the survey grid is designed to detect plant effects over a wide area (252 km^2), it provides little information on effects in the immediate discharge area. Generally condenser-passed water with an excess temperature of 0.5°C or more can be detected at only 3 of the 14 to 30 stations which are sampled during each cruise. Net hauls are collected from the lake bottom to the surface and this tends to dilute differences in zooplankton distributions which may occur in the floating thermal plume.

In order to obtain better information on zooplankton distributions in the immediate discharge area, we conducted a supplementary study on September 25, 1976. Zooplankton were collected continuously along a series of transects extending from approximately 1.6 km north of the plant site to the discharge jets for the 3-m series and a further 1.6 km south of the jets for the 1-m series. Water temperatures were recorded continuously and 2 navigational fixes were made every minute by using a Motorola Mini-Ranger (to provide ship location with time).

The sampling was done from the R/V MYSIS. The collecting apparatus consisted of a centrifugal pump (rated at 110 gal/min), a 7.5 cm hose equipped with a check valve, a 23-kg. weight, fairings, and a PVC pipe which discharged the pumped water into a 50-cm diameter, 156 µ mesh net suspended in a barrel of water. A thermistor was mounted in the PVC pipe and connected to a paper chart recorder.

The hose was lowered initially to 1-m and the MYSIS cruised at an approximate speed of 3.5 to 4.0 knots (minimum cruising speed) along a zig-zag pattern. Every 2 minutes, the net suspended in the barrel of water was changed, a procedure requiring a few seconds. A total of 85 samples were collected for the 1-m transect series between 13:46 and 16:35 EDT. A second series was conducted sampling water from 3 m but only the north half of the survey grid could be sampled before sunset. A total of 46 samples were collected between 17:44 and 19:14 EDT.

Results

This report presents preliminary results of the 1-m sampling series. Every second sample from both transect series has been counted but so far only the results from the 1-m series have been examined in detail.

Figure 32 shows the plot of 1-m water temperatures. A well developed thermal plume was detected extending at least 0.8 km north of the plant site and flowing offshore. Colder water (17.5 to 18.0°C) was located south of the discharge jets.

Large differences in the concentrations of several zooplankton taxa were observed in the thermal plume in comparison to their concentrations outside the plume. Generally copepods occurred in high concentrations (Fig. 33) inside the plume and in lower concentrations outside the plume while the reverse situation was noted for the cladocerans (Fig. 34). Preliminary results of principal component analyses of 13 zooplankton taxa abundances at 42 stations indicate that the immediate discharge area can be subdivided into approximately eight regions (Fig. 35). Regions 1 and 2 correspond to high concentrations of copepods and low concentrations of cladocerans while region 8 corresponds to high concentrations of cladocerans and low concentrations of copepods.

Several hypotheses are being considered to explain these distributions. One possibility is that zooplankton drawn into the power plant through the intake structures and plume-entrained zooplankton occurred in different concentrations than zooplankton at 1-m. This possibility is being evaluated against known zooplankton concentrations in the survey grid during the September short survey cruise and in the cooling waters during the September entrainment study. Further information on zooplankton distributions at a number of depths at DC-6 on the morning of the plume study are also being examined.

REFERENCES

Conover, W. J. 1971. Practical Nonparametric Statistics. Wiley, New York.

Siegel, S. 1956. Nonparametric Statistics for the Behavioral Sciences. McGraw-Hill, New York.

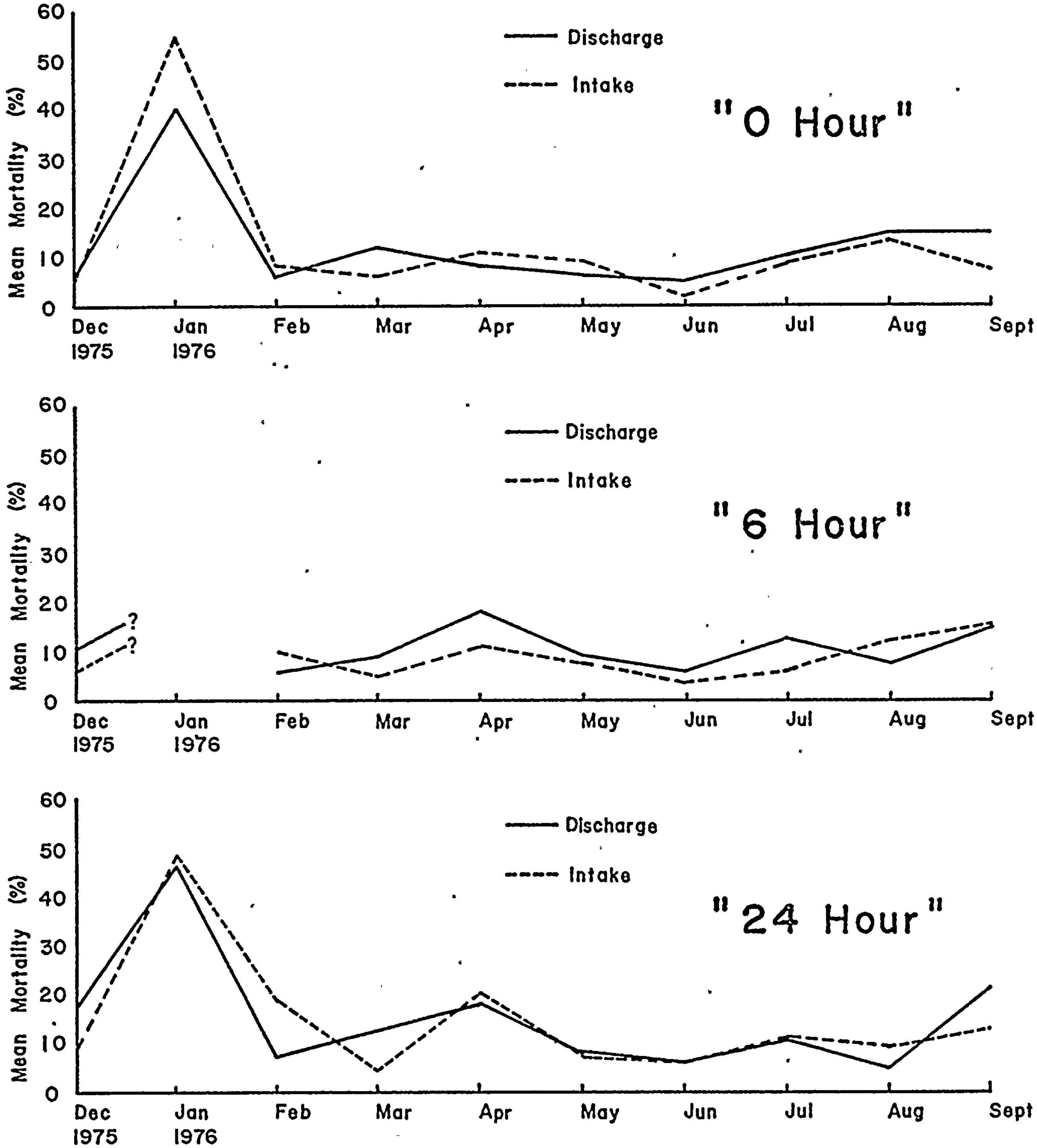

FIGURE 1. The mean mortality (%) after 0, 6, and 24 hours incubation of total zooplankton collected from the intake forebay (MTR 1-5, 6 m) and discharge bay (Unit 1). Six-hour incubations were not counted in January.

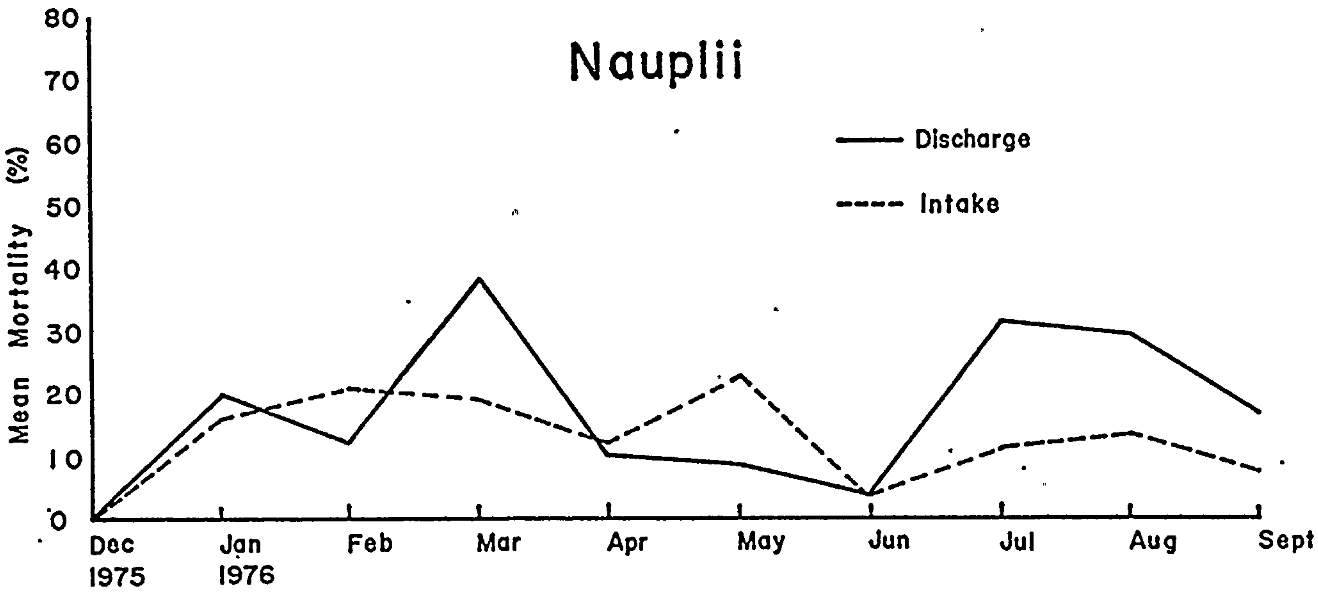

FIGURE 2. The mean mortality (%) at 0-hours of nauplii from the intake forebay (MTR 1-5, 6 m) and the discharge bay (Unit 1) over 10 months.

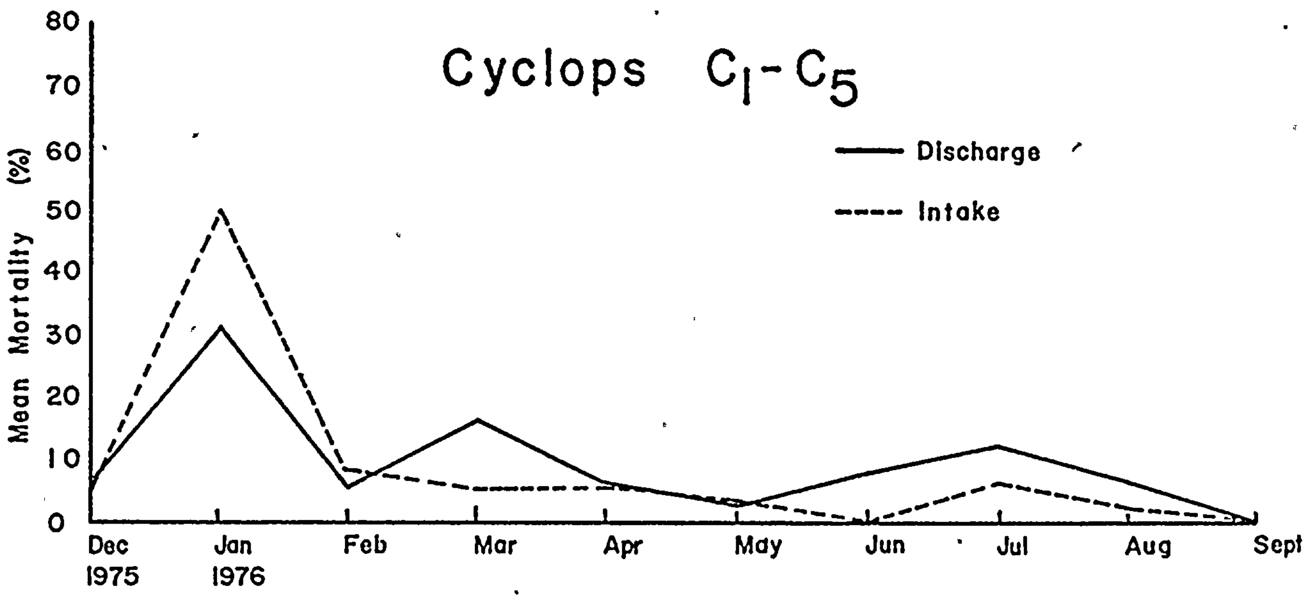

FIGURE 3. The mean mortality (%) at 0-hours of immature *Cyclops* spp. copepodites from the intake forebay (MTR 1-5, 6 m) and the discharge bay (Unit 1) over 10 months.

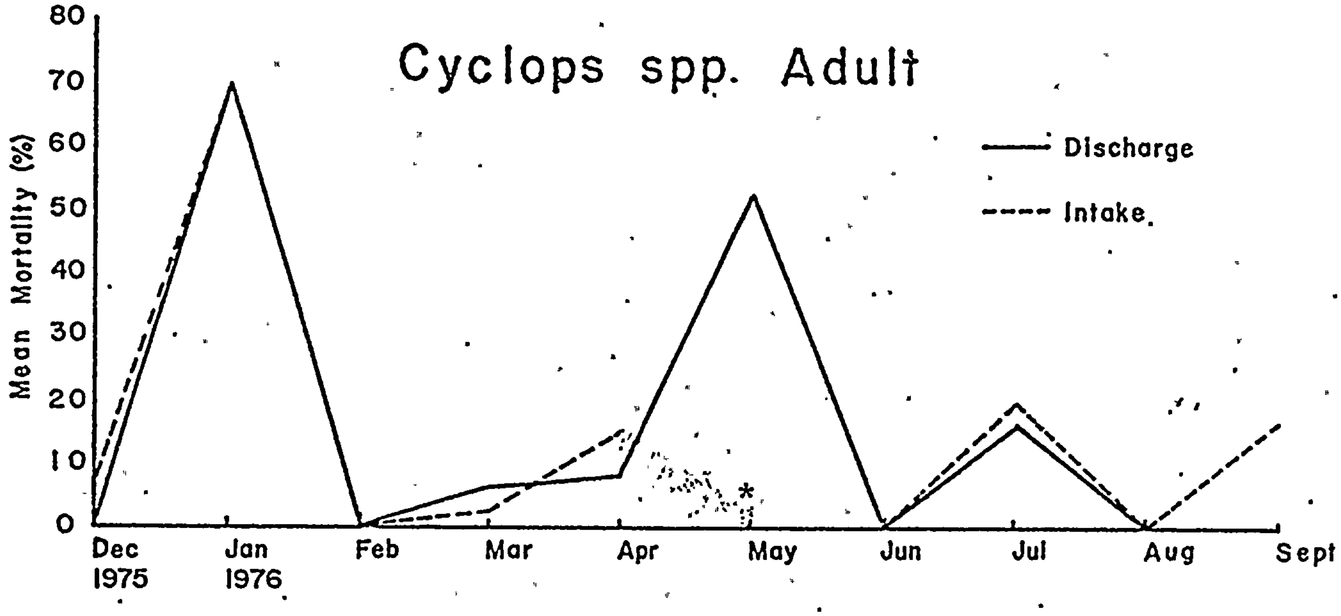

FIGURE 4. The mean mortality (%) at 0-hours of adult *Cyclops* spp. from the intake forebay (MTR 1-5, 6 m) and discharge bay (Unit 1) over 10 months. No adults were found in the May intake samples (*).

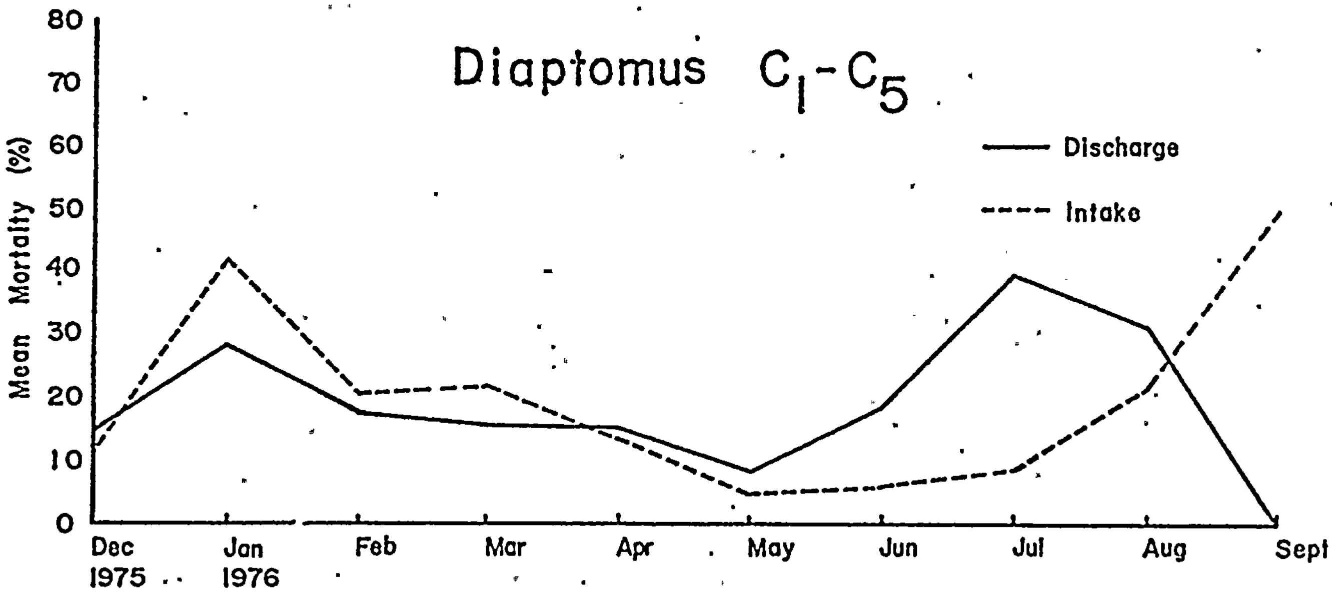

FIGURE 5. The mean mortality (%) at 0-hours of immature *Diaptomus* spp. copepodites from the intake forebay (MTR 1-5, 6 m) and discharge bay (Unit 1) over 10 months.

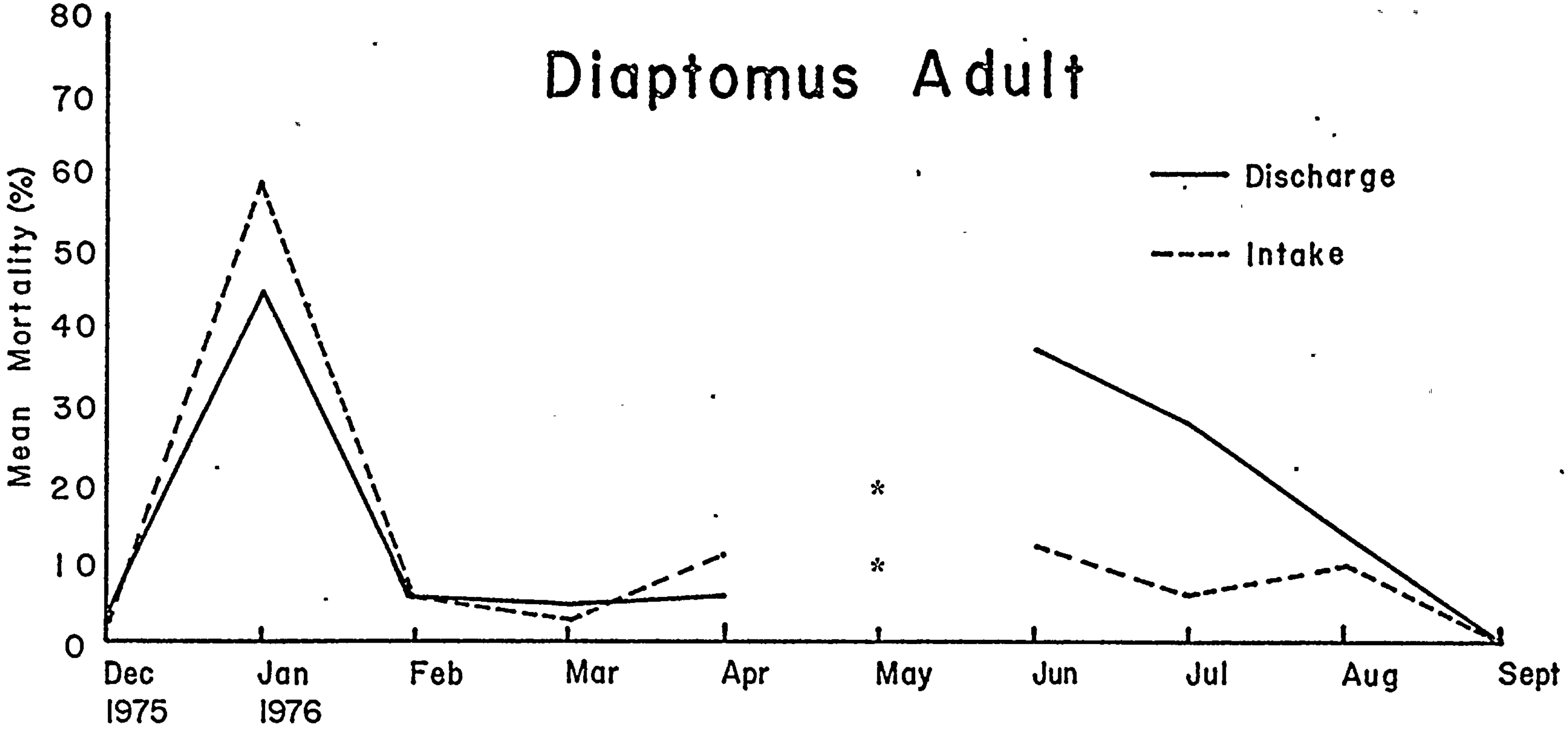

FIGURE 6. The mean mortality (%) of adult *Diaptomus* spp. from the intake forebay (MTR 1-5, 6 m) and discharge bay (Unit 1) over 10 months. No adults were found in the May samples (*).

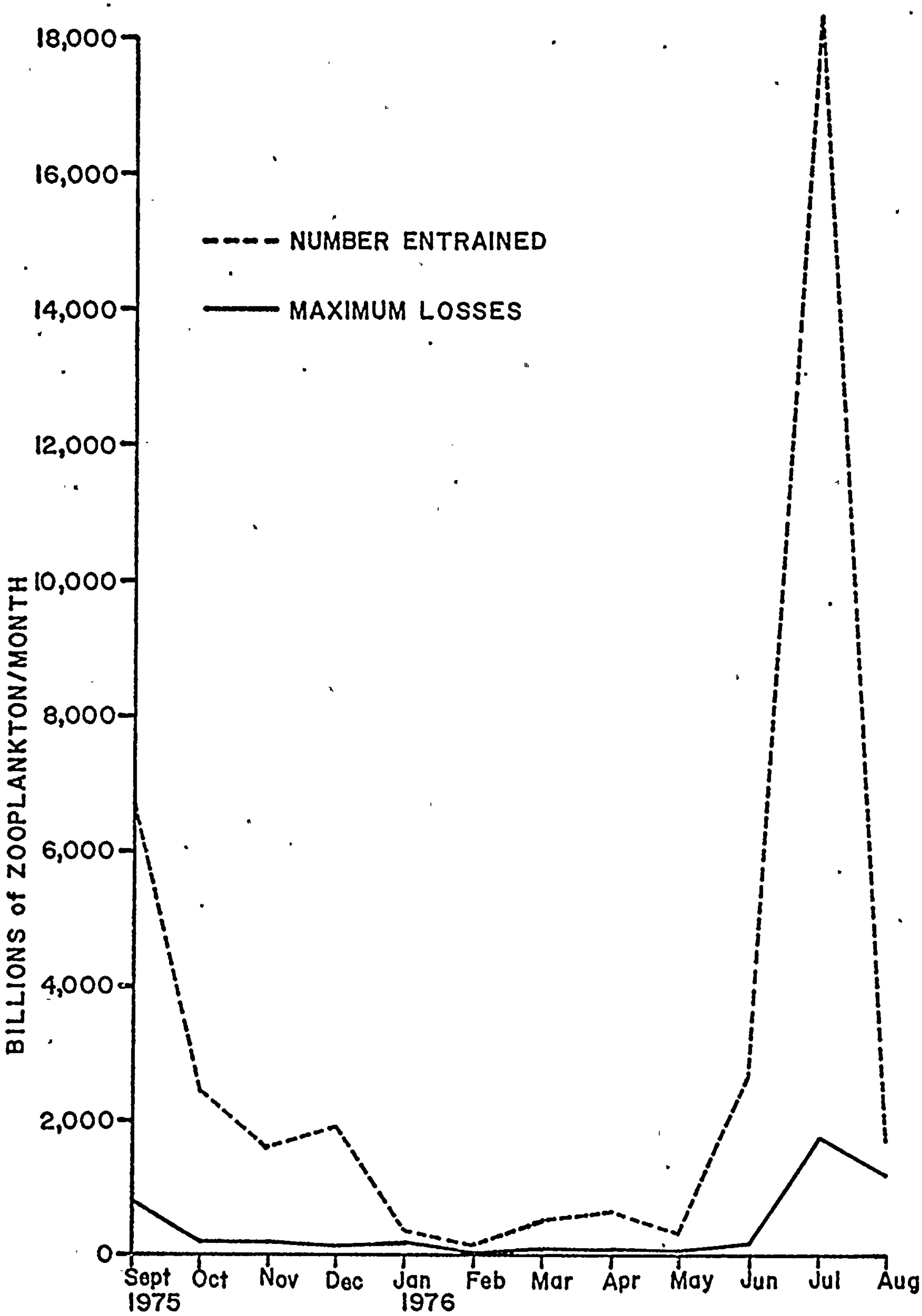

FIGURE 7. The estimated numbers of zooplankton passing through the power plant each month and the estimated maximum number of zooplankton killed by condenser passage.

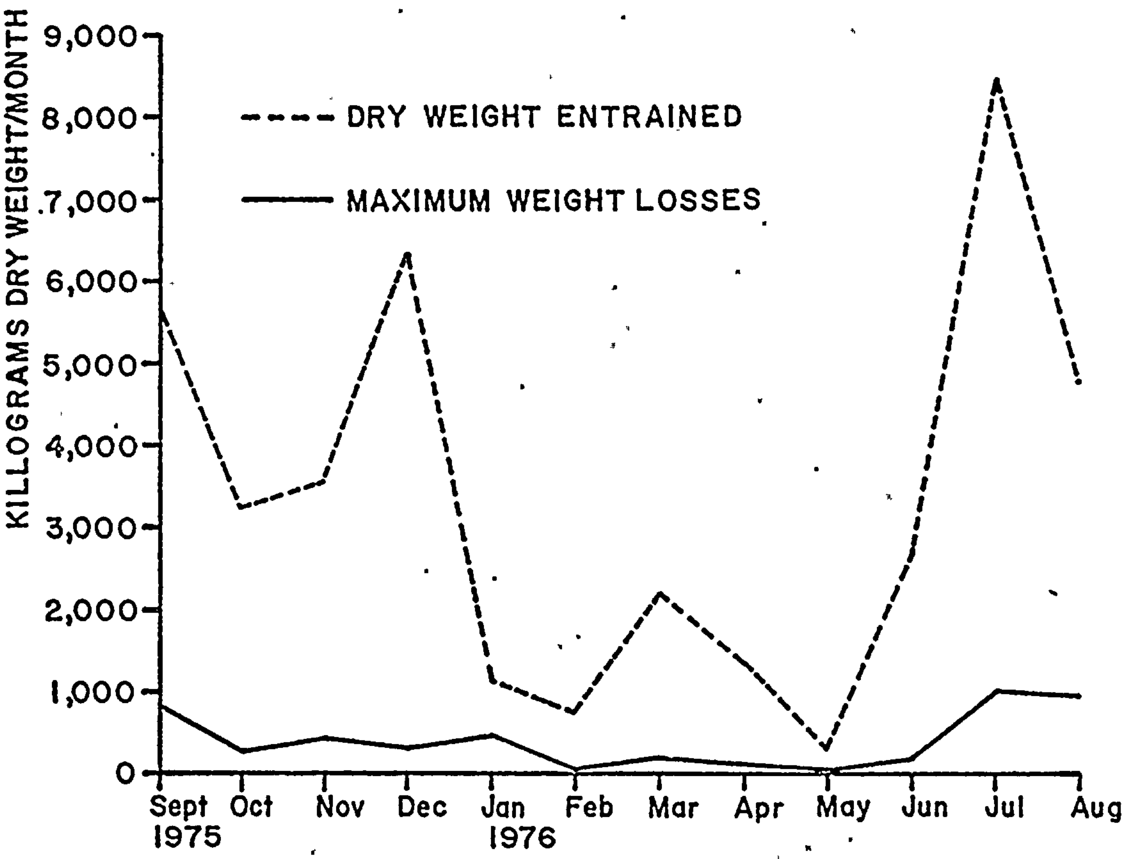

FIGURE 8. The estimated biomass of zooplankton passing through the power plant each month and the estimated maximum biomass of zooplankton killed during or immediately after condenser passage.

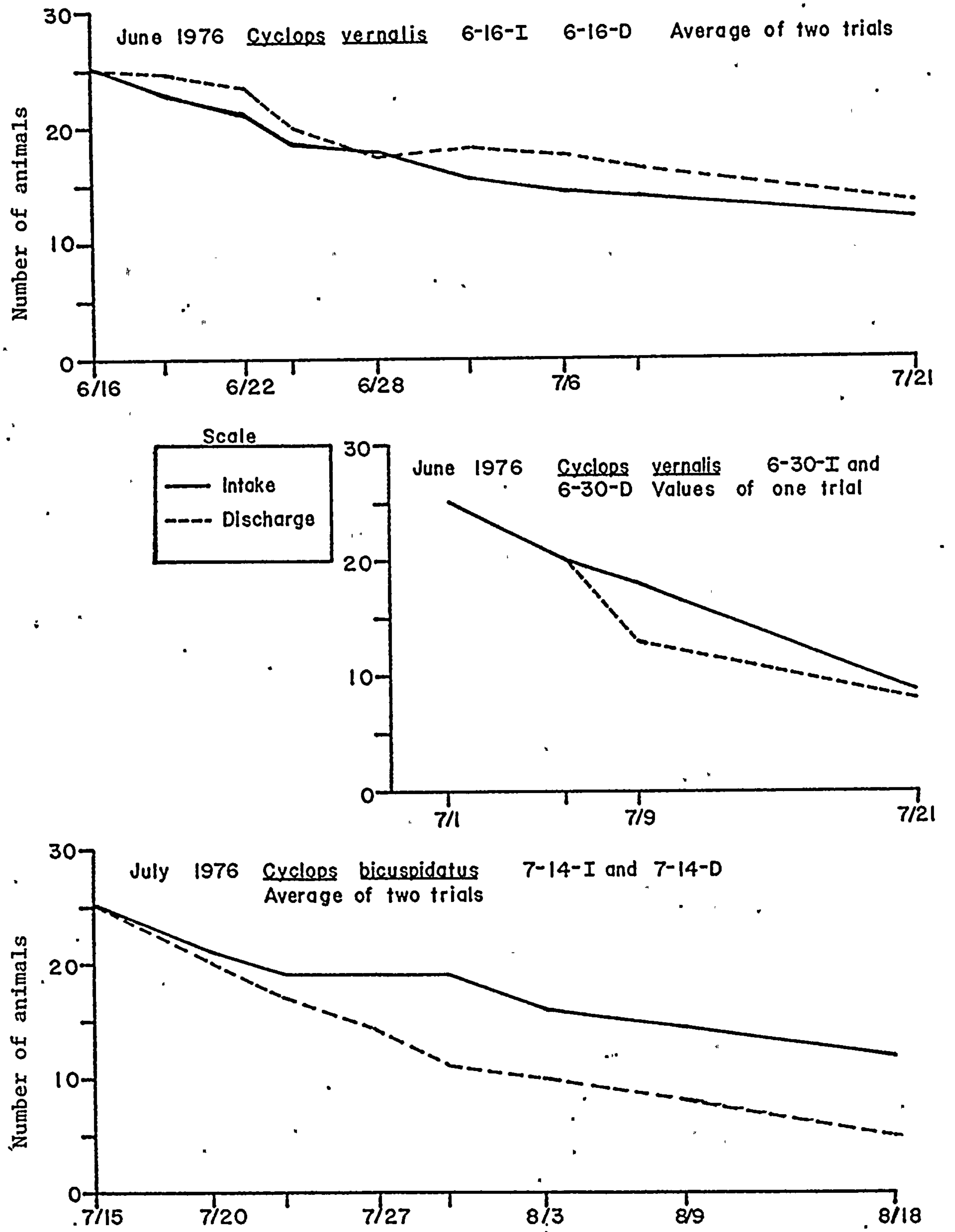

FIGURE 9. The population history of laboratory cultures of *Cyclops vernalis* or *bicuspidatus* collected from the intake and discharge forebays.

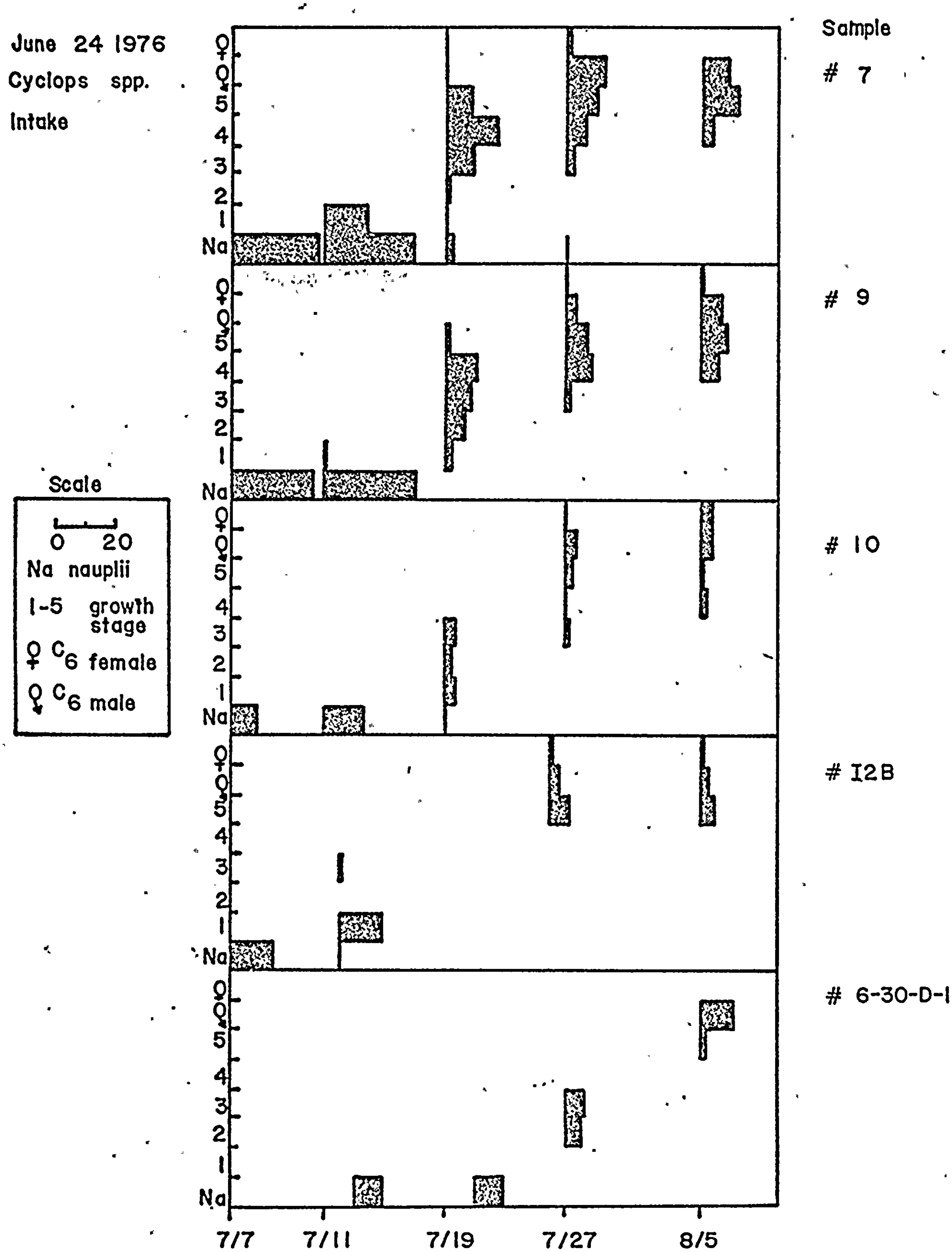

FIGURE 10. The developmental history of clutches from individual gravid *Cyclops vernalis* females from nauplii through copepodid stage 6.

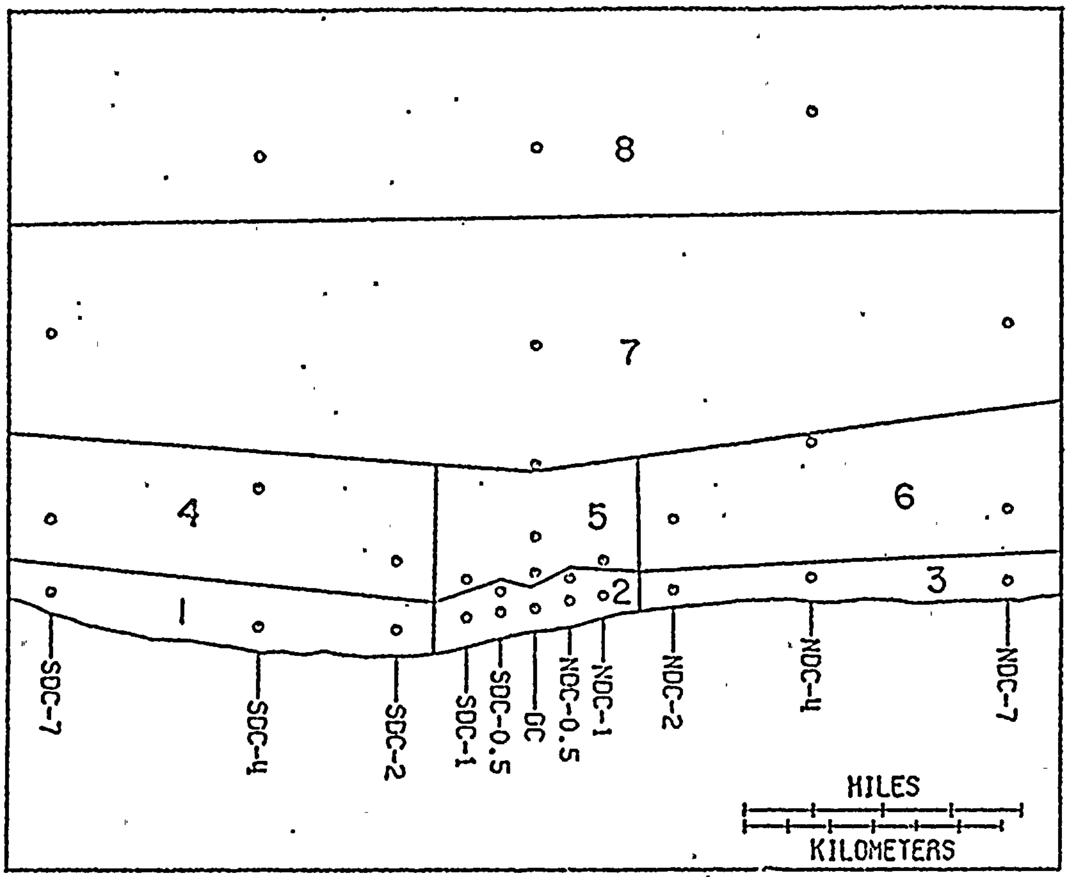

FIGURE 11. The survey grid divided into eight zones. Circles refer to station locations during the major survey cruises (April, July, October).

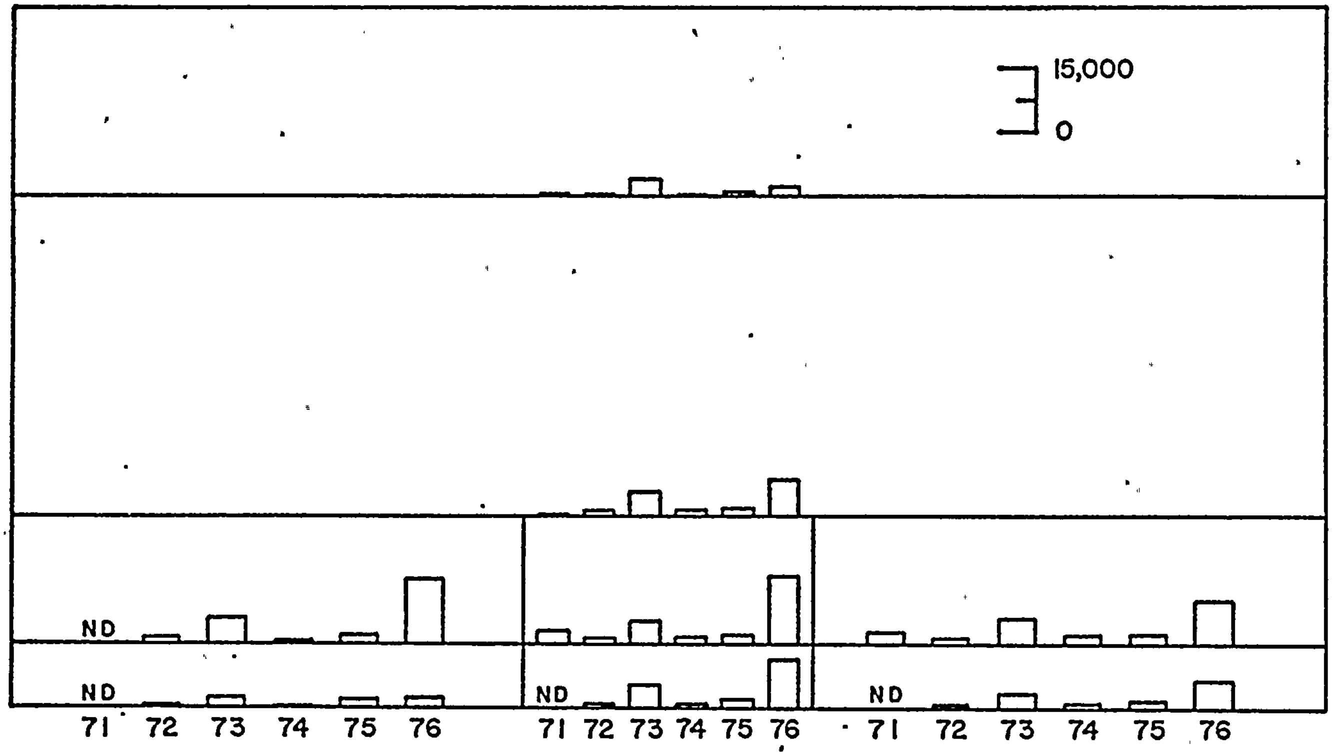

FIGURE 12. The mean number of copeopd nauplii per m^3 found at the stations in each zone in April 1971-1976 (ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

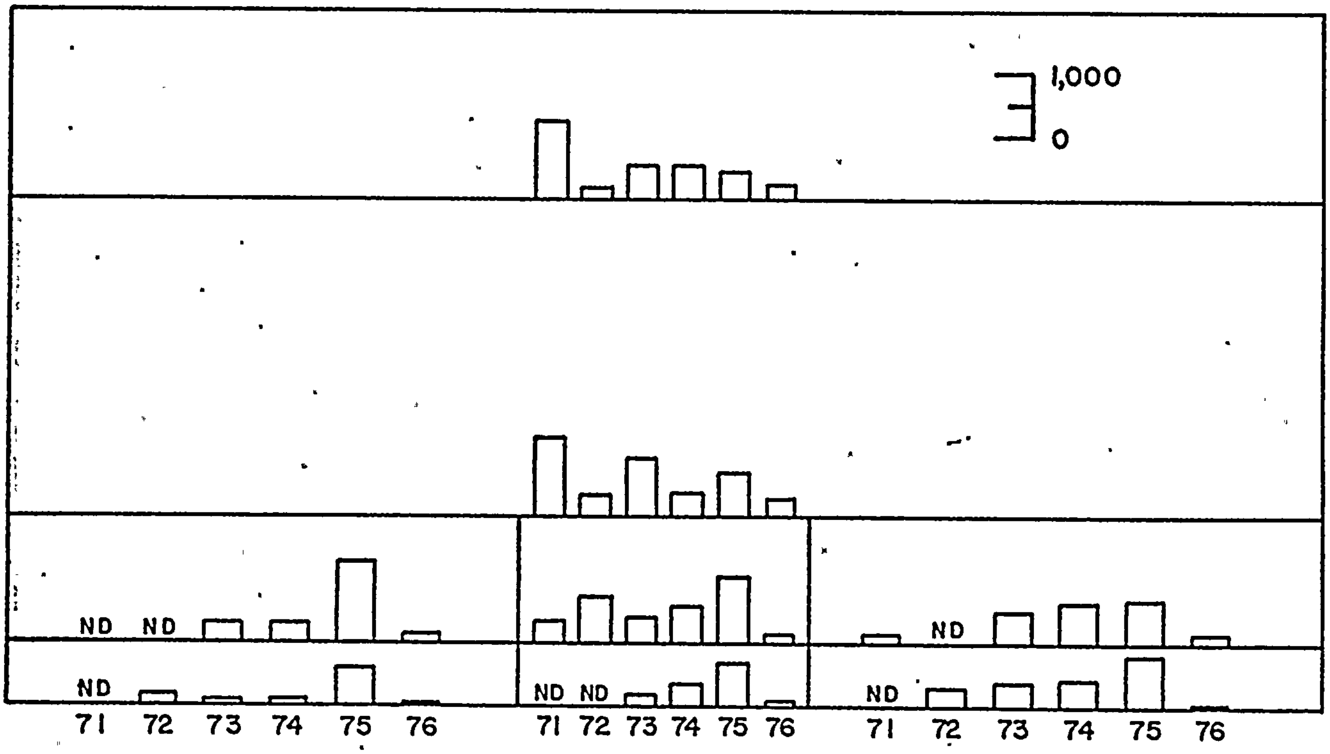

FIGURE 13. The mean number of immature *Cyclops* spp. per m^3 found at the stations in each zone in April 1971-1976 (ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

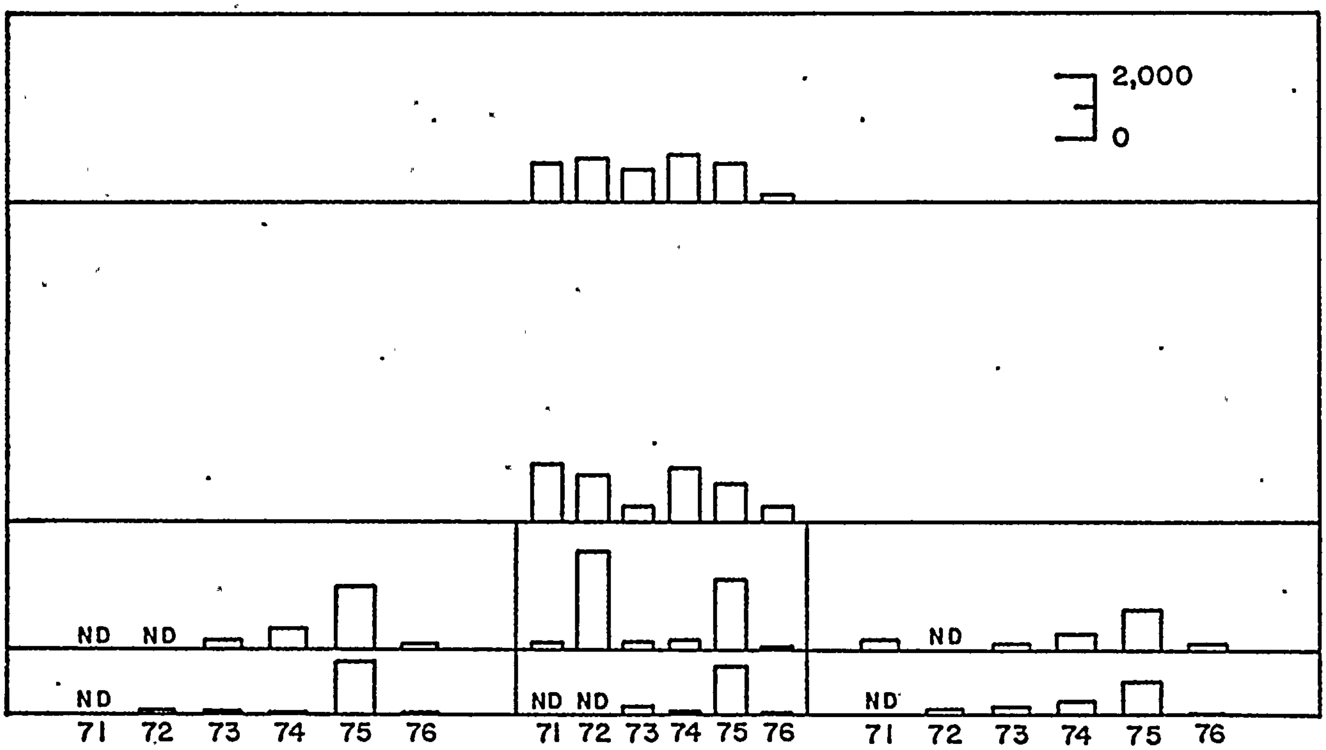

FIGURE 14. The mean number of *Cyclops* spp. C6 found at the stations in each zone in April 1971-1976 (ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

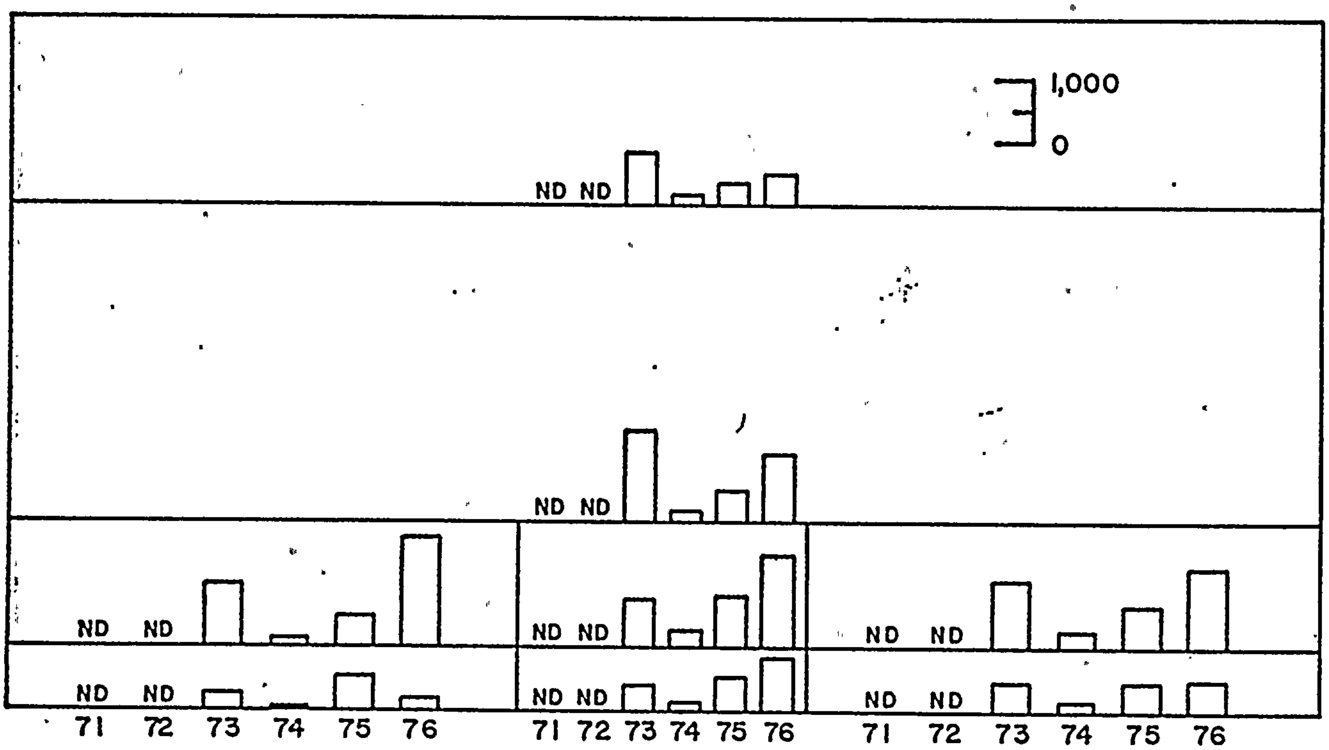

FIGURE 15. The mean number of immature *Diaptomus* spp. found at the stations in each zone in April 1971-1976.(ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

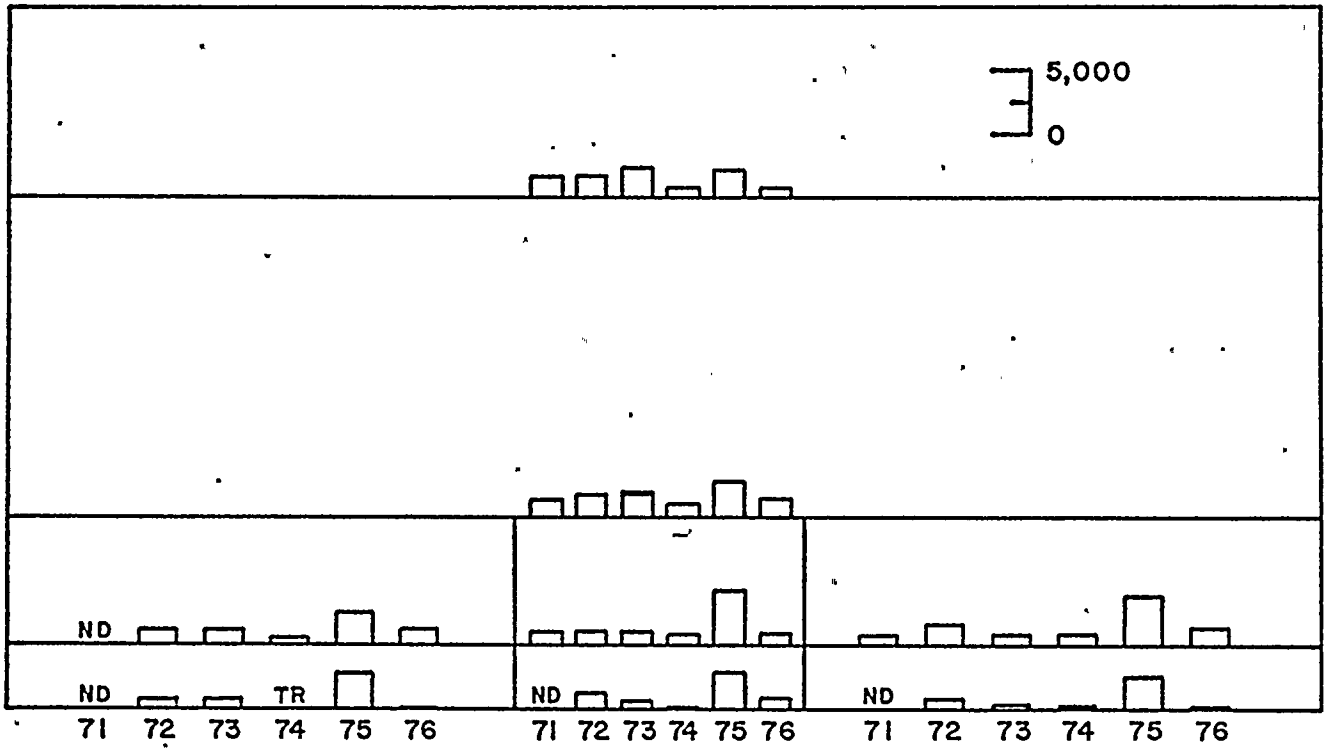

FIGURE 16. The mean number of *Diaptomus* spp. C6 per m^3 found at the stations in each zone in April 1971-1976 (ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

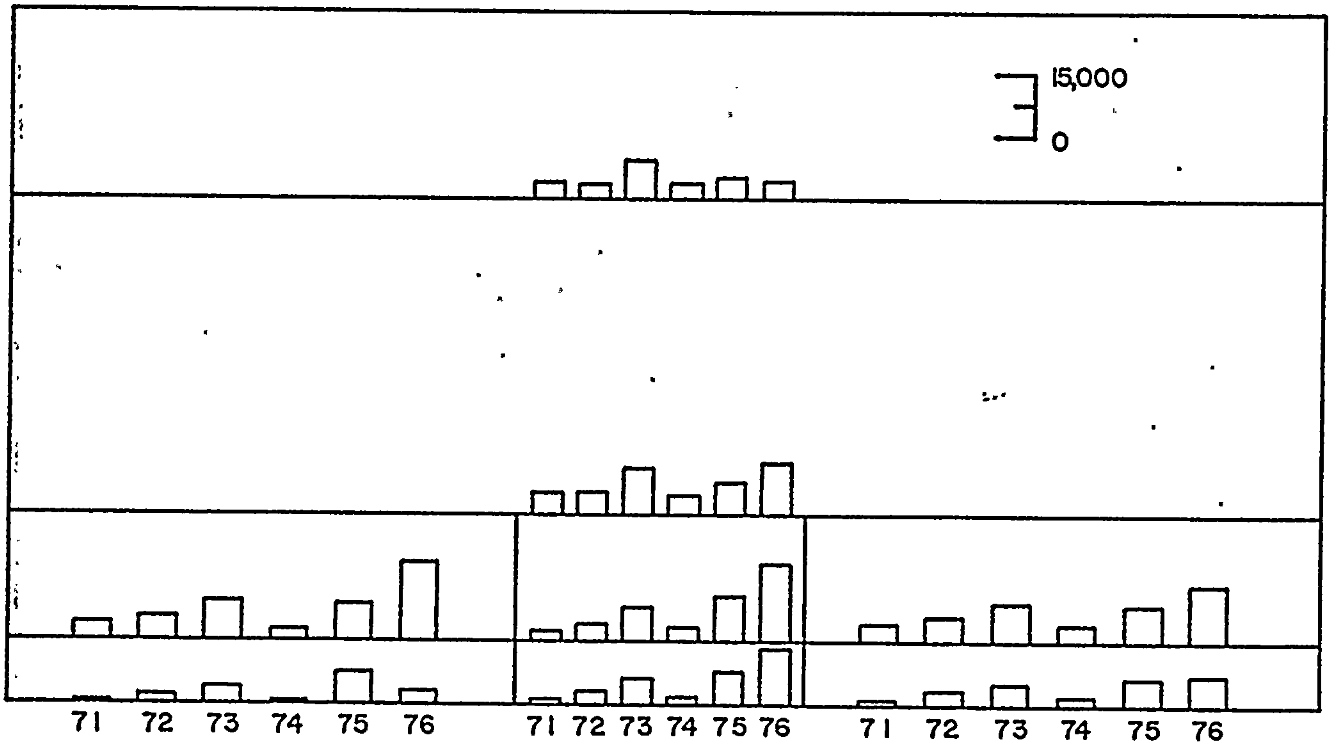

FIGURE 17. The mean number of zooplankton found at the stations in each zone in April 1971-1976. The number of stations in some zones varies from year to year.

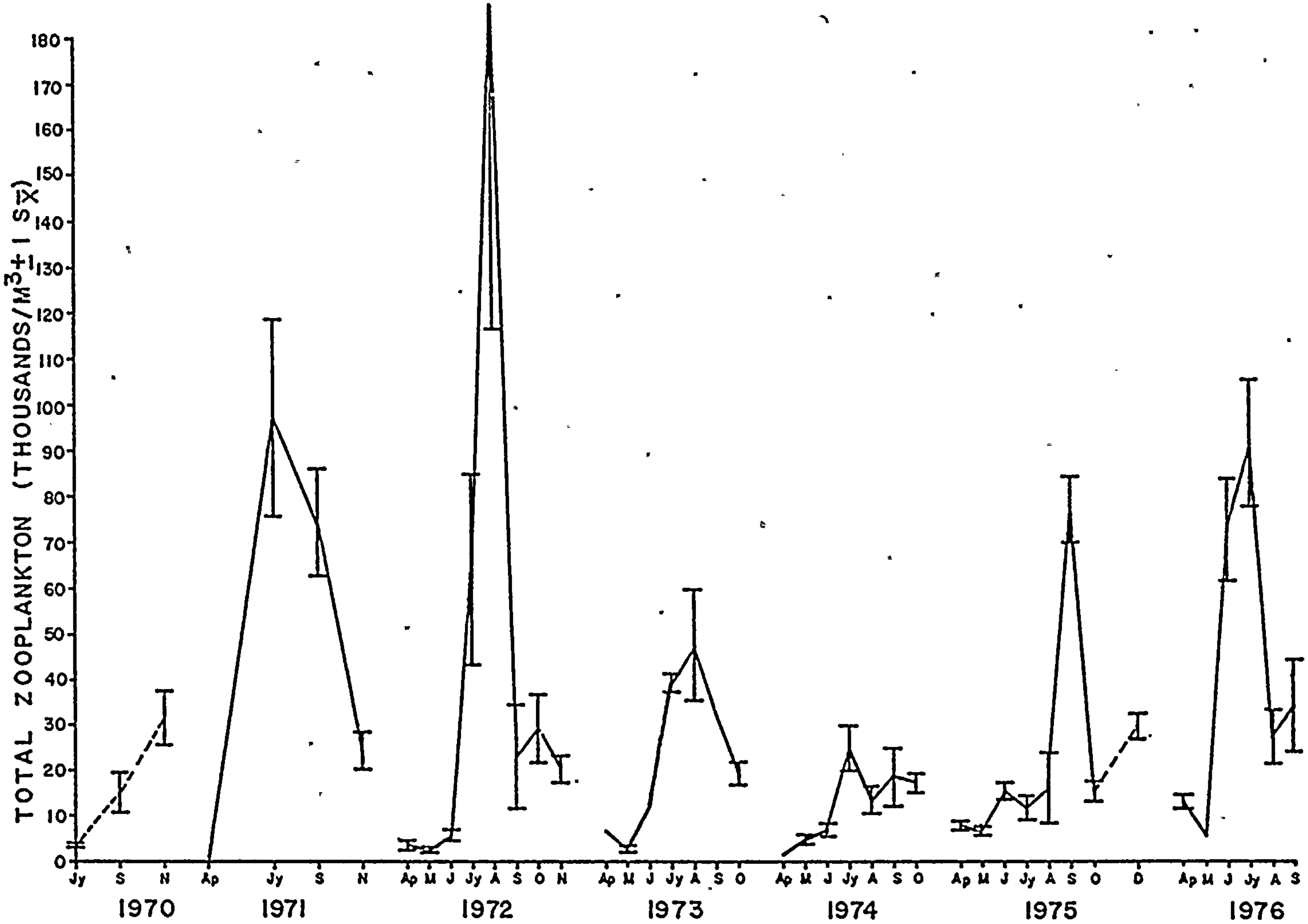

FIGURE 18. The mean number of zooplankton per m^3 found at the stations in Zone 2 (inshore plume) in 1975-76 and in a similar area of the survey grid in 1970-1974.

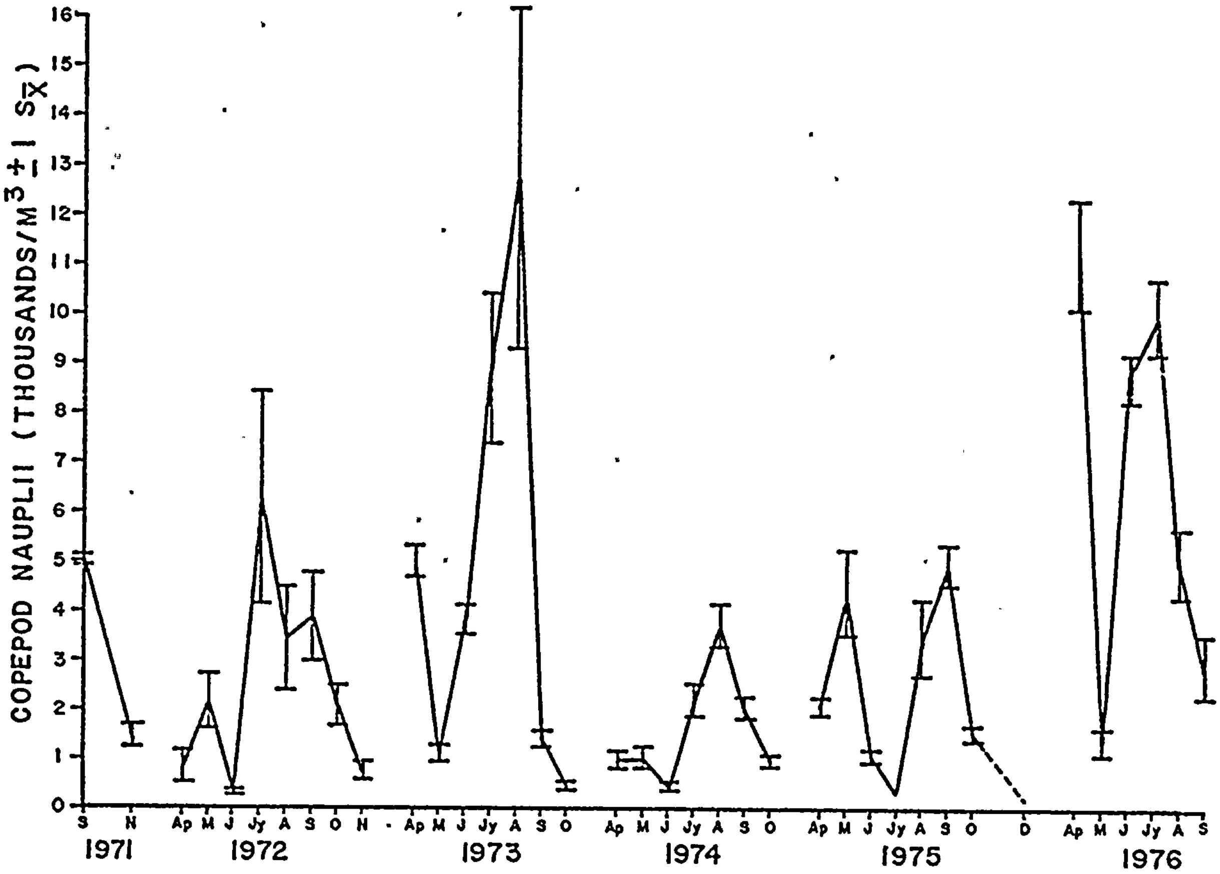

FIGURE 19. The mean number of copepod nauplii per m^3 found at the stations of Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1971-1974.

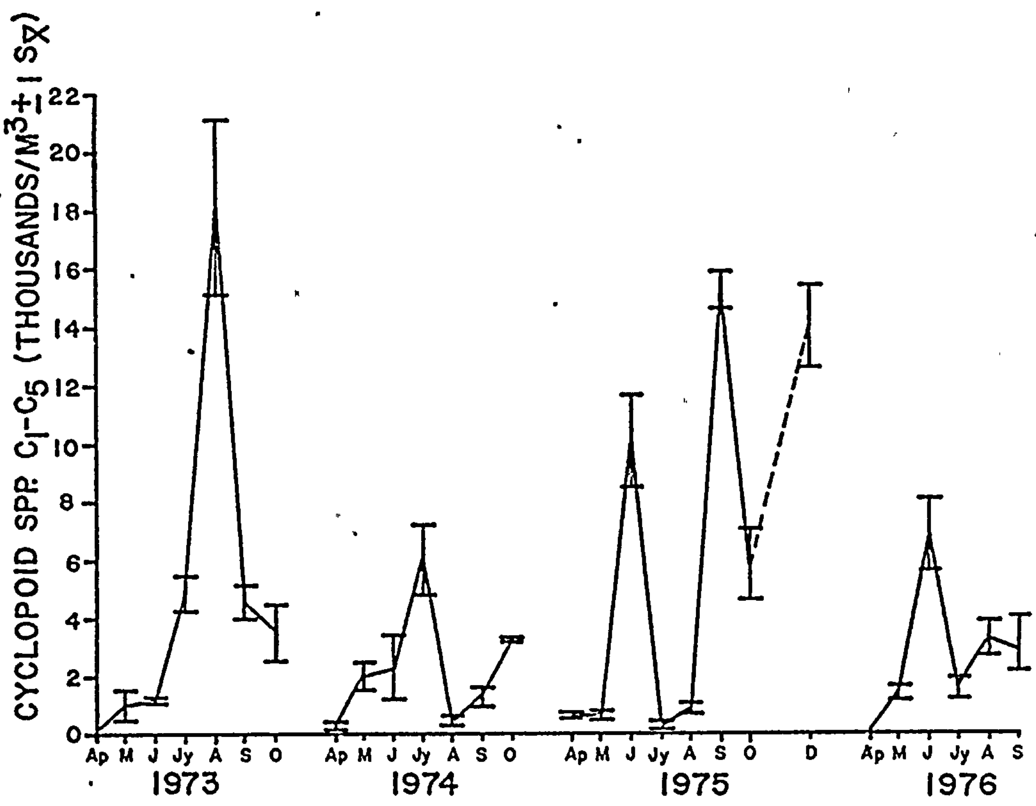

FIGURE 20. The mean number of immature cyclopoid copepodites per m^3 found at the stations in Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1973-1974.

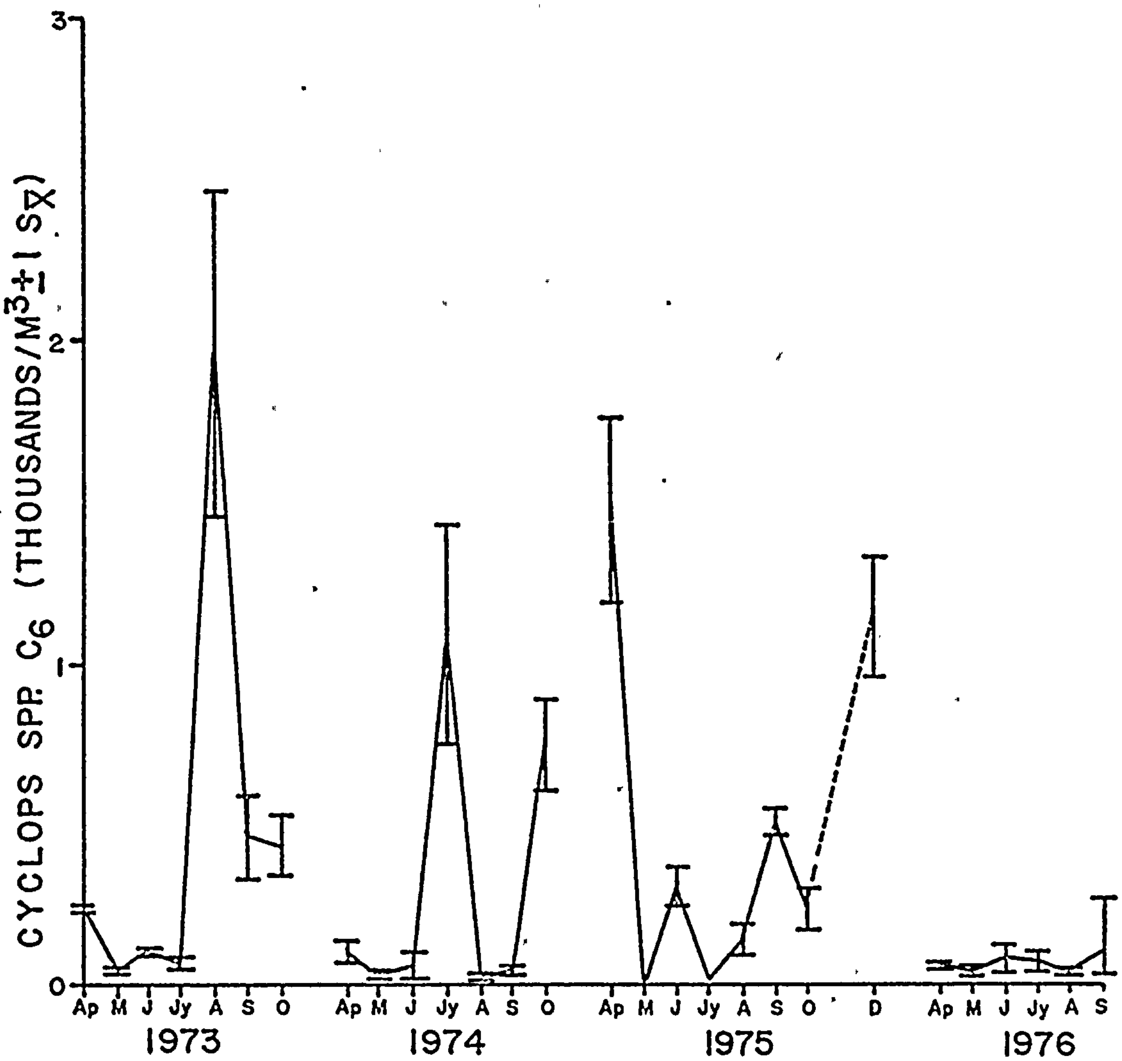

FIGURE 21. The mean number of *Cyclops* spp. C6 per m^3 found at the stations in Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1973-1974.

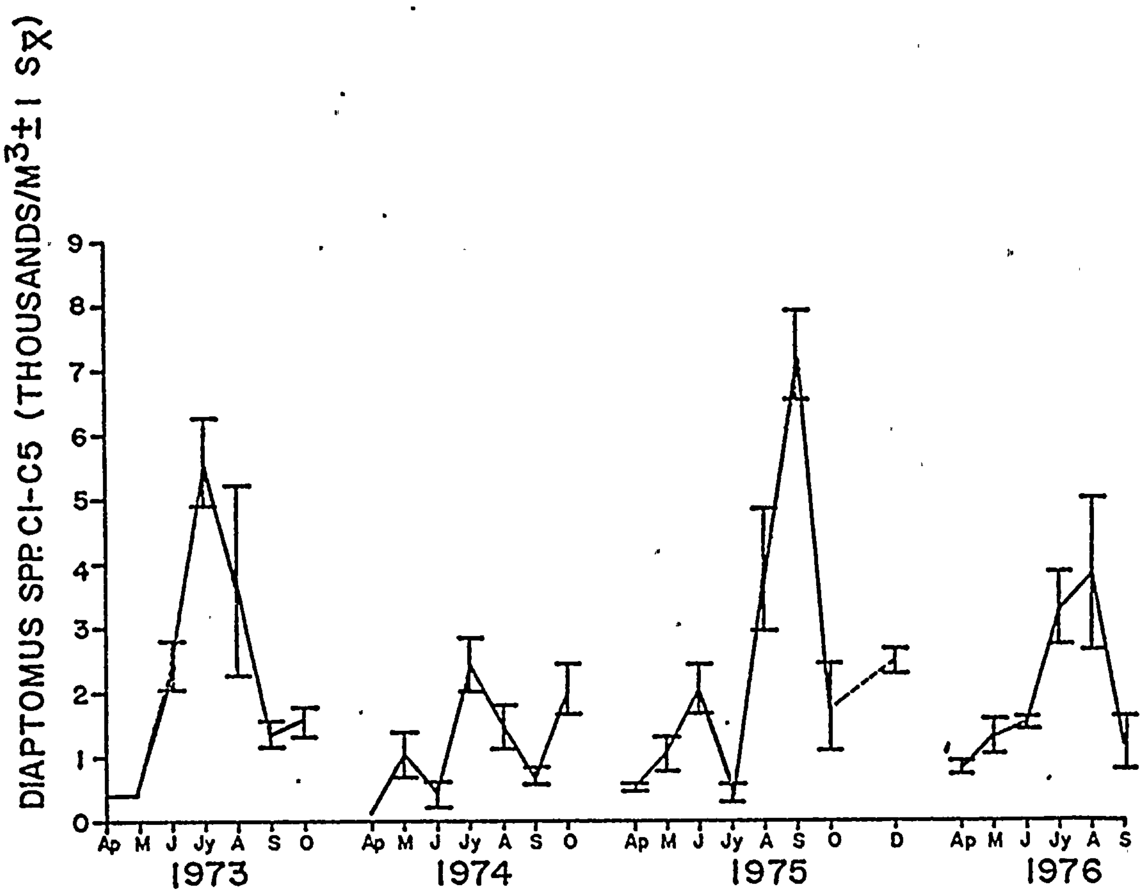

FIGURE 22. The mean number of *Diaptomus* spp. C1-C5 per m^3 found at the stations in Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1973-1974.

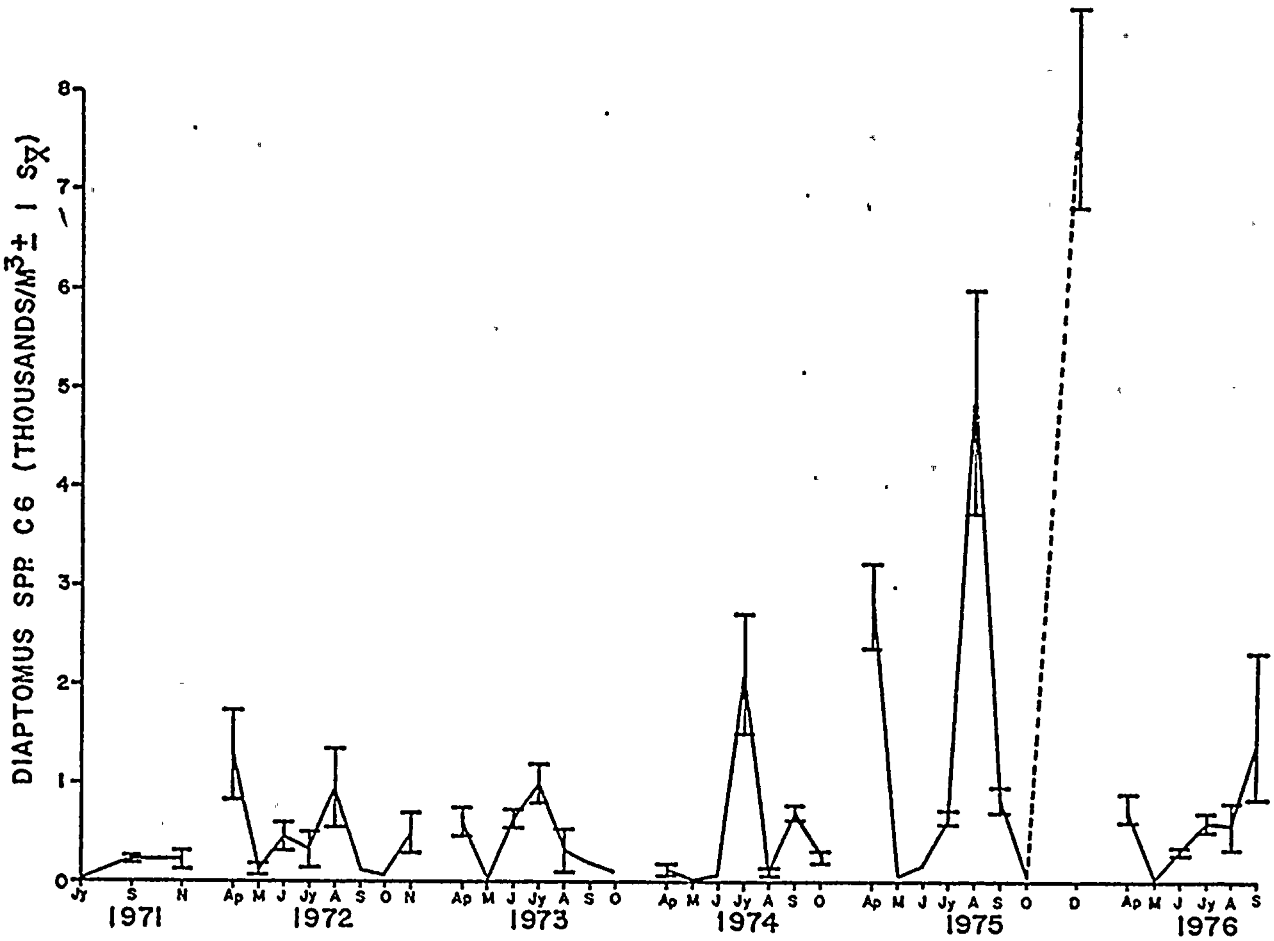

FIGURE 23. The mean number of *Diaptomus* spp. C6 per m^3 found at the stations in Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1971-1974.

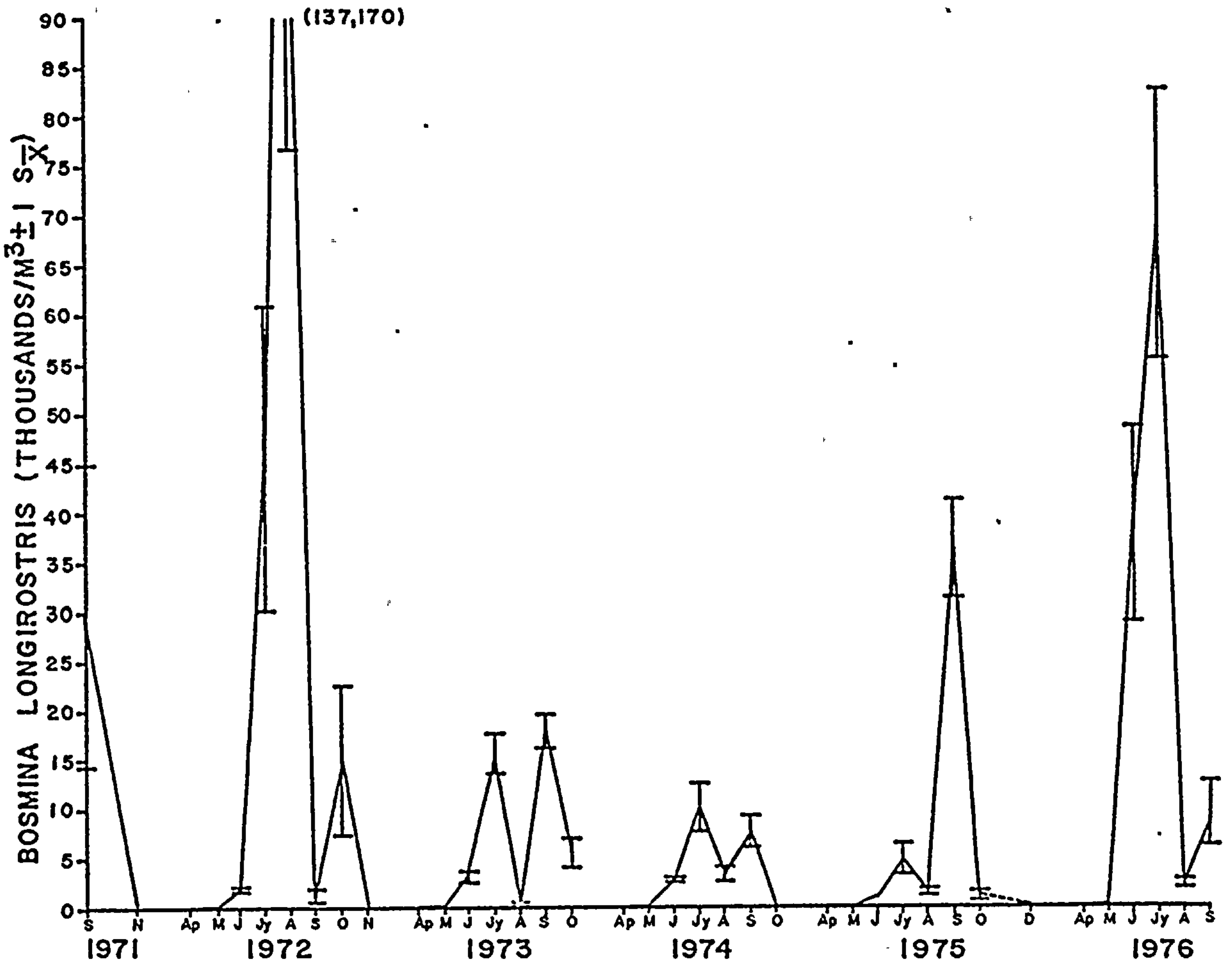

FIGURE 24. The mean number of *Bosmina longirostris* per m^3 found at the stations in Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1971-1974.

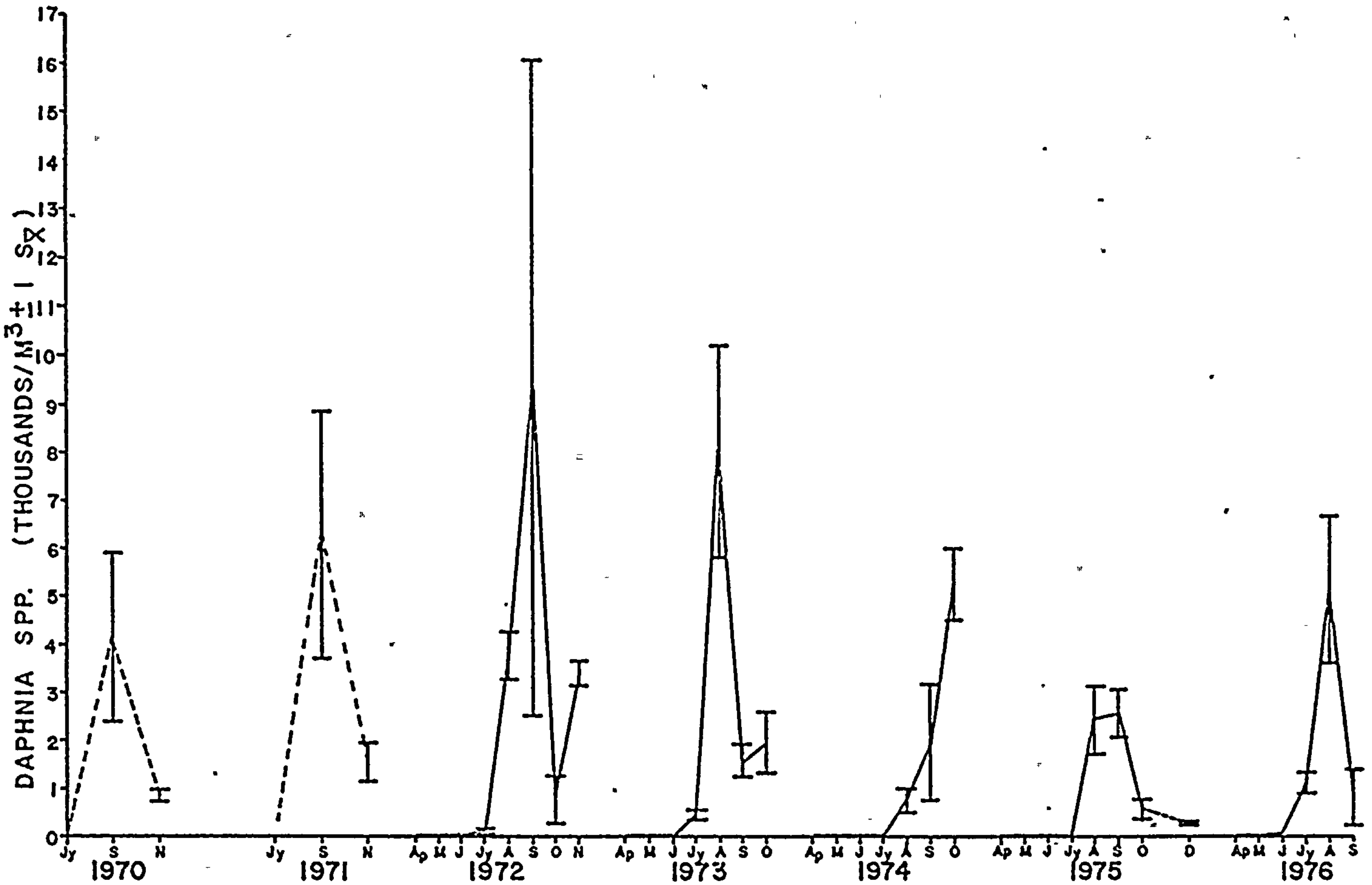

FIGURE 25. The mean number of *Daphnia* spp. per m^3 found at the stations in Zone 2 (inshore plume) in 1975-1976 and in a similar area of the survey grid in 1970-1974.

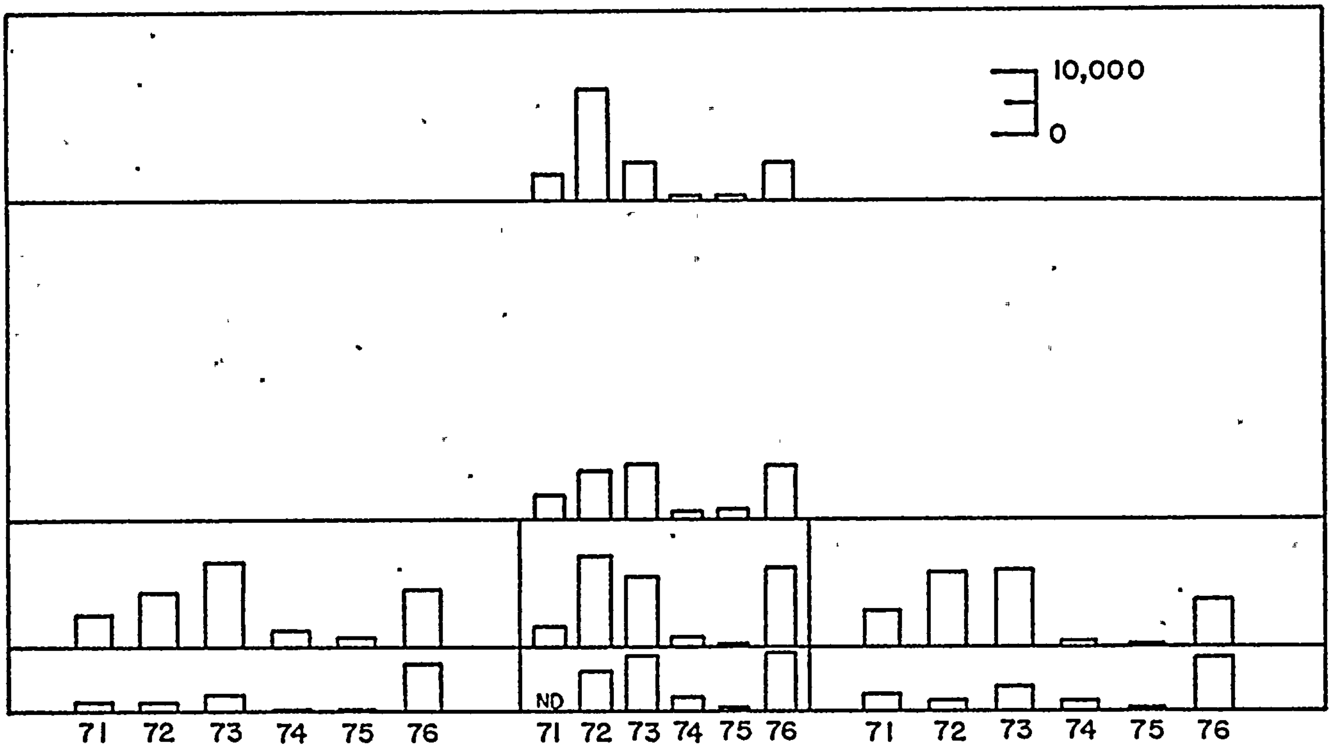

FIGURE 26. The mean number of copepod nauplii per m^3 found at the stations in each zone in July 1971-1976 (ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

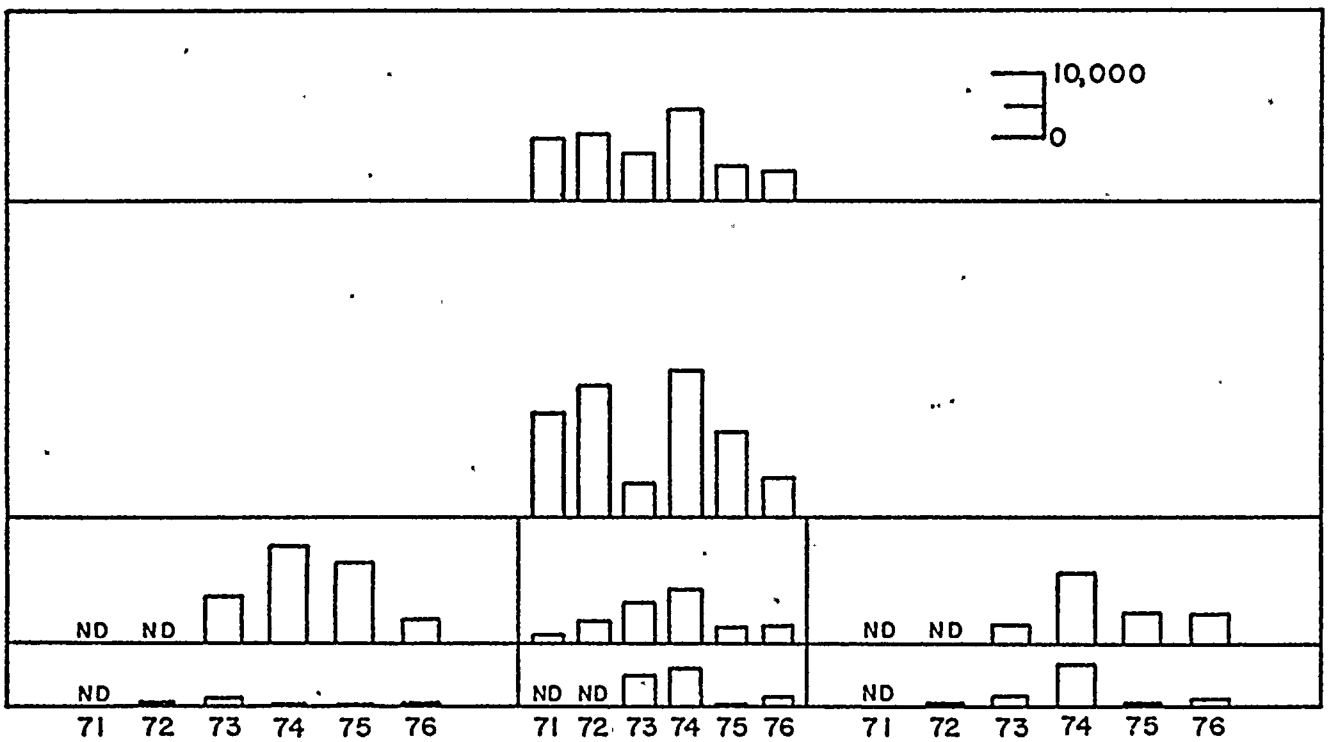

FIGURE 27. The mean number of immature *Cyclops* spp. per m^3 found at the stations in each zone in July 1971-1976 (ND indicates that the #/m^3 was not determined in that year). The number of stations in some zones varies from year to year.

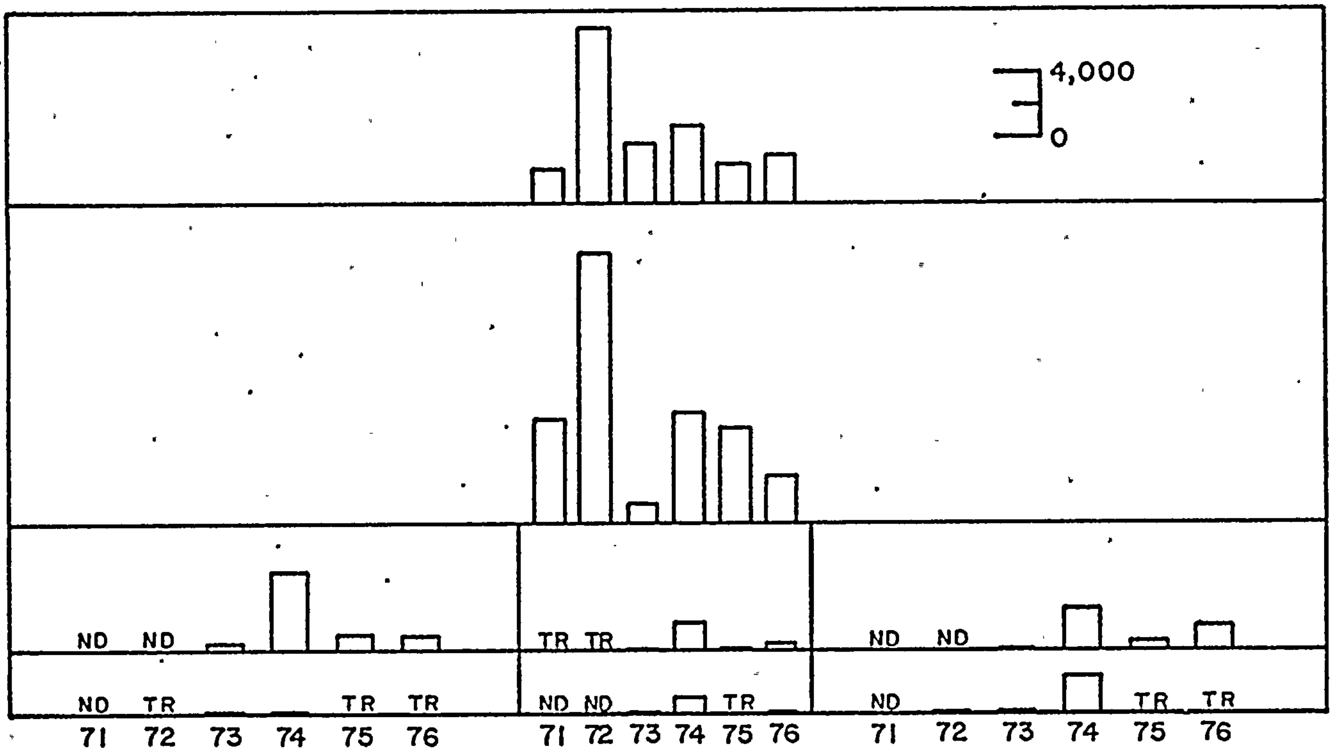

FIGURE 28. The mean number of *Cyclops* spp. C6 per m^3 found at the stations in each zone in July 1971-1976 (ND indicates that the $\#/m^3$ was not determined, TR indicates the $\#/m^3$ was too low to be visible on the histogram). The number of stations in some zones varies from year to year.

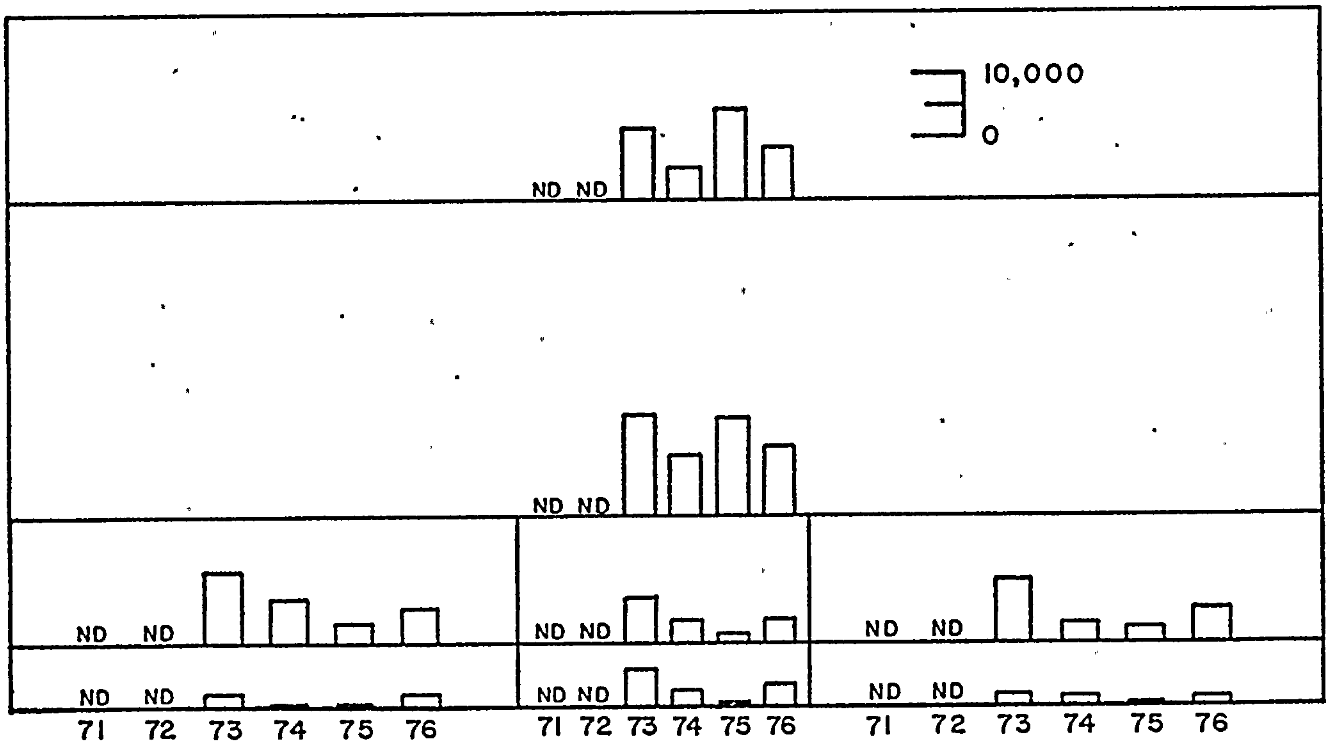

FIGURE 29. The mean number of immature *Diaptomus* spp. per m^3 found at the stations in each zone in July 1971-1976 (ND indicates that the $\#/m^3$ was not determined in that year). The number of stations in some zones varies from year to year.

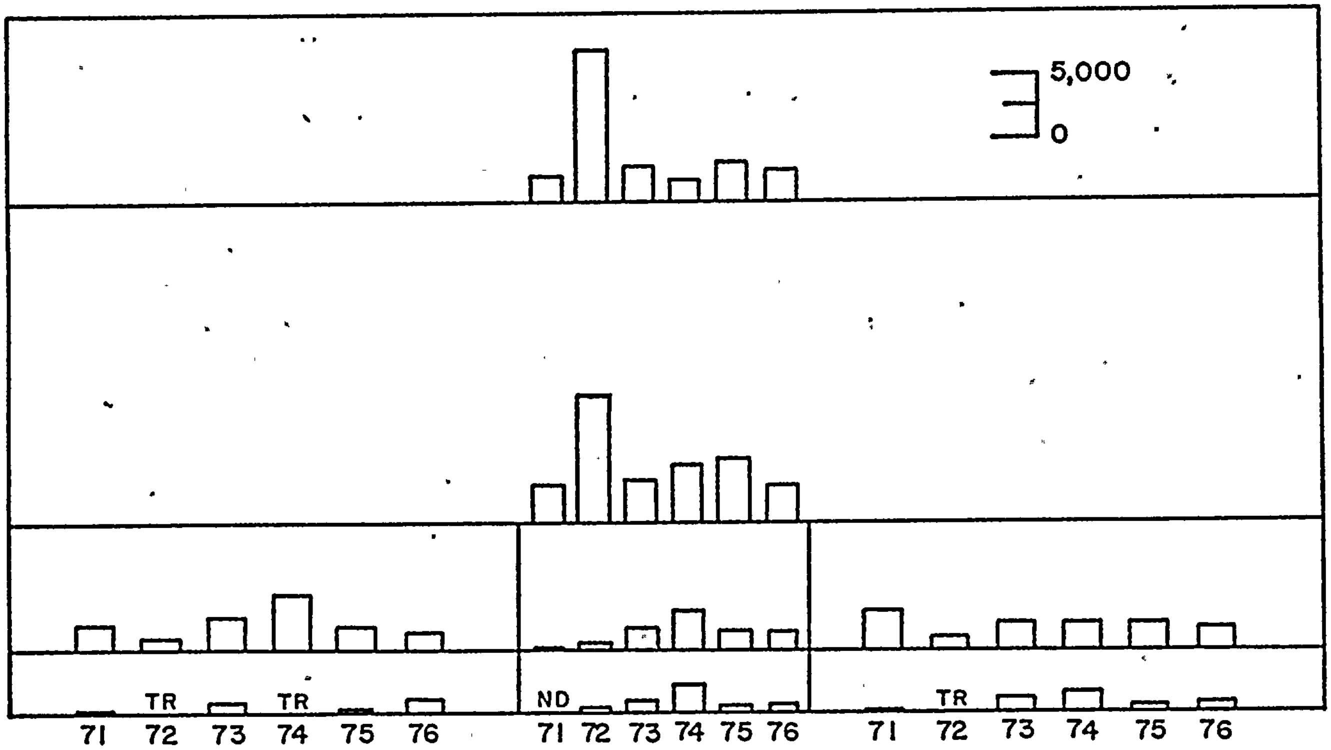

FIGURE 30. The mean number of *Diaptomus* spp. C6 per m^3 found at the stations in each zone in July 1971-1976 (ND indicates that the #/m^3 was not determined, TR indicates that the #/m^3 was too low to be visible on the histogram). The number of stations in some zones varies from year to year.

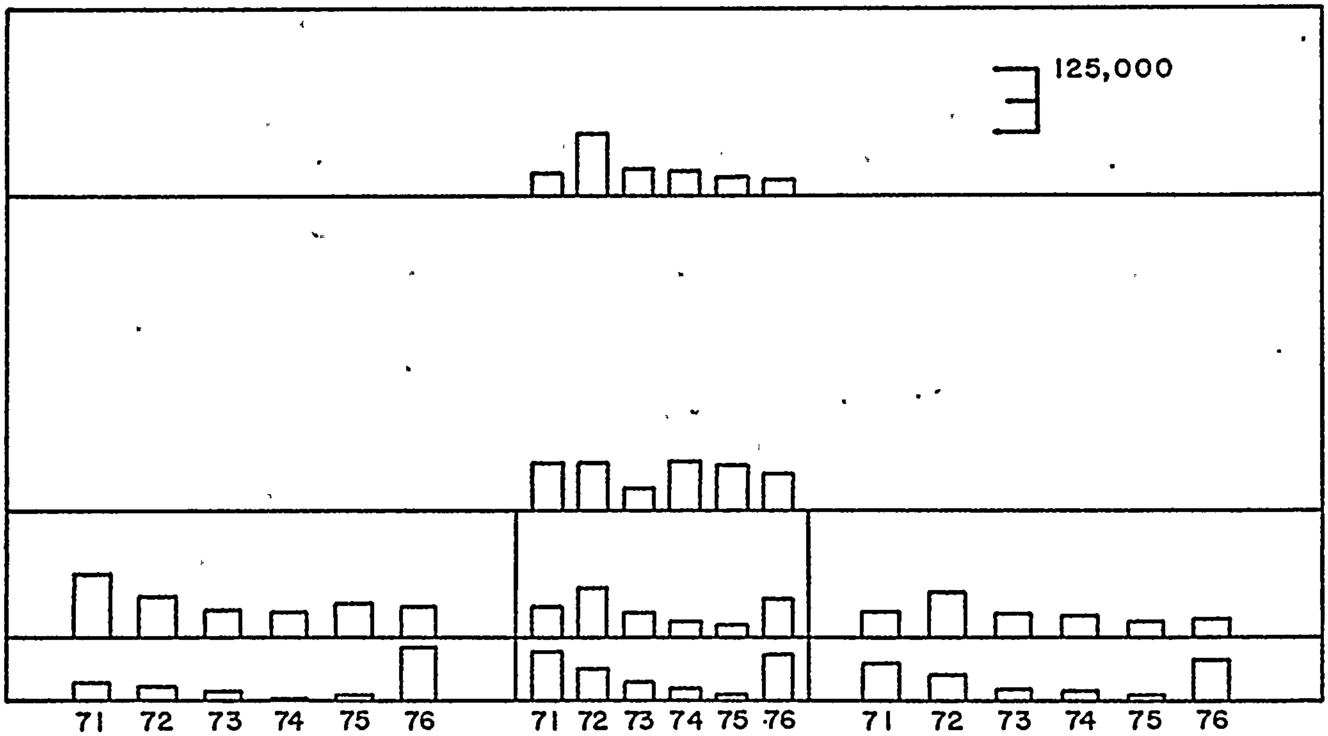

FIGURE 31. The mean number of zooplankton per m^3 found at the stations in each zone in July 1971-1976. The number of stations in some zones varies from year to year.

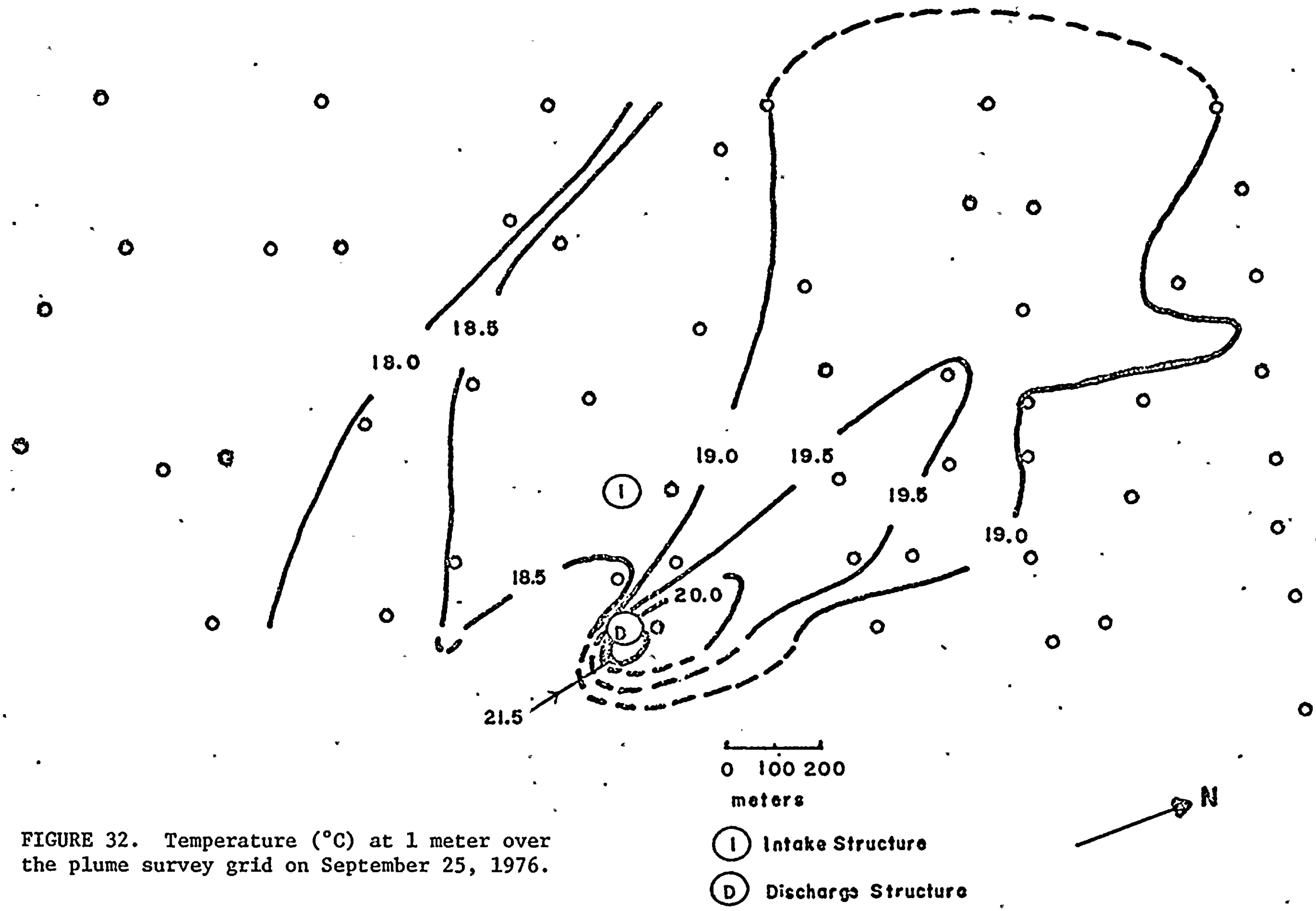

FIGURE 32. Temperature (°C) at 1 meter over the plume survey grid on September 25, 1976.

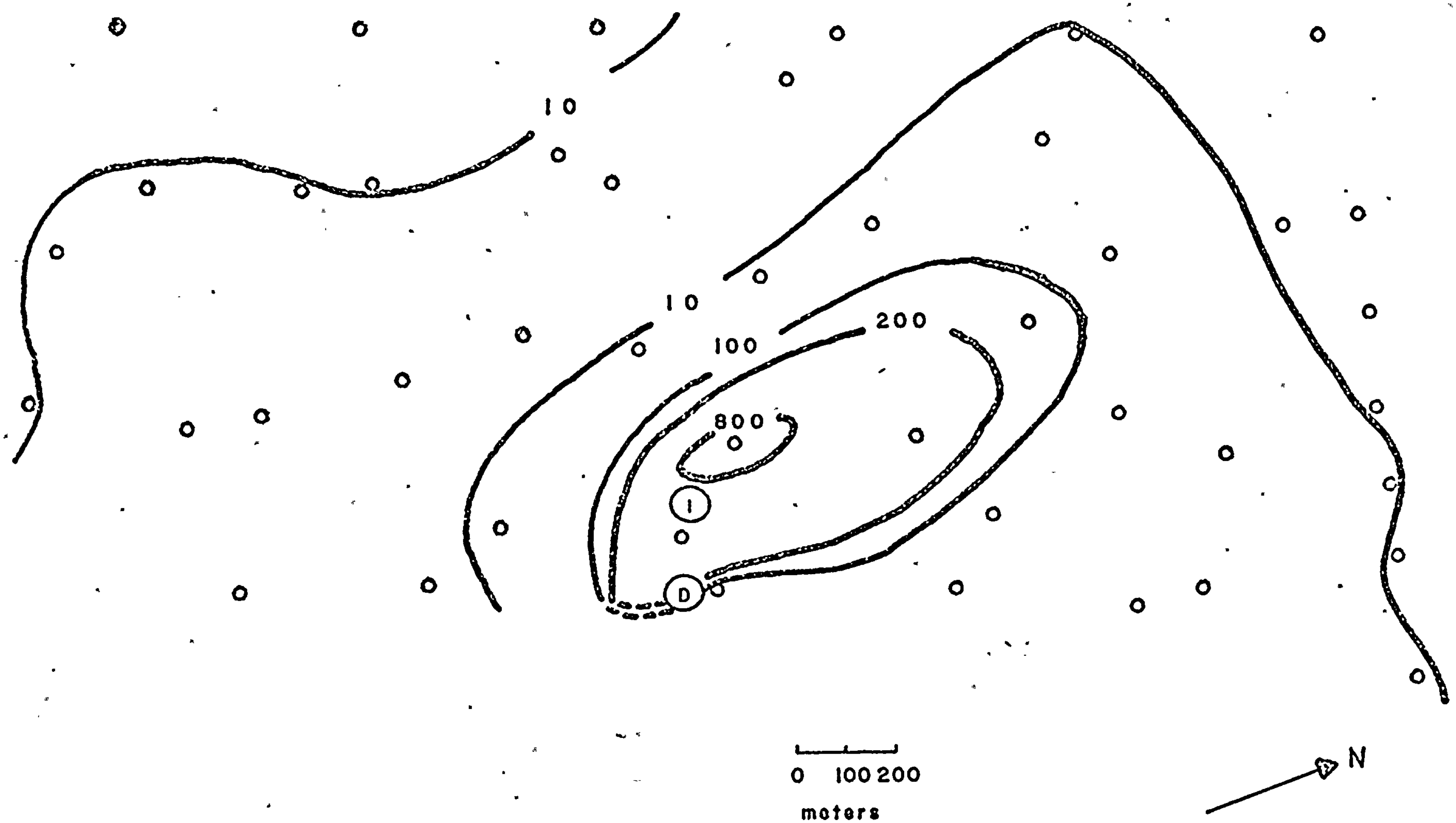

FIGURE 33. Concentrations (#/m^3) of *Cyclops bicuspidatus thomasi* C6 at 1 meter over the plume survey grid on September, 1976.

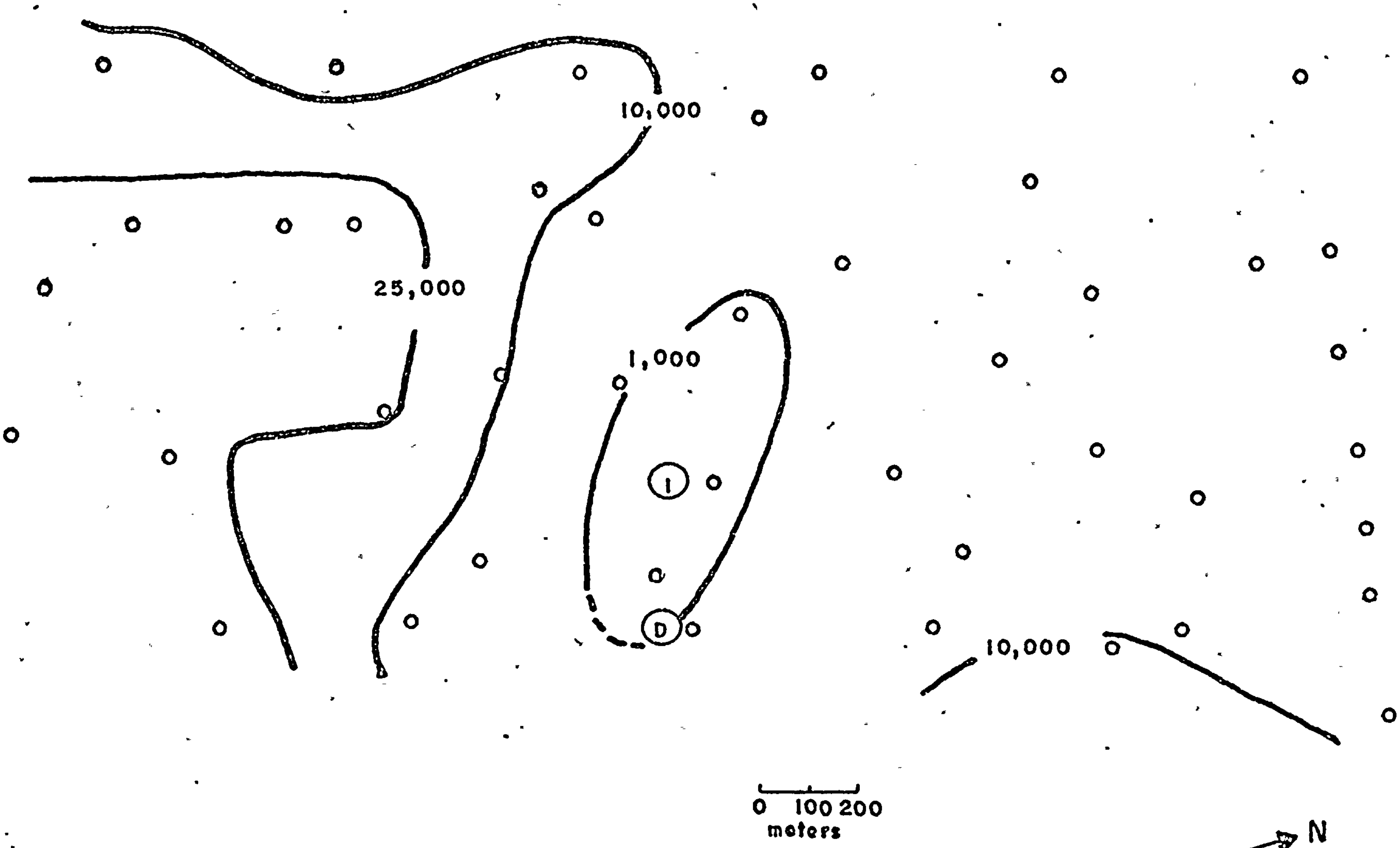

FIGURE 34. Concentrations (#/m^3) of *Bosmina longirostris* at 1 meter over the plume survey grid on September 25, 1976.

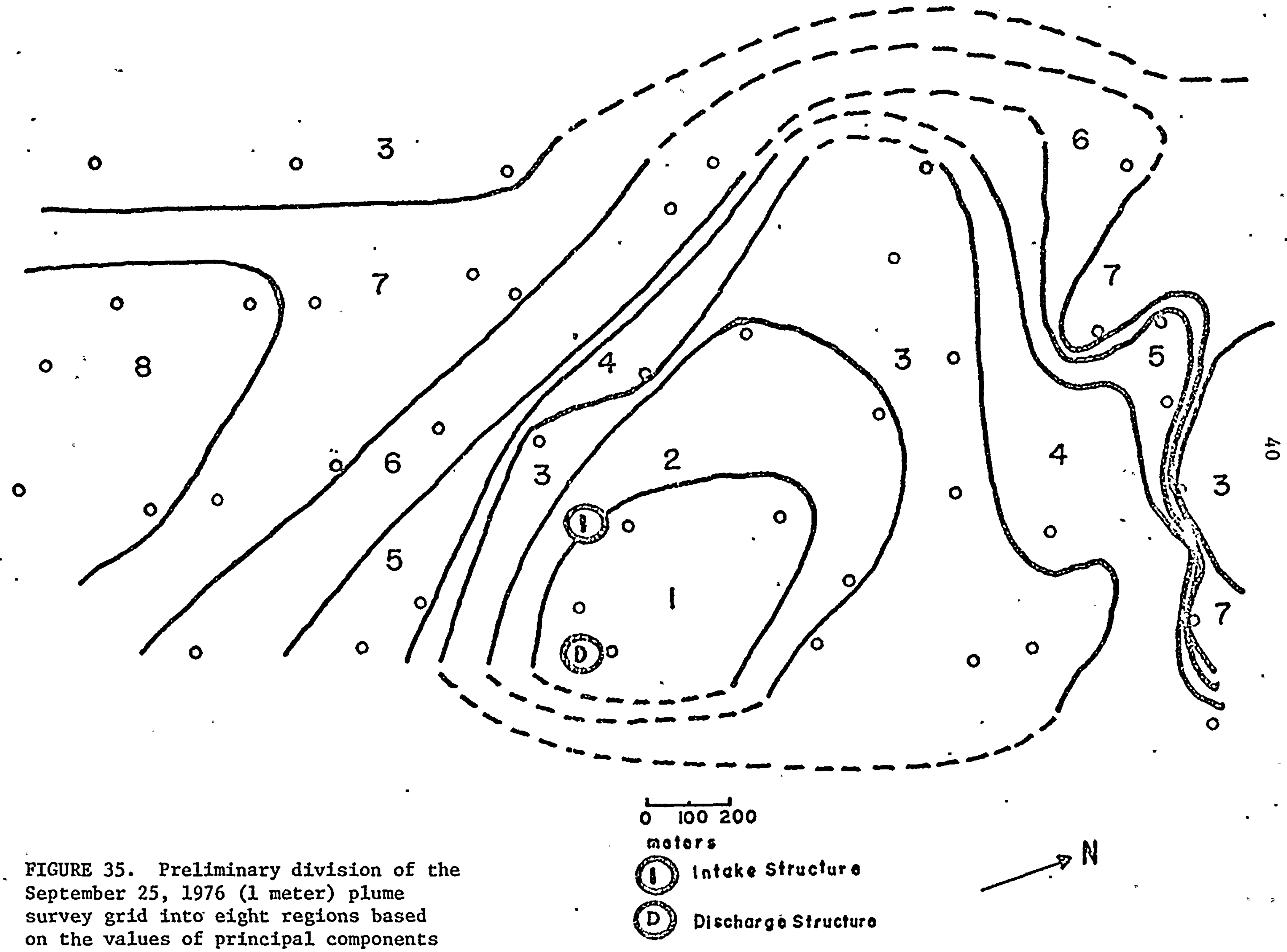

FIGURE 35. Preliminary division of the September 25, 1976 (1 meter) plume survey grid into eight regions based on the values of principal components 1 and 2.

TABLE 1. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on June 15, 1976 from the intake forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 20.0°C.

Taxon	Incubation Time: 0 hr			6 hr			24 hr		
	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample
Copepod nauplii	3.9	1.3	12.6	3.9	1.9	15.4	6.7	1.0	9.2
Cyclops spp. C1-C5	0.0	0.0	21.6	1.8	1.1	27.0	2.3	1.1	20.9
Cyclops bicuspidatus thomasi C6	0.0		0.1	0.0	0.0	0.3	50.0	50.0	0.4
Cyclops vernalis C6	0.0		0.3				0.0	0.0	0.9
Diaptomus spp. C1-C5	6.3	2.2	3.9	11.7	11.7	2.9	4.4	4.4	3.2
Diaptomus ashlandi C6	100.0		0.1	0.0		0.3	0.0		0.1
Diaptomus minutus C6	0.0	0.0	0.4	0.0	0.0	0.3	17.5	7.5	0.9
Epischura lacustris C1-C5							50.0		0.1
Eurytemora affinis C1-C5	3.4		8.0				4.5	1.3	12.4
Bosmina longirostris	1.4	0.1	25.4	1.9	0.6	31.1	3.4	0.0	29.3
Ceriodaphnia quadrangula				0.0		0.1			
Chydorus sphaericus	0.0		0.1	0.0		0.3	0.0	0.0	0.3
Diaphanosoma leuchtenbergianum	0.0		0.1						
Eubosmina coregoni	0.0		0.1				0.0		0.1
Leptodora kindtii	0.0		0.1	0.0		0.1			
Asplanchna spp.	2.9	0.1	27.4	7.8	0.1	22.3	14.6	3.7	22.2
TOTAL	2.2	0.2	100.0	3.7	0.0	100.0	6.3	0.4	100.0
Total number of organisms observed per incubation period		1689			1171			1639	

TABLE 2. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on June 15, 1976 from the discharge forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 30.8°C.

	Incubation Time								
	0 hr			6 hr			24 hr		
Taxon	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample
Copepod nauplii	4.2	1.8	8.1	9.7	7.7	7.2	5.6	5.6	3.8
Cyclops spp. C1-C5	7.9	3.0	24.1	2.1	1.4	23.8	1.3	0.6	26.3
Cyclops bicuspidatus thomasi C6				50.0	50.0	0.5	0.0		0.3
Cyclops vernalis C6	0.0	0.0	0.4	0.0	0.0	0.2	8.3	8.3	0.7
Tropocyclops prasinus mexicanus C6							0.0	0.0	0.2
Diaptomus spp. C1-C5	18.5	4.9	4.6	8.2	5.1	4.2	15.4	5.4	4.2
Diaptomus ashlandi C6				0.0		0.1			
Diaptomus minutus C6	37.5	12.5	0.5	12.5	12.5	0.6	0.0	0.0	0.4
Epischura lacustris C1-C5				0.0		0.1			
Epischura lacustris C6							33.3		0.3
Eurytemora affinis C1-C5	2.1		8.5	4.2		9.5			
Bosmina longirostris	2.3	0.6	26.1	6.2	2.0	33.7	4.8	1.8	41.1
Chydorus sphaericus				25.0	25.0	0.3	0.0		0.2
Diaphanosoma leuchtenbergianum	100.0		0.1						
Eubosmina coregoni				0.0		0.1			
Asplanchna spp.	4.5	0.7	27.7	9.1	2.5	19.6	15.9	1.1	22.6
TOTAL	5.2	1.2	100.0	6.2	2.5	100.0	6.5	1.7	100.0
Total number of organisms observed per incubation period		1117			1269			1070	

TABLE 3. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on July 13, 1976 from the intake forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 13.7°C.

Taxon	Incubation Time: 0 hr, Mean % dead	0 hr, $s_{\bar{x}}$	0 hr, % of sample	6 hr, Mean % dead	6 hr, $s_{\bar{x}}$	6 hr, % of sample	24 hr, Mean % dead	24 hr, $s_{\bar{x}}$	24 hr, % of sample
Copepod nauplii	11.8	2.7	1.1	8.3	8.3	0.6	0.0	0.0	0.5
Cyclops spp. C1-C5	6.5	3.8	4.6	4.2	2.3	5.0	10.7	1.6	4.4
Cyclops bicuspidatus thomasi C6	20.3	1.1	2.1	13.9	4.5	2.0	20.1	13.0	1.7
Cyclops vernalis C6	0.0	0.0	0.3						
Tropocyclops prasinus mexicanus C1-C5	0.0		0.0						
Eucyclops agilis C6	0.0		0.0				0.0		0.2
Eucyclops prionophorus C6							0.0		0.0
Diaptomus spp. C1-C5	8.6	1.7	6.8	13.0	7.7	6.1	6.1	1.8	7.8
Diaptomus ashlandi C6	6.6	6.6	1.1	2.8	2.8	1.1	12.4	1.9	1.7
Diaptomus minutus C6	0.0		0.0				0.0		0.0
Diaptomus oregonensis C6							0.0		0.0
Eurytemora affinis C1-C5				0.0		0.3			
Canthocamptus sp. C6				0.0		0.0			
Bosmina longirostris	8.6	2.3	82.8	5.7	2.2	84.7	12.1	0.5	83.1
Chydorus sphaericus	0.0		0.1				0.0		0.0
Daphnia sp.	50.0		0.1						
Daphnia retrocurva							0.0		0.2
Eubosmina coregoni				0.0		0.0			
Holopedium gibberum	0.0		0.0						
Eurycercus lamellatus	0.0		0.1	0.0		0.1	0.0		0.1
Alona spp.	0.0	0.0	0.1				0.0	0.0	0.2
Asplanchna spp.	8.3	8.3	0.3	0.0		0.1	100.0		0.0
TOTAL	8.7	2.2	100.0	6.5	1.1	100.0	11.7	0.0	100.0
Total number of organisms observed per incubation period		2693			2652			2290	

TABLE 4. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on July 13, 1976 from the discharge forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 21.0°C.

Taxon	Incubation Time								
	0 hr			6 hr			24 hr		
	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample
Copepod nauplii	31.5	23.5	1.2	12.5	12.5	0.6	0.0	0.0	0.7
Cyclops spp. C1-C5	12.4	2.4	5.5	10.8	5.2	6.1	2.3	2.3	4.7
Cyclops bicuspidatus thomasi C6	18.2	15.1	2.0	16.6	3.4	2.1	19.9	7.9	2.4
Cyclops vernalis C6	0.0	0.0	0.2	0.0		0.3	50.0	50.0	0.1
Eucyclops agilis C6	0.0		0.0	0.0		0.1			
Diaptomus spp. C1-C5	39.2	7.9	6.3	30.4	6.7	7.1	30.7	10.3	6.1
Diaptomus ashlandi C6	27.1	6.0	1.3	18.6	15.7	1.6	13.6	5.9	1.6
Diaptomus minutus C6	100.0		0.0	100.0		0.0			
Diaptomus oregonensis C6	0.0		0.0				50.0	50.0	0.1
Epischura lacustris C6				100.0		0.0			
Eurytemora affinis C1-C5	0.0		0.3				12.5		0.2
Bosmina longirostris	7.1	0.9	82.7	11.1	4.3	81.2	9.9	1.5	83.6
Chydorus sphaericus	0.0	0.0	0.1	0.0		0.1	0.0	0.0	0.1
Daphnia retrocurva	100.0		0.0	0.0		0.0	0.0		0.0
Eubosmina coregoni				0.0		0.0			
Eurycercus lamellatus	0.0	0.0	0.1	0.0		0.0	0.0		0.0
Alona spp.				0.0	0.0	0.2			
Asplanchna spp.	0.0	0.0	0.2	100.0		0.0	0.0	0.0	0.3
TOTAL	10.2	1.4	100.0	12.5	4.6	100.0	10.9	1.7	100.0
Total number of organisms observed per incubation period		2916			2402			2905	

TABLE 5. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on August 10, 1976 from the intake forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 20.2°C.

Taxon	Incubation Time: 0 hr			6 hr			24 hr		
	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample
Copepod nauplii	13.9	11.1	5.0	2.8	2.8	4.7	9.4	9.4	2.9
Cyclops spp. C1-C5	2.6	0.8	42.2	2.3	2.0	50.9	2.2	0.5	51.7
Cyclops bicuspidatus thomasi C6	0.0		0.1	50.0		0.3	12.5		0.6
Cyclops vernalis C6	0.0	0.0	1.3	0.0		0.3	0.0		0.1
Tropocyclops prasinus mexicanus C1-C5	16.7	16.7	1.2	0.0	0.0	0.9			
Tropocyclops prasinus mexicanus C6	0.0	0.0	2.8	0.0	0.0	2.6	0.0	0.0	3.1
Diaptomus spp. C1-C5	21.5	10.5	10.6	18.4	3.0	7.3	3.4	1.6	11.9
Diaptomus ashlandi C6	0.0		0.1	0.0		0.1	0.0		0.4
Diaptomus minutus C6	12.5	12.5	0.8	0.0	0.0	1.0	0.0	0.0	0.5
Diaptomus oregonensis C6	0.0	0.0	0.6						
Epischura lacustris C1-C5							0.0		0.1
Eurytemora affinis C1-C5	0.0		2.1	12.5		2.0	2.3	2.3	2.2
Bosmina longirostris	31.8	17.0	18.9	26.0	0.3	15.0	21.6	3.6	13.1
Ceriodaphnia quadrangula	0.0	0.0	0.9	8.3	8.3	1.2	12.5	12.5	0.6
Chydorus sphaericus	33.3		0.4	0.0	0.0	1.0	0.0	0.0	1.4
Daphnia galeata mendotae	0.0	0.0	0.2	100.0	0.0	0.3			
Daphnia retrocurva	27.6	18.9	7.7	38.7	7.2	8.5	35.6	1.0	8.6
Diaphanosoma leuchtenbergianum	37.5	37.5	0.6	100.0		0.1	100.0		0.1
Eubosmina coregoni	6.8	6.8	3.4	23.6	18.1	2.4	43.8	6.3	2.0
Holopedium gibberum	25.0		0.4						
Leptodora kindtii	0.0		0.2						
Latona setifera				0.0		0.1			
Alona spp.				0.0		0.2			
Asplanchna spp.	25.0	25.0	0.6	0.0	0.0	1.0	0.0	0.0	0.6
TOTAL	13.5	0.3	100.0	12.2	2.5	100.0	9.5	0.9	100.0
Total number of organisms observed per incubation period		843			901			804	

TABLE 6. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on August 10, 1976 from the discharge forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 31.5°C.

	Incubation Time								
	0 hr			6 hr			24 hr		
Taxon	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample
Copepod nauplii	29.2	6.6	4.8	2.8	2.8	7.1	0.0	0.0	6.1
Cyclops spp. C1-C5	6.4	2.1	48.8	2.5	0.8	47.8	1.0	0.3	51.1
Cyclops bicuspidatus thomasi C6	0.0	0.0	1.0	0.0		0.3	75.0	25.0	0.4
Cyclops vernalis C6	0.0		0.1	0.0		0.4	0.0		0.4
Tropocyclops prasinus mexicanus C1-C5	7.1	7.1	0.8	0.0	0.0	1.3	0.0	0.0	1.4
Tropocyclops prasinus mexicanus C6	0.0	0.0	3.8	2.3	2.3	1.9	0.0	0.0	3.8
Diaptomus spp. C1-C5	31.6	10.1	14.6	15.1	1.4	9.3	4.4	1.9	9.2
Diaptomus ashlandi C6				0.0	0.0	0.3	0.0	0.0	0.4
Diaptomus minutus C6	0.0	0.0	0.8	0.0	0.0	0.9	0.0	0.0	0.7
Diaptomus oregonensis C6	33.3	16.7	0.7	8.3	8.3	0.5	0.0	0.0	0.4
Epischura lacustris C1-C5	75.0	25.0	0.3	0.0		0.3	0.0	0.0	0.3
Epischura lacustris C6	0.0		0.1	0.0		0.1			
Eurytemora affinis C1-C5	8.3	8.3	1.1	2.5	2.5	3.8	0.0	0.0	1.9
Bosmina longirostris	19.8	0.9	10.3	18.3	0.9	11.6	12.4	4.4	11.7
Ceriodaphnia quadrangula	13.3	3.3	1.1	0.0	0.0	0.5	0.0	0.0	0.7
Chydorus sphaericus	0.0		0.2	0.0		0.3	0.0		0.3
Daphnia galeata mendotae				0.0		0.1	0.0	0.0	0.2
Daphnia retrocurva	31.6	15.9	7.0	22.7	2.0	7.8	25.4	10.3	6.7
Diaphanosoma leuchtenbergianum	100.0	0.0	0.8	58.3	16.7	0.7	0.0		0.1
Eubosmina coregoni	18.1	3.8	3.2	29.1	4.1	1.9	42.9	9.6	3.1
Holopedium gibberum	50.0		0.2	0.0		0.1			
Leptodora kindtii	0.0		0.2	50.0	50.0	0.1			
Alona spp.				0.0		0.1			
Asplanchna spp.				8.3	8.3	2.9	0.0	0.0	1.1
TOTAL	15.1	2.7	100.0	7.5	1.7	100.0	5.2	1.3	100.0
Total number of organisms observed per incubation period		1325			1512			1197	

TABLE 7. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on September 23, 1976 from the intake forebay. If a standard error is given then the corresponding mean is based on two replicates (N = 2); if no standard error is given then N = 1 or 0. The mean water temperature of the samples was 18.3°C.

	Incubation Time								
	0 hr			6 hr			24 hr		
Taxon	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample	Mean % dead	$s_{\bar{x}}$	% of sample
Copepod nauplii	7.8	0.5	3.9	13.5	2.4	5.0	4.6	2.6	3.7
Cyclops spp. C1-C5	0.0	0.0	4.1	8.1	8.1	4.6	0.8	0.8	4.2
Cyclops bicuspidatus thomasi C6	0.0		0.1	0.0		0.1	0.0		0.1
Cyclops vernalis C6	16.7		0.3	0.0		0.1	50.0	50.0	0.1
Tropocyclops prasinus mexicanus C1-C5	25.0	25.0	0.3	0.0		0.3	0.0		0.2
Tropocyclops prasinus mexicanus C6	3.6	3.6	1.5	9.2	9.2	1.1	0.0	0.0	1.3
Diaptomus spp. C1-C5	50.0	50.0	0.7	15.9	15.9	1.7	25.0	25.0	0.6
Diaptomus minutus C6	0.0		0.1	50.0		0.4	0.0		0.1
Epischura lacustris C1-C5	100.0	0.0	0.2	25.0	25.0	0.5	68.8	31.3	0.6
Eurytemora affinis C1-C5	20.0	12.1	8.5	30.4		3.5	39.6	11.7	5.5
Bosmina longirostris	5.9	1.5	58.3	15.1	4.8	61.3	9.8	4.3	64.7
Ceriodaphnia quadrangula				0.0		0.1			
Chydorus sphaericus	0.0	0.0	1.8	10.0	10.0	1.3	3.6	3.6	1.3
Daphnia galeata mendotae	0.0		0.1	0.0	0.0	0.2	0.0		0.1
Daphnia retrocurva	58.1	41.9	1.1	21.1		1.1	20.8		0.7
Diaphanosoma leuchtenbergianum	28.1	28.1	0.9	52.1	14.6	0.6	50.0		0.2
Eubosmina coregoni	11.4	1.5	17.7	12.8	1.8	17.7	16.9	7.5	15.8
Holopedium gibberum				100.0		0.1			
Leptodora kindtii	0.0		0.2	41.7	41.7	0.4	91.7	8.3	0.5
Polyphemus pediculus				100.0		0.1			
Eurycercus lamellatus	0.0		0.2	0.0		0.1	0.0		0.1
Ilyocryptus sordidus							0.0		0.1
Latona setifera							0.0		0.1
Alona spp.	0.0		0.1						
Alonella sp.							100.0		0.1
TOTAL	8.3	1.8	100.0	16.1	2.6	100.0	13.4	5.7	100.0
Total number of organisms observed per incubation period		1381			1310			1485	

TABLE 8. The mean and standard error of replicate determinations of the percent dead for each taxon of zooplankton present in samples taken on September 23, 1976 from the discharge forebay. If a standard error is given then the corresponding mean is based on two replicates ($N = 2$); if no standard error is given then $N = 1$ or 0. The mean water temperature of the samples was 28.8°C.

Taxon	Incubation Time: 0 hr, Mean % dead	0 hr, $s_{\bar{x}}$	0 hr, % of sample	6 hr, Mean % dead	6 hr, $s_{\bar{x}}$	6 hr, % of sample	24 hr, Mean % dead	24 hr, $s_{\bar{x}}$	24 hr, % of sample
Copepod nauplii	16.5	2.7	4.2	7.3	4.0	4.0	3.6	3.6	2.6
Cyclops spp. C1-C5	0.0	0.0	2.5	8.8	3.8	2.5	4.0	4.0	4.1
Cyclops bicuspidatus thomasi C6	0.0		0.1						
Cyclops vernalis C6				0.0	0.0	0.2	20.0		0.5
Tropocyclops prasinus mexicanus C1-C5							0.0		0.1
Tropocyclops prasinus mexicanus C6	0.0	0.0	0.4	0.0	0.0	1.1	10.4	10.4	2.0
Diaptomus spp. C1-C5	0.0		0.2	50.0	0.0	0.8	0.0	0.0	0.6
Diaptomus minutus C6	0.0		0.1				0.0		0.1
Epischura lacustris C1-C5	50.0	50.0	0.6	0.0	0.0	0.2	50.0	50.0	0.2
Eurytemora affinis C1-C5				21.9		2.5	40.0		1.4
Bosmina longirostris	12.5	0.9	72.4	14.4	4.9	70.7	18.9	3.3	66.6
Ceriodaphnia quadrangula	0.0		0.1						
Chydorus sphaericus	0.0	0.0	0.7	0.0	0.0	1.4	9.2	0.8	1.7
Daphnia galeata mendotae				0.0		0.1			
Daphnia retrocurva	50.0	50.0	0.6	49.6	20.4	1.1	29.2		0.6
Diaphanosoma leuchtenbergianum	70.8	4.2	0.6	0.0		0.2	100.0	0.0	0.6
Eubosmina coregoni	27.1	2.2	14.2	24.0	8.1	14.8	34.9	2.6	18.1
Leptodora kindtii	0.0		0.2	100.0		0.1	79.2	20.8	0.5
Polyphemus pediculus							0.0		0.1
Eurycercus lamellatus	0.0		0.2	0.0	0.0	0.2	25.0	25.0	0.3
Latona setifera	0.0		0.1						
Alona spp.				0.0		0.1	0.0		0.1
Alonella sp.				100.0		0.1			
Asplanchna spp.	0.0		0.1						
TOTAL	15.3	0.0	100.0	15.5	5.3	100.0	21.1	2.9	100.0
Total number of organisms observed per incubation period		1266			1138			1100	

TABLE 9. The mean mortalities over 20 months (Feb. 1975 – Sept. 1976) for 24 taxa and the number of samples (N) in which the taxa were found. A * indicates that the median difference between the intake and discharge mortalities was significantly different from zero at the .05 level. The last column shows the number of pairs of samples on which the test is based (– indicates ≤ 1 pair).

Taxon	0 hour				6 hours				24 hours				Number of pairs of samples for median test		
	Intake		Discharge		Intake		Discharge		Intake		Discharge				
	$\bar{x}$	N	$\bar{x}$	N	$\bar{x}$	N	$\bar{x}$	N	$\bar{x}$	N	$\bar{x}$	N	0hr	6hr	24hr
Copepod nauplii	12.7	41	13.6	42	12.3	39	14.3	39	16.6	41	15.3	41	38	34	33
Immature *Cyclops* spp. C1-C5	7.8	42	9.1	42	7.8	39	11.7	39	8.5	41	10.8	41	39	39	39
Cyclops bicuspidatus thomasi C6	10.0	39 *	12.7	39	11.5	37	12.3	39	13.4	38 *	20.1	41	30	31	32
Cyclops vernalis C6	1.3	13	.5	20	5.0	10	0.0	25	15.8	13	12.3	27	–	–	4
Immature *Tropocyclops*	17.7	16	20.7	14	3.0	11	42.0	17	3.8	8	9.3	18	6	6	2
Tropocyclops prasinus mexicanus C6	8.4	25	9.9	31	12.9	23	13.7	29	14.6	24	13.8	33	17	16	18
Immature *Diaptomus* spp.	20.0	42	22.2	42	21.8	39 *	29.2	39	29.5	41 *	29.7	41	41	39	39
Diaptomus ashlandi C6	16.5	33	13.1	32	11.0	28	11.4	32	14.7	32	22.1	36	25	23	26
Diaptomus minutus C6	4.4	35 *	13.7	37	11.8	30	18.0	37	22.1	34	21.8	39	24	24	25
Diaptomus oregonensis C6	10.7	29	13.5	34	5.8	23 *	10.5	33	8.4	27 *	18.8	35	20	13	21
Diaptomus sicilis C6	17.1	19	10.7	21	12.7	13	16.2	22	10.7	15	25.0	25	7	9	9
Immature *Epischura lacustris*	36.4	11	26.3	13	6.3	8	20.4	19	28.8	10	21.0	22	4	3	5
Epischura lacustris C6	0.0	3	0.0	12	40.0	5	20.0	15	0.0	5	37.0	18	11	–	–
Immature *Eurytemora affinis*	6.8	15	5.4	20	4.3	13	5.6	21	10.5	17	22.3	24	–	6	14
Eurytemora affinis C6	0.0	2	0.0	5			0.0	6	33.3	3	0.0	6	3	–	–
Immature *Limnocalanus macrurus*	17.3	6	52.1	10	36.6	6	55.3	10	28.1	4	31.8	13	–	3	4
Limnocalanus macrurus C6	25.0	4	6.3	4	20.8	4	23.1	6	0.0	4	0.0	7	26	2	–
Bosmina longirostris	10.3	32	15.5	35	15.1	28	16.0	38	13.9	31	5.5	41	8	24	23
Daphnia galeata mendotae	15.7	15	19.4	17	30.4	14	19.8	24	19.3	13	10.9	26	8	7	5
Daphnia retrocurva	25.1	20	38.1	25	33.2	18	43.5	26	31.3	17	32.9	28	15	18	15
Diaphanosoma leuchtenbergianum	41.7	14	57.9	13	58.9	13	62.8	14	64.4	10	72.7	16	12	10	9
Eubosmina coregoni	8.1	19	20.0	28	17.4	20	15.7	30	15.9	19	16.5	34	17	14	16
Holopedium gibberum	47.7	13	27.6	13	48.3	10	44.4	12	46.3	5	64.1	12	7	6	5
Asplanchna spp.	5.4	26	3.2	24	6.5	17	8.2	27	12.6	21	9.5	30	8	8	10
Total Zooplankton	11.8	42	12.1	42	11.3	39 *	13.1	39	15.9	41	17.3	41	42	39	41

TABLE 10. The mean concentration, standard error, and percent composition of zooplankton in the intake waters and the mean number of zooplankton entering the plant per minute on May 11-12, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon at grate MTR 1-5 5m depth.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	1120	301.5	32.38	2.42	0.65
Cyclops spp. C1-C5	1159	241.7	33.51	2.50	0.52
Cyclops bicuspidatus thomasi C6	92	26.0	2.66	0.20	0.06
Cyclops vernalis C6	46	28.8	1.33	0.10	0.06
Paracyclops fimbriatus poppei C1-C5	1	0.7	0.02	0.00	0.00
Diaptomus spp. C1-C5	700	208.4	20.24	1.51	0.45
Epischura lacustris C1-C5	77	19.8	2.23	0.17	0.04
Eurytemora affinis C1-C5	109	54.4	3.14	0.23	0.12
Eurytemora affinis C6	42	17.1	1.21	0.09	0.04
Limnocalanus macrurus C1-C5	13	4.3	0.37	0.03	0.01
Canthocamptus sp. C1-C5	1	0.6	0.02	0.00	0.00
Canthocamptus sp. C6	3	1.5	0.07	0.01	0.00
Bryocamptus sp. C1-C6	1	1.0	0.03	0.00	0.00
Bosmina longirostris	74	13.7	2.15	0.16	0.03
Chydorus sphaericus	11	8.0	0.32	0.02	0.02
Daphnia galeata mendotae	1	0.7	0.02	0.00	0.00
Daphnia retrocurva	1	1.0	0.03	0.00	0.00
Eubosmina coregoni	2	1.1	0.05	0.00	0.00
Holopedium gibberum	1	0.7	0.02	0.00	0.00
Eurycercus lamellatus	1	0.3	0.01	0.00	0.00
Alona spp.	1	1.0	0.03	0.00	0.00
Asplanchna spp.	2	2.0	0.06	0.00	0.00
Total	3459	643.7	100.00	7.46	1.39

TABLE 11. The mean concentration, standard error, and percent composition of zooplankton in the discharge waters and the mean number of zooplankton leaving the plant per minute on May 11-12, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon from the discharge waters of Unit 1.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	1199	202.3	32.88	2.59	0.44
Cyclops spp. C1-C5	1152	203.4	31.60	2.49	0.44
Cyclops bicuspidatus thomasi C6	83	27.1	2.27	0.18	0.06
Cyclops vernalis C6	47	27.1	1.28	0.10	0.06
Tropocyclops prasinus mexicanus C6	2	0.9	0.05	0.00	0.00
Eucyclops speratus C6	1	0.5	0.01	0.00	0.00
Paracyclops fimbriatus poppei C1-C5	1	0.5	0.01	0.00	0.00
Diaptomus spp. C1-C5	708	183.1	19.41	1.53	0.40
Diaptomus minutus C6	1	0.5	0.02	0.00	0.00
Epischura lacustris C1-C5	115	23.7	3.16	0.25	0.05
Eurytemora affinis C1-C5	113	56.1	3.11	0.24	0.12
Eurytemora affinis C6	53	20.3	1.47	0.12	0.04
Limnocalanus macrurus C1-C5	18	3.2	0.50	0.04	0.01
Canthocamptus sp. C1-C5	3	2.5	0.09	0.01	0.01
Canthocamptus sp. C6	4	3.6	0.12	0.01	0.01
Bosmina longirostris	124	14.9	3.41	0.27	0.03
Ceriodaphnia quadrangula	1	0.3	0.02	0.00	0.00
Chydorus sphaericus	14	7.3	0.39	0.03	0.02
Daphnia retrocurva	1	0.8	0.02	0.00	0.00
Eubosmina coregoni	2	0.6	0.05	0.00	0.00
Alona spp.	2	1.5	0.05	0.00	0.00
Asplanchna spp.	2	0.9	0.05	0.00	0.00
Total	3647	508.7	100.00	7.87	1.10

TABLE 12. The mean concentration, standard error, and percent composition of zooplankton in the intake waters and the mean number of zooplankton entering the plant per minute on June 15-16, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon at grate MTR 1-5 5m depth.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	4236	585.1	15.46	12.04	1.66
Cyclops spp. C1-C5	6362	1298.3	23.22	18.08	3.69
Cyclops bicuspidatus thomasi C6	48	21.1	0.18	0.14	0.06
Cyclops vernalis C6	547	445.8	2.00	1.56	1.27
Tropocyclops prasinus mexicanus C6	2	1.4	0.01	0.01	0.00
Diaptomus spp. C1-C5	1583	305.7	5.78	4.50	0.87
Diaptomus ashlandi C6	1	0.7	0.0	0.00	0.00
Diaptomus minutus C6	120	18.2	0.44	0.34	0.05
Epischura lacustris C1-C5	34	28.1	0.12	0.10	0.08
Epischura lacustris C6	2	1.4	0.01	0.00	0.00
Eurytemora affinis C1-C5	3279	528.8	11.97	9.32	1.50
Eurytemora affinis C6	48	21.4	0.18	0.14	0.06
Limnocalanus macrurus C1-C5	1	1.4	0.01	0.00	0.00
Bosmina longirostris	5739	321.6	20.95	16.31	0.92
Chydorus sphaericus	41	4.0	0.15	0.12	0.01
Daphnia retrocurva	3	1.6	0.01	0.01	0.00
Diaphanosoma leuchtenbergianum	1	1.4	0.01	0.00	0.00
Eubosmina coregoni	1	1.4	0.01	0.00	0.00
Leptodora kindtii	7	2.7	0.03	0.02	0.01
Polyphemus pediculus	4	2.7	0.01	0.01	0.01
Eurycercus lamellatus	10	4.9	0.04	0.03	0.01
Alona spp.	3	1.6	0.01	0.01	0.00
Asplanchna spp.	5323	925.9	19.43	15.12	2.62
Total	27393	3027.2	100.00	77.85	8.59

TABLE 13. The mean concentration, standard error, and percent composition of zooplankton in the discharge waters and the mean number of zooplankton leaving the plant per minute on June 15-16, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon from the discharge waters of Unit 1.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	1748	337.7	11.22	4.97	0.96
Cyclops spp. C1-C5	3844	571.0	24.68	10.93	1.63
Cyclops bicuspidatus thomasi C6	41	19.3	0.27	0.12	0.05
Cyclops vernalis C6	376	311.9	2.42	1.07	0.89
Tropocyclops prasinus mexicanus C6	4	2.6	0.03	0.01	0.01
Diaptomus spp. C1-C5	753	84.2	4.83	2.14	0.24
Diaptomus ashlandi C6	1	0.8	0.01	0.00	0.00
Diaptomus minutus C6	57	9.3	0.37	0.16	0.03
Epischura lacustris C1-C5	22	14.0	0.14	0.06	0.04
Epischura lacustris C6	4	2.9	0.03	0.01	0.01
Eurytemora affinis C1-C5	1819	189.7	11.68	5.17	0.54
Eurytemora affinis C6	42	25.5	0.27	0.12	0.07
Bosmina longirostris	5444	719.5	34.95	15.47	2.05
Chydorus sphaericus	21	4.9	0.13	0.06	0.01
Daphnia retrocurva	2	1.8	0.01	0.00	0.00
Eubosmina coregoni	2	1.0	0.01	0.00	0.00
Holopedium gibberum	1	0.9	0.01	0.00	0.00
Leptodora kindtii	6	4.5	0.04	0.02	0.01
Polyphemus pediculus	2	0.8	0.01	0.01	0.00
Eurycercus lamellatus	2	1.5	0.01	0.01	0.00
Ilyocryptus sordidus	1	0.7	0.01	0.00	0.00
Alona spp.	4	2.9	0.03	0.01	0.01
Asplanchna spp.	1378	268.5	8.85	3.92	0.76
Total	15575	1104.9	100.00	44.27	3.13

TABLE 14. The mean concentration, standard error, and percent composition of zooplankton in the intake waters and the mean number of zooplankton entering the plant per minute on July 13-14, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon at grate MTR 1-5 5m depth.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	2871	387.7	1.77	8.30	1.12
Cyclops spp. C1-C5	9984	1397.8	6.16	28.85	4.05
Cyclops bicuspidatus thomasi C6	2481	198.6	1.53	7.17	0.58
Cyclops vernalis C6	758	351.0	0.47	2.19	1.01
Tropocyclops prasinus mexicanus C6	10	10.3	0.01	0.03	0.03
Eucyclops agilis C6	30	10.0	0.02	0.09	0.03
Diaptomus spp. C1-C5	5129	2124.8	3.16	14.83	6.15
Diaptomus ashlandi C6	1335	232.0	0.82	3.86	0.67
Diaptomus minutus C6	45	4.1	0.03	0.13	0.01
Diaptomus oregonensis C6	25	19.2	0.02	0.07	0.06
Epischura lacustris C1-C5	21	21.1	0.01	0.06	0.06
Epischura lacustris C6	67	19.3	0.04	0.19	0.06
Eurytemora affinis C1-C5	1017	211.1	0.63	2.94	0.61
Eurytemora affinis C6	128	50.1	0.08	0.37	0.14
Bosmina longirostris	135885	12555.7	83.79	392.71	36.46
Chydorus sphaericus	920	463.9	0.57	2.66	1.34
Daphnia retrocurva	35	17.4	0.02	0.10	0.05
Diaphanosoma leuchtenbergianum	5	4.8	0.0	0.01	0.01
Eubosmina coregoni	116	80.4	0.07	0.34	0.23
Holopedium gibberum	10	10.3	0.01	0.03	0.03
Polyphemus pediculus	11	10.6	0.01	0.03	0.03
Eurycercus lamellatus	479	216.2	0.30	1.38	0.63
Latona setifera	9	8.6	0.01	0.02	0.02
Alona spp.	340	126.8	0.21	0.98	0.37
Asplanchna spp.	457	91.8	0.28	1.32	0.27
Total	162167	14216.9	100.00	468.68	41.32

TABLE 15. The mean concentration, standard error, and percent composition of zooplankton in the discharge waters and the mean number of zooplankton leaving the plant per minute on July 13-14, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon from the discharge waters of Unit 1.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	1830	293.5	1.29	5.29	0.85
Cyclops spp. C1-C5	11724	2450.6	8.26	33.88	7.09
Cyclops bicuspidatus thomasi C6	2474	306.9	1.74	7.15	0.89
Cyclops vernalis C6	550	345.7	0.39	1.59	1.00
Tropocyclops prasinus mexicanus C6	20	15.3	0.01	0.06	0.04
Eucyclops agilis C6	7	6.8	0.0	0.02	0.02
Paracyclops fimbriatus poppei C6	4	4.2	0.0	0.01	0.01
Diaptomus spp. C1-C5	4821	1826.2	3.40	13.94	5.28
Diaptomus ashlandi C6	853	187.6	0.60	2.46	0.54
Diaptomus minutus C6	81	46.7	0.06	0.23	0.13
Diaptomus oregonensis C6	51	28.0	0.04	0.15	0.08
Epischura lacustris C1-C5	12	7.7	0.01	0.04	0.02
Epischura lacustris C6	56	27.8	0.04	0.16	0.08
Eurytemora affinis C1-C5	967	147.2	0.68	2.80	0.43
Eurytemora affinis C6	103	46.3	0.07	0.30	0.13
Canthocamptus sp. C6	8	7.8	0.01	0.02	0.02
Bosmina longirostris	116133	22210.6	81.85	335.62	64.28
Chydorus sphaericus	791	411.6	0.56	2.29	1.19
Daphnia retrocurva	99	52.7	0.07	0.29	0.15
Diaphanosoma leuchtenbergianum	4	4.2	0.0	0.01	0.01
Eubosmina coregoni	89	47.4	0.06	0.26	0.14
Holopedium gibberum	16	15.9	0.01	0.05	0.05
Polyphemus pediculus	12	7.7	0.01	0.04	0.02
Eurycercus lamellatus	357	141.2	0.25	1.03	0.41
Ilyocryptus sordidus	18	12.8	0.01	0.05	0.04
Macrothrix laticornis	23	17.9	0.02	0.07	0.05
Latona setifera	4	4.2	0.0	0.01	0.01
Alona spp.	236	148.2	0.17	0.68	0.43
Alona affinis	104	103.9	0.07	0.30	0.30
Alonella sp.	49	33.9	0.03	0.14	0.10
Asplanchna spp.	384	94.2	0.27	1.11	0.27
Total	141881	21803.6	100.00	410.04	63.14

TABLE 16. The mean concentration, standard error, and percent composition of zooplankton in the intake waters and the mean number of zooplankton entering the plant per minute on August 10-11, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon at grate MTR 1-5 5m depth.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	2854	373.3	5.84	8.40	1.10
Cyclops spp. C1-C5	20963	4940.3	42.86	61.64	14.48
Cyclops bicuspidatus thomasi C6	364	133.6	0.74	1.07	0.39
Cyclops vernalis C6	73	29.7	0.15	0.22	0.09
Tropocyclops prasinus mexicanus C1-C5	798	139.1	1.63	2.35	0.41
Tropocyclops prasinus mexicanus C6	2291	633.1	4.68	6.74	1.86
Diaptomus spp. C1-C5	6096	336.0	12.46	17.93	1.00
Diaptomus ashlandi C6	91	71.9	0.19	0.27	0.21
Diaptomus minutus C6	198	88.7	0.41	0.58	0.26
Diaptomus oregonensis C6	127	29.7	0.26	0.37	0.09
Epischura lacustris C1-C5	135	47.1	0.28	0.40	0.14
Epischura lacustris C6	32	12.7	0.06	0.09	0.04
Eurytemora affinis C1-C5	856	271.2	1.75	2.52	0.80
Eurytemora affinis C6	397	274.8	0.81	1.17	0.81
Bosmina longirostris	2731	473.3	5.58	8.03	1.39
Ceriodaphnia quadrangula	310	21.7	0.63	0.91	0.06
Chydorus sphaericus	146	80.4	0.30	0.43	0.24
Daphnia galeata mendotae	60	16.2	0.12	0.18	0.05
Daphnia retrocurva	7004	3424.0	14.32	20.63	10.10
Diaphanosoma leuchtenbergianum	1099	420.9	2.25	3.24	1.24
Eubosmina coregoni	1430	380.5	2.92	4.21	1.12
Holopedium gibberum	122	19.2	0.25	0.36	0.06
Leptodora kindtii	71	10.8	0.15	0.21	0.03
Eurycercus lamellatus	7	6.9	0.01	0.02	0.02
Alona spp.	17	10.1	0.03	0.05	0.03
Alonella sp.	34	17.5	0.07	0.10	0.05
Asplanchna spp.	607	160.9	1.24	1.79	0.48
Total	48914	4854.2	100.00	143.89	14.29

TABLE 17. The mean concentration, standard error, and percent composition of zooplankton in the discharge waters and the mean number of zooplankton leaving the plant per minute on August 10-11, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon from the discharge waters of Unit 1.

Species	#/m^3	$s_{\bar{x}}$	%	#/min x 10^6	$s_{\bar{x}}$ x 10^6
Copepod nauplii	4226	388.9	9.15	12.43	1.14
Cyclops spp. C1-C5	17275	1370.8	37.41	50.81	4.02
Cyclops bicuspidatus thomasi C6	290	61.1	0.63	0.85	0.18
Cyclops vernalis C6	50	38.6	0.11	0.15	0.11
Tropocyclops prasinus mexicanus C1-C5	1069	276.9	2.31	3.14	0.81
Tropocyclops prasinus mexicanus C6	2261	602.4	4.90	6.65	1.77
Diaptomus spp. C1-C5	5560	506.8	12.04	16.36	1.50
Diaptomus ashlandi C6	76	40.7	0.16	0.22	0.12
Diaptomus minutus C6	201	56.4	0.44	0.59	0.17
Diaptomus oregonensis C6	68	34.7	0.15	0.20	0.10
Epischura lacustris C1-C5	125	62.6	0.27	0.37	0.18
Epischura lacustris C6	21	12.6	0.04	0.06	0.04
Eurytemora affinis C1-C5	846	329.2	1.83	2.49	0.97
Eurytemora affinis C6	359	278.2	0.78	1.06	0.82
Bosmina longirostris	3109	575.4	6.73	9.14	1.68
Ceriodaphnia quadrangula	297	67.1	0.64	0.87	0.20
Chydorus sphaericus	86	49.2	0.19	0.25	0.14
Daphnia galeata mendotae	33	19.4	0.07	0.10	0.06
Daphnia retrocurva	6781	2872.9	14.68	19.97	8.47
Diaphanosoma leuchtenbergianum	1015	170.4	2.20	2.99	0.50
Eubosmina coregoni	1455	399.7	3.15	4.28	1.17
Holopedium gibberum	197	42.4	0.43	0.58	0.12
Leptodora kindtii	54	36.0	0.12	0.16	0.11
Polyphemus pediculus	2	2.3	0.0	0.01	0.01
Eurycercus lamellatus	17	14.2	0.04	0.05	0.04
Latona setifera	2	2.1	0.0	0.01	0.01
Alona spp.	24	18.1	0.05	0.07	0.05
Alonella sp.	29	1.7	0.06	0.09	0.01
Asplanchna spp.	656	153.1	1.42	1.93	0.45
Total	46182	2867.5	100.00	135.87	8.55

TABLE 18. The mean concentration, standard error, and percent composition of zooplankton in the intake waters and the mean number of zooplankton entering the plant per minute on September 23-24, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon at grate MTR 1-5 5m depth.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	2554	171.5	5.91	7.85	0.51
Cyclops spp. C1-C5	1800	236.4	4.16	5.53	0.72
Cyclops bicuspidatus thomasi C6	66	23.0	0.15	0.20	0.07
Cyclops vernalis C6	112	82.4	0.26	0.34	0.25
Tropocyclops prasinus mexicanus C1-C5	160	78.4	0.37	0.49	0.24
Tropocyclops prasinus mexicanus C6	658	157.6	1.52	2.02	0.48
Eucyclops spp. C1-C5	5	4.6	0.01	0.01	0.01
Eucyclops spp. C6	9	9.2	0.02	0.03	0.03
Paracyclops fimbriatus poppei C1-C5	23	23.2	0.05	0.07	0.07
Paracyclops fimbriatus poppei C6	5	4.6	0.01	0.01	0.01
Diaptomus spp. C1-C5	205	33.5	0.47	0.63	0.10
Diaptomus minutus C6	31	16.5	0.07	0.09	0.05
Epischura lacustris C1-C5	261	94.4	0.60	0.80	0.29
Eurytemora affinis C1-C5	2429	583.1	5.62	7.46	1.78
Eurytemora affinis C6	75	38.4	0.17	0.23	0.12
Canthocamptus sp. C1-C5	3	2.6	0.01	0.01	0.01
Canthocamptus sp. C6	5	4.6	0.01	0.01	0.01
Bosmina longirostris	23971	11125.1	55.44	73.56	34.12
Ceriodaphnia quadrangula	8	5.1	0.02	0.02	0.02
Chydorus sphaericus	1801	1364.1	4.16	5.52	4.18
Daphnia galeata mendotae	52	20.7	0.12	0.16	0.06
Daphnia retrocurva	253	72.3	0.58	0.78	0.22
Diaphanosoma leuchtenbergianum	249	75.9	0.58	0.77	0.23
Eubosmina coregoni	8125	1706.7	18.79	24.97	5.21
Holopedium gibberum	10	8.9	0.02	0.03	0.03
Leptodora kindtii	180	22.4	0.42	0.55	0.07
Polyphemus pediculus	12	6.2	0.03	0.04	0.02
Eurycercus lamellatus	85	47.1	0.20	0.26	0.14
Ilyocryptus sordidus	19	18.8	0.04	0.06	0.06
Alona spp.	41	36.1	0.10	0.13	0.11
Alonella sp.	23	23.3	0.05	0.07	0.07
Asplanchna spp.	14	4.9	0.03	0.04	0.02
Total	43242	13037.5	100.00	132.77	39.91

TABLE 19. The mean concentration, standard error, and percent composition of zooplankton in the discharge waters and the mean number of zooplankton leaving the plant per minute on September 23-24, 1976. Each mean was calculated from the mean concentration of zooplankton at sunset, midnight, sunrise, and noon from the discharge waters of Unit 1.

Species	#/m^3	$s_{\bar{x}}$	%	#/min X 10^6	$s_{\bar{x}}$ X 10^6
Copepod nauplii	1659	658.2	4.61	5.10	2.02
Cyclops spp. C1-C5	1076	181.8	2.99	3.31	0.56
Cyclops bicuspidatus thomasi C6	35	6.9	0.10	0.11	0.02
Cyclops vernalis C6	87	34.8	0.24	0.27	0.11
Tropocyclops prasinus mexicanus C1-C5	62	17.9	0.17	0.19	0.05
Tropocyclops prasinus mexicanus C6	451	70.0	1.26	1.39	0.22
Eucyclops spp. C6	2	2.1	0.01	0.01	0.01
Paracyclops fimbriatus poppei C1-C5	9	9.3	0.03	0.03	0.03
Paracyclops fimbriatus poppei C6	7	4.4	0.02	0.02	0.01
Diaptomus spp. C1-C5	146	30.1	0.41	0.45	0.09
Diaptomus ashlandi C6	5	4.6	0.01	0.01	0.01
Diaptomus minutus C6	30	12.9	0.08	0.09	0.04
Diaptomus oregonensis C6	5	4.6	0.01	0.01	0.01
Epischura lacustris C1-C5	129	35.3	0.36	0.40	0.11
Eurytemora affinis C1-C5	1448	485.9	4.03	4.45	1.49
Eurytemora affinis C6	39	19.4	0.11	0.12	0.06
Canthocamptus sp. C1-C5	2	2.2	0.01	0.01	0.01
Canthocamptus sp. C6	11	10.8	0.03	0.03	0.03
Bosmina longirostris	21499	10421.5	59.80	65.98	31.96
Ceriodaphnia quadrangula	5	4.6	0.01	0.01	0.01
Chydorus sphaericus	885	528.9	2.46	2.71	1.62
Daphnia galeata mendotae	99	49.9	0.27	0.30	0.15
Daphnia retrocurva	686	478.8	1.91	2.11	1.47
Diaphanosoma leuchtenbergianum	195	77.7	0.54	0.60	0.24
Eubosmina coregoni	7106	1666.6	19.76	21.89	5.18
Holopedium gibberum	5	4.6	0.01	0.01	0.01
Leptodora kindtii	168	64.1	0.47	0.52	0.20
Polyphemus pediculus	2	2.4	0.01	0.01	0.01
Eurycercus lamellatus	64	38.5	0.18	0.19	0.12
Ilyocryptus sordidus	6	6.4	0.02	0.02	0.02
Alona spp.	22	13.1	0.06	0.07	0.04
Alonella sp.	4	4.4	0.01	0.01	0.01
Asplanchna spp.	5	4.6	0.01	0.01	0.01
Total	35952	11898.6	100.00	110.45	36.43

Table 20. Mean abundances and standard errors (N=2) determined from two replicate hauls at each of 30 lake survey stations on May 12, 1976. The percentage that each taxon represents of the total zooplankton counted at the station is also given.

Species	DC-1			DC-2			DC-3			DC-4		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	1109	164	24.9	2301	134	27.9	2425	235	31.6	2795	381	30.5
Cyclopoid copepods												
Cyclops spp. C1-C5	1196	67	26.9	2363	10	28.7	2309	41	30.1	2118	59	23.1
Cyclops bicuspidatus thomasi C6	45	2	1.0	49	15	0.6	33	1	0.4	73	16	0.8
Cyclops vernalis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	4	1	0.1	3	3	0.0	3	0	0.0	2	2	0.0
Calanoid copepods												
Diaptomus spp. C1-C5	1523	7	34.3	2518	91	30.6	1715	37	22.4	3203	97	34.9
Diaptomus ashlandi C6	0	0	0.0	9	3	0.1	2	1	0.0	18	2	0.2
Diaptomus minutus C6	2	2	0.1	12	4	0.1	12	1	0.1	13	1	0.1
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0	1	1	0.0	2	2	0.0
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	66	19	1.5	198	29	2.4	168	6	2.2	89	20	1.0
Epischura lacustris C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	68	9	1.5	39	14	0.5	36	5	0.5	45	17	0.5
Eurytemora affinis C6	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C1-C5	23	5	0.5	41	1	0.5	166	13	2.2	185	21	2.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	1	1	0.0	2	2	0.0
Canthocamptus spp. C6	0	0	0.0	2	2	0.0	2	2	0.0	2	2	0.0
Cladocerans												
Bosmina longirostris	384	47	8.6	656	17	8.0	740	166	9.6	592	24	6.4
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	2	2	0.0	0	0	0.0
Chydorus sphaericus	6	6	0.1	1	1	0.0	5	5	0.1	3	3	0.0
Daphnia galeata mendotae	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Daphnia retrocurva	0	0	0.0	4	2	0.1	4	1	0.1	5	5	0.1
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina coregoni	1	1	0.0	2	2	0.0	5	5	0.1	0	0	0.0
Holopedium gibberum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Leptodora kindtii	0	0	0.0	1	1	0.0	2	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Rotifers												
Asplanchna spp.	16	9	0.4	41	5	0.5	37	2	0.5	27	7	0.3
Total	4446	198	100.0	8240	5	100.0	7666	418	100.0	9173	583	100.0
Dry wt (mg/m^3)	5.0	0.2		8.9	0.1		8.8	0.5		10.9	0.4	
Dry wt (ug/individual)	1.1	0.0		1.1	0.0		1.2	0.0		1.2	0.0	

Table 20 continued.

Species	DC-5			DC-6			NDC.5-1			NDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	10174	1994	37.9	8811	5	57.1	1095	307	26.6	1325	87	26.9
Cyclopoid copepods												
Cyclops spp. C1-C5	4555	203	17.0	1426	96	9.2	1086	181	26.4	1389	126	28.2
Cyclops bicuspidatus thomasi C6	117	30	0.4	451	80	2.9	83	3	2.0	25	2	0.5
Cyclops vernalis C6	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	5	5	0.0	3	3	0.0	2	0	0.1	7	2	0.1
Calanoid copepods												
Diaptomus spp. C1-C5	9788	864	36.5	3987	398	25.8	1034	57	25.1	1300	32	26.4
Diaptomus ashlandi C6	439	45	1.6	313	41	2.0	4	2	0.1	5	0	0.1
Diaptomus minutus C6	0	0	0.0	56	15	0.4	0	0	0.0	4	1	0.1
Diaptomus oregonensis C6	0	0	0.0	31	25	0.2	0	0	0.0	1	1	0.0
Diaptomus sicilis C6	60	39	0.2	32	3	0.2	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	0	0	0.0	0	0	0.0	102	1	2.5	108	28	2.2
Epischura lacustris C6	5	5	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	0	0	0.0	11	1	0.1	112	7	2.7	58	16	1.2
Eurytemora affinis C6	0	0	0.0	0	0	0.0	1	1	0.0	2	2	0.1
Limnocalanus macrurus C1-C5	1232	94	4.6	294	4	1.9	31	20	0.8	19	6	0.4
Limnocalanus macrurus C6	0	0	0.0	13	7	0.1	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	5	5	0.0	0	0	0.0	2	0	0.1	2	0	0.1
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	1	1	0.0	3	3	0.1
Cladocerans												
Bosmina longirostris	362	122	1.4	0	0	0.0	487	113	11.9	638	6	12.9
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Chydorus sphaericus	5	5	0.0	0	0	0.0	49	18	1.2	6	1	0.1
Daphnia galeata mendotae	21	21	0.1	0	0	0.0	1	1	0.0	0	0	0.0
Daphnia retrocurva	27	6	0.1	0	0	0.0	0	0	0.0	1	1	0.0
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina coregoni	0	0	0.0	0	0	0.0	2	2	0.1	7	2	0.1
Holopedium gibberum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Leptodora kindtii	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Rotifers												
Asplanchna spp.	32	32	0.1	3	3	0.0	12	12	0.3	22	22	0.4
Total	26830	3360	100.0	15431	470	100.0	4112	564	100.0	4925	321	100.0
Dry wt (mg/m^3)	36.6	3.3		18.0	1.5		4.8	0.3		5.4	0.3	
Dry wt (ug/individual)	1.4	0.0		1.2	0.1		1.2	0.1		1.1	0.0	

Table 20 continued.

Species	NDC-1-1			NDC-2-1			NDC-2-3			NDC-4-1		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	720	35	18.2	763	39	32.1	1874	202	20.0	1532	211	27.2
Cyclopoid copepods												
Cyclops spp. C1-C5	1744	636	44.2	655	38	27.6	3078	8	32.9	1366	124	24.3
Cyclops bicuspidatus thomasi C6	108	94	2.7	12	1	0.5	41	2	0.4	57	32	1.0
Cyclops vernalis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	3	0	0.1	0	0	0.0	5	5	0.1	5	5	0.1
Calanoid copepods												
Diaptomus spp. C1-C5	810	193	20.5	336	11	14.1	2998	201	32.0	1785	51	31.7
Diaptomus ashlandi C6	0	0	0.0	0	0	0.0	9	3	0.1	0	0	0.0
Diaptomus minutus C6	0	0	0.0	3	3	0.1	16	1	0.2	2	2	0.0
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0	4	4	0.1	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	109	17	2.8	173	13	7.3	102	36	1.1	364	65	6.5
Epischura lacustris C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	26	3	0.6	22	7	0.9	37	2	0.4	98	12	1.7
Eurytemora affinis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C1-C5	42	29	1.1	12	9	0.5	107	4	1.1	52	16	0.9
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	3	0	0.0	4	0	0.1
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	3	3	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	322	53	8.2	374	23	15.7	1049	45	11.2	328	110	5.8
Ceriodaphnia quadrangula	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	17	1	0.4	10	0	0.4	0	0	0.0	5	5	0.1
Daphnia galeata mendotae	1	1	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Daphnia retrocurva	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Diaphanosoma leuchtenbergianum	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina coregoni	4	1	0.1	2	0	0.1	7	1	0.1	2	2	0.0
Holopedium gibberum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Leptodora kindtii	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Rotifers												
Asplanchna spp.	39	9	1.0	15	1	0.6	31	4	0.3	25	21	0.4
Total	3948	1049	100.0	2376	93	100.0	9368	483	100.0	5625	501	100.0
Dry wt (mg/m^3)	4.6	1.5		2.5	0.0		11.1	0.6		6.4	0.6	
Dry wt (ug/individual)	1.1	0.1		1.1	0.0		1.2	0.0		1.1	0.0	

Table 20 continued.

Species	NDC-7-1			NDC-7-5			SDC.5-1			SDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	1226	148	30.4	3992	757	23.8	1978	406	41.1	2689	278	29.6
Cyclopoid copepods												
Cyclops spp. C1-C5	936	129	23.3	6219	850	37.1	1326	99	27.6	2448	207	27.0
Cyclops bicuspidatus thomasi C6	24	6	0.6	539	40	3.2	26	26	0.5	14	4	0.1
Cyclops vernalis C6	0	0	0.0	3	3	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	3	1	0.1	11	11	0.1	0	0	0.0	6	0	0.1
Calanoid copepods												
Diaptomus spp. C1-C5	1140	454	28.3	4396	352	26.3	1014	83	21.1	2771	109	30.5
Diaptomus ashlandi C6	2	2	0.1	64	36	0.4	0	0	0.0	2	2	0.0
Diaptomus minutus C6	3	3	0.1	51	1	0.3	0	0	0.0	6	3	0.1
Diaptomus oregonensis C6	0	0	0.0	8	8	0.1	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	11	11	0.1	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	187	24	4.6	23	12	0.1	169	19	3.5	351	76	3.9
Epischura lacustris C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	69	2	1.7	37	10	0.2	6	1	0.1	62	42	0.7
Eurytemora affinis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C1-C5	36	14	0.9	918	234	5.5	7	0	0.1	42	7	0.5
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	1	1	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	363	63	9.0	447	85	2.7	261	77	5.4	644	4	7.1
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	2	2	0.0
Chydorus sphaericus	19	1	0.5	0	0	0.0	10	5	0.2	10	10	0.1
Daphnia galeata mendotae	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Daphnia retrocurva	0	0	0.0	14	2	0.1	0	0	0.0	0	0	0.0
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina coregoni	1	1	0.0	0	0	0.0	0	0	0.0	5	1	0.1
Holopedium gibberum	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Leptodora kindtii	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Rotifers												
Asplanchna spp.	17	6	0.4	14	2	0.1	13	1	0.3	28	28	0.3
Total	4027	368	100.0	16748	6	100.0	4811	663	100.0	9078	23	100.0
Dry wt (mg/m^3)	4.5	0.5		24.6	1.7		4.5	0.5		9.6	0.2	
Dry wt (ug/individual)	1.1	0.0		1.5	0.1		0.9	0.0		1.1	0.0	

Table 20 continued.

Species	SDC-1-1			SDC-2-1			SDC-2-3			SDC-4-1		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	739	159	19.7	495	104	33.4	2681	841	33.3	295	6	51.5
Cyclopoid copepods												
Cyclops spp. C1-C5	1523	120	40.7	299	2	20.1	1760	127	21.8	62	32	10.8
Cyclops bicuspidatus thomasi C6	26	5	0.7	16	5	1.1	17	5	0.2	0	0	0.0
Cyclops vernalis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	1	1	0.1	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	0	0	0.0	2	2	0.1	0	0	0.0	0	0	0.0
Calanoid copepods												
Diaptomus spp. C1-C5	911	135	24.3	395	20	26.6	2814	385	34.9	112	33	19.5
Diaptomus ashlandi C6	0	0	0.0	4	1	0.3	7	3	0.1	1	1	0.1
Diaptomus minutus C6	0	0	0.0	3	2	0.2	4	4	0.1	0	0	0.0
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	134	38	3.6	83	16	5.6	278	119	3.4	31	10	5.5
Epischura lacustris C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	15	2	0.4	10	5	0.7	24	8	0.3	5	0	0.8
Eurytemora affinis C6	2	0	0.1	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C1-C5	21	3	0.6	7	2	0.5	68	26	0.8	7	4	1.3
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	1	1	0.1	2	2	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	327	105	8.7	121	30	8.2	374	96	4.6	52	5	9.1
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	5	0	0.1	4	2	0.3	4	0	0.1	4	3	0.8
Daphnia galeata mendotae	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Daphnia retrocurva	0	0	0.0	0	0	0.0	2	2	0.0	0	0	0.0
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina coregoni	0	0	0.0	2	2	0.1	0	0	0.0	1	1	0.1
Holopedium gibberum	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Leptodora kindtii	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Rotifers												
Asplanchna spp.	38	1	1.0	42	10	2.8	21	1	0.3	3	0	0.5
Total	3741	563	100.0	1482	187	100.0	8055	1597	100.0	573	39	100.0
Dry wt (mg/m^3)	4.1	0.6		1.6	0.2		8.6	1.6		0.6	0.0	
Dry wt (ug/individual)	1.1	0.0		1.1	0.0		1.1	0.0		1.0	0.0	

Table 20 continued.

Species	SDC-7-1			SDC-7-5		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	424	105	52.6	5821	370	31.3
Cyclopoid copepods						
Cyclops spp. C1-C5	92	37	11.4	3769	258	20.3
Cyclops bicuspidatus thomasi C6	7	6	0.9	32	4	0.2
Cyclops vernalis C6	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	0	0	0.0	3	3	0.0
Calanoid copepods						
Diaptomus spp. C1-C5	175	71	21.7	7852	502	42.3
Diaptomus ashlandi C6	4	4	0.5	81	25	0.4
Diaptomus minutus C6	2	2	0.3	80	4	0.4
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	5	0	0.0
Epischura lacustris C1-C5	16	16	2.0	13	7	0.1
Epischura lacustris C6	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	3	2	0.4	3	3	0.0
Eurytemora affinis C6	1	1	0.1	0	0	0.0
Limnocalanus macrurus C1-C5	21	2	2.6	665	93	3.6
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0
Harpacticoid copepods						
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0
Cladocerans						
Bosmina longirostris	54	19	6.7	232	53	1.3
Ceriodaphnia quadrangula	1	1	0.1	0	0	0.0
Chydorus sphaericus	3	0	0.3	0	0	0.0
Daphnia galeata mendotae	0	0	0.0	0	0	0.0
Daphnia retrocurva	0	0	0.0	16	6	0.1
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0
Eubosmina coregoni	0	0	0.0	8	8	0.0
Holopedium gibberum	0	0	0.0	0	0	0.0
Leptodora kindtii	0	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0
Rotifers						
Asplanchna spp.	3	3	0.3	3	3	0.0
Total	805	245	100.0	18581	1300	100.0
Dry wt (mg/m^3)	0.9	0.2		23.9	2.1	
Dry wt (ug/individual)	1.1	0.0		1.3	0.0	

Table 20 continued.

Genus	NDC-1-2			NDC-4-3			NDC-4-4			NDC-7-3		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	1722	12	24.0	2404	651	19.6	8291	294	57.0	3038	191	23.9
Cyclopoid copepods												
Cyclops C1-C5	2204	89	30.7	3638	141	29.6	1208	140	8.3	3585	8	28.2
Cyclops C6	23	13	0.3	192	43	1.6	403	28	2.8	123	26	1.0
Tropocyclops C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops C6	2	2	0.0	7	2	0.1	3	3	0.0	2	2	0.0
Calanoid copepods												
Diaptomus C1-C5	2042	103	28.4	4282	359	34.8	3702	324	25.5	3769	270	29.6
Diaptomus C6	17	6	0.2	*	*	*	712	106	4.9	61	9	0.5
Epischura C1-C5	144	11	2.0	42	13	0.3	0	0	0.0	167	5	1.3
Epischura C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora C1-C5	40	12	0.6	39	19	0.3	0	0	0.0	30	8	0.2
Eurytemora C6	0	0	0.0	5	5	0.0	3	3	0.0	2	2	0.0
Limnocalanus C1-C5	65	16	0.9	244	29	2.0	184	61	1.3	194	22	1.5
Limnocalanus C6	0	0	0.0	0	0	0.0	1	1	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus C1-C5	3	0	0.1	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus C6	0	0	0.0	0	0	0.0	0	0	0.0	4	4	0.0
Cladocerans												
Bosmina	859	4	12.0	1299	268	10.6	29	27	0.2	1685	46	13.2
Ceriodaphnia	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus	3	0	0.1	7	2	0.1	0	0	0.0	6	6	0.1
Daphnia	3	0	0.1	12	7	0.1	3	3	0.0	*	*	*
Diaphanosoma	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina	2	2	0.0	2	2	0.0	0	0	0.0	15	7	0.1
Holopedium	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Leptodora	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Polyphemus	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Rotifers												
Asplanchna	49	0	0.7	22	3	0.2	0	0	0.0	27	27	0.2
Total	7182	180	100.0	12295	1492	100.0	14539	372	100.0	12725	4	100.0
Dry wt (mg/m^3)	8.2	0.2		15.9	1.6		17.2	0.3		15.5	0.0	
Dry wt (ug/individual)	1.1	0.0		1.3	0.0		1.2	0.0		1.2	0.0	

* See final page of table for this taxon

Table 20 continued.

Genus	SDC-1-2			SDC-4-3			SDC-4-4			SDC-7-3		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	2474	163	27.8	5311	331	32.1	11992	286	49.5	2455	67	35.5
Cyclopoid copepods												
Cyclops C1-C5	2356	35	26.4	4437	14	26.8	3133	145	12.9	1709	156	24.7
Cyclops C6	20	8	0.2	42	18	0.3	649	133	2.7	76	27	1.1
Tropocyclops C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops C6	9	5	0.1	0	0	0.0	0	0	0.0	0	0	0.0
Calanoid copepods												
Diaptomus C1-C5	3084	15	34.6	4733	150	28.6	7155	812	29.5	2113	166	30.6
Diaptomus C6	4	0	0.1	69	27	0.4	772	16	3.2	12	6	0.2
Epischura C1-C5	236	26	2.6	39	21	0.2	0	0	0.0	118	62	1.7
Epischura C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eurytemora C1-C5	32	0	0.4	42	6	0.3	0	0	0.0	19	1	0.3
Eurytemora C6	0	0	0.0	0	0	0.0	0	0	0.0	3	3	0.1
Limnocalanus C1-C5	18	6	0.2	845	100	5.1	471	118	1.9	98	12	1.4
Limnocalanus C6	0	0	0.0	0	0	0.0	20	20	0.1	0	0	0.0
Harpacticoid copepods												
Canthocamptus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus C6	0	0	0.0	0	0	0.0	0	0	0.0	2	2	0.0
Cladocerans												
Bosmina	619	1	6.9	972	46	5.9	47	34	0.2	243	82	3.5
Ceriodaphnia	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus	2	2	0.0	0	0	0.0	0	0	0.0	2	2	0.0
Daphnia	2	2	0.0	*	*	*	6	6	0.0	2	2	0.0
Diaphanosoma	0	0	0.0	6	6	0.0	0	0	0.0	2	2	0.0
Eubosmina	2	2	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Holopedium	0	0	0.0	0	0	0.0	0	0	0.0	2	2	0.0
Leptodora	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Polyphemus	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Rotifers												
Asplanchna	54	2	0.6	24	0	0.1	0	0	0.0	58	9	0.8
Total	8912	173	100.0	16531	89	100.0	24246	857	100.0	6917	591	100.0
Dry wt (mg/m^3)	9.4	0.0		22.3	0.8		29.7	2.0		7.5	0.9	
Dry wt (ug/individual)	1.1	0.0		1.4	0.1		1.2	0.0		1.1	0.0	

* See final page of table for this taxon.

Table 20 continued. Rare taxa and taxa counted as species at genus stations in May, 1976.

Taxa	Station	#/m^3	$S_{\bar{x}}$	%
Eucyclops agilis C6	DC-2	1	1	0.0
Eucyclops agilis C6	NDC.5-1	1	1	0.0
Eucyclops agilis C6	NDC-1-2	2	2	0.0
Eucyclops agilis C6	NDC-4-1	2	2	0.0
Paracyclops fimbriatus poppei C1-C5	SDC-7-3	4	4	0.1
Paracyclops fimbriatus poppei C6	SDC-7-3	2	2	0.0
Diaptomus ashlandi C6	NDC-4-3	61	37	0.5
Diaptomus minutus C6	NDC-4-3	22	3	0.2
Diaptomus oregonensis C6	NDC-4-3	10	10	0.1
Bryocamptus spp. C6	NDC-4-3	5	5	0.0
Daphnia galeata mendotae	NDC-7-3	2	2	0.0
Daphnia galeata mendotae	SDC-4-3	3	3	0.0
Daphnia retrocurva	NDC-7-3	15	7	0.1
Daphnia retrocurva	SDC-4-3	6	6	0.0
Eurycercus lamellatus	NDC.5-1	1	1	0.0
Ilyocryptus sordidus	NDC-1-1	1	1	0.0
Macrothrix laticornis	NDC.5-1	1	1	0.0
Alona spp.	DC-3	1	1	0.0
Alona spp.	NDC.5-1	1	1	0.0
Alona spp.	NDC-1-2	2	2	0.0

Table 21. Mean abundances and standard errors (N=2) determined from two replicate hauls at each of 14 lake survey stations on June 17, 1976. The percentage that each taxon represents of the total zooplankton counted at the station is also given.

Species	DC-1			DC-2			DC-3			DC-4		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	7663	1281	10.8	10396	893	16.1	6192	219	10.3	4945	918	11.1
Cyclopoid copepods												
Cyclops spp. C1-C5	5446	246	7.7	15260	945	23.6	8207	482	13.6	3898	219	8.8
Cyclops bicuspidatus thomasi C6	146	87	0.2	45	45	0.1	79	33	0.1	242	49	0.6
Cyclops vernalis C6	29	0	0.0	0	0	0.0	23	23	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	15	15	0.0	0	0	0.0	0	0	0.0	19	19	0.0
Tropocyclops prasinus mexicanus C6	59	30	0.1	15	15	0.0	11	11	0.0	39	19	0.1
Calanoid copepods												
Diaptomus spp. C1-C5	1276	201	1.8	1120	488	1.7	1738	166	2.9	2699	337	6.1
Diaptomus ashlandi C6	15	15	0.0	15	15	0.0	0	0	0.0	219	32	0.5
Diaptomus minutus C6	397	135	0.6	423	93	0.6	366	29	0.6	190	3	0.4
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0	23	23	0.0	224	108	0.5
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	11	11	0.0	10	10	0.0
Epischura lacustris C1-C5	0	0	0.0	0	0	0.0	58	58	0.1	0	0	0.0
Epischura lacustris C6	30	30	0.0	0	0	0.0	0	0	0.0	20	1	0.1
Eurytemora affinis C1-C5	2158	561	3.1	2931	225	4.5	3562	1316	5.9	590	242	1.3
Eurytemora affinis C6	59	1	0.1	60	30	0.1	69	24	0.1	69	28	0.2
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	42616	245	60.2	22141	6081	34.2	33270	1158	55.1	26290	2362	59.3
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	73	14	0.1	61	30	0.1	23	0	0.0	0	0	0.0
Daphnia galeata mendotae	0	0	0.0	0	0	0.0	0	0	0.0	10	10	0.0
Daphnia retrocurva	44	15	0.1	0	0	0.0	11	11	0.0	183	67	0.4
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0	0	0	0.0	20	1	0.1
Eubosmina coregoni	0	0	0.0	0	0	0.0	22	22	0.0	0	0	0.0
Holopedium gibberum	0	0	0.0	15	15	0.0	12	12	0.0	19	19	0.0
Leptodora kindtii	0	0	0.0	0	0	0.0	12	12	0.0	10	10	0.0
Polyphemus pediculus	0	0	0.0	0	0	0.0	23	23	0.0	21	21	0.1
Rotifers												
Asplanchna spp.	10735	1675	15.2	12211	1444	18.9	6628	295	11.0	4645	386	10.5
Total	70758	776	100.0	64695	10169	100.0	60341	3752	100.0	44364	4582	100.0
Dry wt (mg/m^3)	80.7	1.3		69.8	12.3		71.8	4.5		58.2	6.4	
Dry wt (ug/individual)	1.1	0.0		1.1	0.0		1.2	0.0		1.3	0.0	

Table 21 continued.

Species	DC-5			DC-6			NDC.5-1			NDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	6635	578	13.7	7573	97	20.7	7493	1087	8.4	9302	2466	8.9
Cyclopoid copepods												
Cyclops spp. C1-C5	2926	340	6.1	3820	700	10.4	3552	1405	4.0	6486	2127	6.2
Cyclops bicuspidatus thomasi C6	689	9	1.4	1442	101	3.9	16	16	0.0	190	66	0.2
Cyclops vernalis C6	17	17	0.0	11	11	0.0	0	0	0.0	12	12	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	17	17	0.0	0	0	0.0	65	34	0.1	67	18	0.1
Calanoid copepods												
Diaptomus spp. C1-C5	6073	119	12.6	13833	1118	37.8	1487	133	1.7	1648	484	1.6
Diaptomus ashlandi C6	553	60	1.1	1176	301	3.2	0	0	0.0	25	25	0.0
Diaptomus minutus C6	536	94	1.1	305	43	0.8	378	283	0.4	236	63	0.2
Diaptomus oregonensis C6	128	9	0.3	232	28	0.6	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	58	29	0.2	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	26	26	0.1	0	0	0.0	99	99	0.1	50	50	0.1
Epischura lacustris C6	43	26	0.1	54	11	0.1	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	936	17	1.9	171	25	0.5	3866	233	4.3	2571	243	2.5
Eurytemora affinis C6	213	60	0.4	98	54	0.3	16	16	0.0	21	21	0.0
Limnocalanus macrurus C1-C5	9	9	0.0	142	54	0.4	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	83	69	0.2	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	25127	51	51.9	5141	1466	14.0	56571	7366	63.4	62691	6468	60.2
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	9	9	0.0	22	22	0.1	16	16	0.0	46	3	0.0
Daphnia galeata mendotae	0	0	0.0	11	11	0.0	0	0	0.0	0	0	0.0
Daphnia retrocurva	196	43	0.4	109	21	0.3	0	0	0.0	0	0	0.0
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0	0	0	0.0	21	21	0.0
Eubosmina coregoni	34	34	0.1	113	4	0.3	0	0	0.0	37	37	0.0
Holopedium gibberum	17	17	0.0	29	14	0.1	0	0	0.0	0	0	0.0
Leptodora kindtii	17	17	0.0	22	22	0.1	0	0	0.0	55	30	0.1
Polyphemus pediculus	68	34	0.1	69	40	0.2	32	1	0.0	0	0	0.0
Rotifers												
Asplanchna spp.	4117	374	8.5	2120	575	5.8	15610	88	17.5	20681	4731	19.9
Total	48383	783	100.0	36634	4613	100.0	89201	9945	100.0	104140	16611	100.0
Dry wt (mg/m^3)	69.5	1.0		75.8	12.4		100.6	11.6		115.8	17.1	
Dry wt (ug/individual)	1.5	0.0		2.1	0.1		1.1	0.0		1.1	0.0	

Table 21 continued.

Species	NDC-7-1			NDC-7-5			SDC.5-1			SDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	11146	796	22.7	4663	125	14.8	9555	176	17.4	9619	1178	22.2
Cyclopoid copepods												
Cyclops spp. C1-C5	4038	118	8.2	6049	338	19.2	8366	242	15.2	10735	234	24.8
Cyclops bicuspidatus thomasi C6	0	0	0.0	1349	152	4.3	16	16	0.0	0	0	0.0
Cyclops vernalis C6	0	0	0.0	17	17	0.1	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C6	41	41	0.1	0	0	0.0	0	0	0.0	11	11	0.0
Calanoid copepods												
Diaptomus spp. C1-C5	1575	136	3.2	5568	610	17.7	1470	183	2.7	1741	116	4.0
Diaptomus ashlandi C6	0	0	0.0	1211	185	3.9	31	31	0.1	0	0	0.0
Diaptomus minutus C6	231	14	0.5	863	60	2.7	208	10	0.4	281	43	0.6
Diaptomus oregonensis C6	15	15	0.0	209	175	0.7	47	47	0.1	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	60	60	0.2	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	0	0	0.0	35	35	0.1	66	66	0.1	40	40	0.1
Epischura lacustris C6	0	0	0.0	17	17	0.1	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	2342	321	4.8	189	67	0.6	2453	604	4.5	1734	50	4.0
Eurytemora affinis C6	58	3	0.1	35	0	0.1	0	0	0.0	22	22	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	17826	1597	36.4	7188	246	22.8	20385	486	37.1	12215	426	28.2
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	42	12	0.1	9	9	0.0	17	17	0.0	41	2	0.1
Daphnia galeata mendotae	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Daphnia retrocurva	14	14	0.0	561	3	1.8	32	1	0.1	11	11	0.0
Diaphanosoma leuchtenbergianum	14	14	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Eubosmina coregoni	15	15	0.0	354	30	1.1	33	33	0.1	11	11	0.0
Holopedium gibberum	0	0	0.0	43	8	0.1	0	0	0.0	0	0	0.0
Leptodora kindtii	0	0	0.0	69	35	0.2	0	0	0.0	0	0	0.0
Polyphemus pediculus	0	0	0.0	60	8	0.2	0	0	0.0	21	1	0.1
Rotifers												
Asplanchna spp.	11666	583	23.8	2934	212	9.3	12316	1026	22.4	6806	803	15.7
Total	49023	824	100.0	31486	1290	100.0	54995	320	100.0	43286	309	100.0
Dry wt (mg/m^3)	48.2	2.1		56.7	5.5		57.7	1.1		46.5	0.2	
Dry wt (ug/individual)	1.0	0.0		1.8	0.1		1.1	0.0		1.1	0.0	

Table 21 continued.

Species	SDC-7-1			SDC-7-5		
	#/m³	$s_{\bar{x}}$	%	#/m³	$s_{\bar{x}}$	%
Copepod nauplii	15621	1221	23.4	5080	1421	5.4
Cyclopoid copepods						
Cyclops spp. C1-C5	6772	1761	10.1	5507	184	5.8
Cyclops bicuspidatus thomasi C6	11	11	0.0	907	36	1.0
Cyclops vernalis C6	0	0	0.0	15	15	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	47	47	0.1
Tropocyclops prasinus mexicanus C6	11	11	0.0	24	24	0.0
Calanoid copepods						
Diaptomus spp. C1-C5	3076	82	4.6	4936	58	5.2
Diaptomus ashlandi C6	32	32	0.1	1117	391	1.2
Diaptomus minutus C6	407	154	0.6	283	95	0.3
Diaptomus oregonensis C6	11	11	0.0	67	20	0.1
Diaptomus sicilis C6	0	0	0.0	24	24	0.0
Epischura lacustris C1-C5	0	0	0.0	15	15	0.0
Epischura lacustris C6	0	0	0.0	24	24	0.0
Eurytemora affinis C1-C5	1237	152	1.9	1057	162	1.1
Eurytemora affinis C6	0	0	0.0	62	33	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	38	9	0.0
Limnocalanus macrurus C6	0	0	0.0	15	15	0.0
Harpacticoid copepods						
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0
Cladocerans						
Bosmina longirostris	23191	2559	34.7	68670	2986	72.9
Ceriodaphnia quadrangula	19	19	0.0	0	0	0.0
Chydorus sphaericus	19	19	0.0	0	0	0.0
Daphnia galeata mendotae	0	0	0.0	0	0	0.0
Daphnia retrocurva	0	0	0.0	47	47	0.1
Diaphanosoma leuchtenbergianum	0	0	0.0	0	0	0.0
Eubosmina coregoni	0	0	0.0	24	24	0.0
Holopedium gibberum	0	0	0.0	15	15	0.0
Leptodora kindtii	19	19	0.0	38	9	0.0
Polyphemus pediculus	0	0	0.0	24	24	0.0
Rotifers						
Asplanchna spp.	16426	1015	24.6	6234	833	6.6
Total	66849	6470	100.0	94266	5467	100.0
Dry wt (mg/m^3)	67.3	6.7		130.8	6.4	
Dry wt (ug/individual)	1.0	0.0		1.4	0.0	

Table 22. Mean abundances and standard errors (N=2) determined from two replicate hauls at each of 30 lake survey stations on July 15, 1976. The percentage that each taxon represents of the total zooplankton counted at the station is also given.

Species	DC-1			DC-2			DC-3			DC-4		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	10345	786	12.4	16782	6	16.7	10858	889	19.1	10164	572	14.7
Cyclopoid copepods												
Cyclops spp. C1-C5	1360	5	1.6	1362	25	1.4	5673	199	10.0	7385	684	10.7
Cyclops bicuspidatus thomasi C6	91	91	0.1	0	0	0.0	1495	357	2.6	2200	754	3.2
Cyclops vernalis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	66	66	0.1	80	80	0.1	247	247	0.4
Tropocyclops prasinus mexicanus C6	1678	507	2.0	2093	46	2.1	356	145	0.6	292	140	0.4
Calanoid copepods												
Diaptomus spp. C1-C5	5094	178	6.1	2077	756	2.1	5121	1206	9.0	9179	44	13.3
Diaptomus ashlandi C6	23	23	0.0	27	27	0.0	67	24	0.1	1016	65	1.5
Diaptomus minutus C6	863	89	1.0	2066	19	2.1	735	61	1.3	908	43	1.3
Diaptomus oregonensis C6	68	68	0.1	134	134	0.1	53	31	0.1	334	46	0.5
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	1377	352	1.6	626	230	0.6	240	13	0.4	186	42	0.3
Epischura lacustris C6	0	0	0.0	0	0	0.0	76	8	0.1	75	39	0.1
Eurytemora affinis C1-C5	1875	264	2.3	1668	149	1.7	538	220	0.9	252	252	0.4
Eurytemora affinis C6	37	37	0.0	0	0	0.0	0	0	0.0	148	4	0.2
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	55129	6140	66.1	69416	198	68.9	24479	1194	43.1	26092	3900	37.8
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	0	0	0.0	0	0	0.0	57	57	0.1	37	1	0.1
Daphnia galeata mendotae	0	0	0.0	0	0	0.0	158	116	0.3	733	276	1.1
Daphnia retrocurva	2044	323	2.4	712	250	0.7	3869	501	6.8	5745	269	8.3
Diaphanosoma leuchtenbergianum	151	105	0.2	0	0	0.0	174	37	0.3	36	36	0.1
Eubosmina coregoni	2403	829	2.9	783	142	0.8	1821	137	3.2	3364	167	4.9
Holopedium gibberum	219	145	0.3	212	52	0.2	200	73	0.4	187	79	0.3
Leptodora kindtii	64	27	0.1	27	27	0.0	44	2	0.1	57	57	0.1
Polyphemus pediculus	105	32	0.1	844	118	0.8	120	6	0.2	111	3	0.2
Rotifers												
Asplanchna spp.	516	76	0.6	1852	195	1.8	535	12	0.9	273	159	0.4
Total	83441	7688	100.0	100749	1480	100.0	56748	2222	100.0	69022	2951	100.0
Dry wt (mg/m^3)	68.8	7.9		73.9	3.2		55.0	4.4		81.3	1.7	
Dry wt (ug/individual)	0.8	0.0		0.7	0.0		1.0	0.0		1.2	0.0	

Table 22 continued.

Species	DC-5 #/m^3	DC-5 $s_{\bar{x}}$	DC-5 %	DC-6 #/m^3	DC-6 $s_{\bar{x}}$	DC-6 %	NDC.5-1 #/m^3	NDC.5-1 $s_{\bar{x}}$	NDC.5-1 %	NDC.5-2 #/m^3	NDC.5-2 $s_{\bar{x}}$	NDC.5-2 %
Copepod nauplii	9500	1086	11.9	4677	1384	14.6	8025	1659	15.2	13917	7180	12.9
Cyclopoid copepods												
Cyclops spp. C1-C5	6228	935	7.8	5244	23	16.4	1048	333	2.0	3180	632	2.9
Cyclops bicuspidatus thomasi C6	2888	182	3.6	3262	474	10.2	114	97	0.2	32	32	0.0
Cyclops vernalis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	30	30	0.0	50	50	0.2	46	4	0.1	110	67	0.1
Tropocyclops prasinus mexicanus C6	29	1	0.0	191	107	0.6	1259	131	2.4	1207	344	1.1
Calanoid copepods												
Diaptomus spp. C1-C5	11804	1158	14.8	6280	1152	19.6	2872	581	5.4	4864	632	4.5
Diaptomus ashlandi C6	1560	117	2.0	1145	266	3.6	0	0	0.0	22	22	0.0
Diaptomus minutus C6	908	84	1.1	526	129	1.6	333	131	0.6	471	61	0.4
Diaptomus oregonensis C6	289	109	0.4	538	42	1.7	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	5	5	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	132	18	0.2	43	4	0.1	383	88	0.7	483	138	0.4
Epischura lacustris C6	30	30	0.0	5	5	0.0	38	4	0.1	0	0	0.0
Eurytemora affinis C1-C5	392	91	0.5	73	26	0.2	1629	602	3.1	3870	1538	3.6
Eurytemora affinis C6	43	13	0.1	34	4	0.1	21	21	0.0	22	22	0.0
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	53	13	0.2	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	34315	4059	43.0	2618	541	8.2	33752	9533	63.8	74446	696	68.9
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	0	0	0.0	0	0	0.0	8	8	0.0	55	34	0.1
Daphnia galeata mendotae	1111	2	1.4	1792	632	5.6	67	17	0.1	32	32	0.0
Daphnia retrocurva	6984	1089	8.8	4068	26	12.7	1154	446	2.2	1550	264	1.4
Diaphanosoma leuchtenbergianum	28	28	0.0	0	0	0.0	76	8	0.1	274	80	0.3
Eubosmina coregoni	2860	153	3.6	1151	121	3.6	1663	189	3.1	2259	489	2.1
Holopedium gibberum	293	8	0.4	147	82	0.5	109	25	0.2	44	1	0.0
Leptodora kindtii	44	16	0.1	68	21	0.2	0	0	0.0	33	11	0.0
Polyphemus pediculus	117	3	0.1	20	10	0.1	118	34	0.2	397	224	0.4
Rotifers												
Asplanchna spp.	147	33	0.2	0	0	0.0	227	109	0.4	844	131	0.8
Total	79735	6622	100.0	31990	4725	100.0	52943	12657	100.0	108112	10536	100.0
Dry wt (mg/m^3)	97.1	9.0		55.9	7.8		42.1	9.5		81.6	5.4	
Dry wt (ug/individual)	1.2	0.0		1.8	0.0		0.8	0.0		0.8	0.0	

Table 22 continued.

Species	NDC-1-1			NDC-2-1			NDC-2-3			NDC-4-1		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	10535	935	6.9	14505	91	13.1	11632	957	21.4	8586	759	13.9
Cyclopoid copepods												
Cyclops spp. C1-C5	2138	135	1.4	983	35	0.9	4306	980	7.9	2044	129	3.3
Cyclops bicuspidatus thomasi C6	0	0	0.0	0	0	0.0	1707	230	3.1	0	0	0.0
Cyclops vernalis C6	0	0	0.0	0	0	0.0	11	11	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	130	39	0.1	107	68	0.1	259	78	0.5	99	99	0.2
Tropocyclops prasinus mexicanus C6	438	17	0.3	723	21	0.6	446	46	0.8	1025	428	1.7
Calanoid copepods												
Diaptomus spp. C1-C5	3074	295	2.0	2074	312	1.9	4201	411	7.7	1062	193	1.7
Diaptomus ashlandi C6	0	0	0.0	0	0	0.0	34	8	0.1	0	0	0.0
Diaptomus minutus C6	259	77	0.2	602	181	0.5	1686	209	3.1	1145	275	1.9
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0	122	59	0.2	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	11	11	0.0	0	0	0.0
Epischura lacustris C1-C5	522	67	0.3	299	53	0.3	447	58	0.8	356	139	0.6
Epischura lacustris C6	46	46	0.0	0	0	0.0	133	49	0.2	0	0	0.0
Eurytemora affinis C1-C5	2405	38	1.6	2386	35	2.1	619	75	1.1	1199	221	1.9
Eurytemora affinis C6	42	42	0.0	18	18	0.0	130	25	0.2	0	0	0.0
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	129397	2308	84.9	86291	22761	77.9	22304	643	41.0	44037	1008	71.3
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	179	94	0.1	37	2	0.0	0	0	0.0	17	17	0.0
Daphnia galeata mendotae	46	46	0.0	35	35	0.0	154	28	0.3	30	3	0.1
Daphnia retrocurva	922	80	0.6	199	82	0.2	3043	222	5.6	362	199	0.6
Diaphanosoma leuchtenbergianum	0	0	0.0	127	49	0.1	130	25	0.2	47	19	0.1
Eubosmina coregoni	1850	335	1.2	1273	411	1.1	1736	389	3.2	1034	56	1.7
Holopedium gibberum	42	42	0.0	70	70	0.1	282	29	0.5	63	36	0.1
Leptodora kindtii	42	42	0.0	39	39	0.0	34	8	0.1	14	14	0.0
Polyphemus pediculus	0	0.	0.0	319	73	0.3	498	98	0.9	394	68	0.6
Rotifers												
Asplanchna spp.	305	32	0.2	741	4	0.7	500	111	0.9	281	281	0.4
Total	152372	975	100.0	110828	23523	100.0	54425	38	100.0	61794	2140	100.0
Dry wt (mg/m^3)	110.2	0.6		77.3	17.0		54.4	1.9		45.2	2.8	
Dry wt (ug/individual)	0.7	0.0		0.7	0.0		1.0	0.0		0.7	0.0	

Table 22 continued.

Species	NDC-7-1			NDC-7-5			SDC.5-1			SDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	1985	710	2.7	8683	1916	14.9	8808	1488	11.1	8103	1329	16.5
Cyclopoid copepods												
Cyclops spp. C1-C5	903	84	1.2	7485	1258	12.9	537	35	0.7	2040	468	4.2
Cyclops bicuspidatus thomasi C6	47	1	0.1	4731	599	8.1	255	190	0.3	37	19	0.1
Cyclops vernalis C6	0	0	0.0	15	15	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	12	12	0.0	45	45	0.1	32	32	0.0	103	9	0.2
Tropocyclops prasinus mexicanus C6	407	94	0.6	165	45	0.3	552	179	0.7	515	47	1.1
Calanoid copepods												
Diaptomus spp. C1-C5	919	236	1.2	14851	60	25.5	1427	99	1.8	4304	449	8.8
Diaptomus ashlandi C6	12	12	0.0	3039	284	5.2	8	8	0.0	19	0	0.0
Diaptomus minutus C6	494	84	0.7	509	30	0.9	698	31	0.9	683	122	1.4
Diaptomus oregonensis C6	12	12	0.0	898	329	1.5	0	0	0.0	37	37	0.1
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	142	51	0.2	120	90	0.2	96	31	0.1	1076	47	2.2
Epischura lacustris C6	0	0	0.0	15	15	0.0	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	659	159	0.9	135	45	0.2	426	76	0.5	1020	28	2.1
Eurytemora affinis C6	46	46	0.1	195	75	0.3	8	8	0.0	19	0	0.0
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	9	9	0.0
Cladocerans												
Bosmina longirostris	66497	1053	89.6	9192	689	15.8	65289	12820	82.1	27041	1927	55.1
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	0	0	0.0	0	0	0.0	24	8	0.0	28	9	0.1
Daphnia galeata mendotae	82	9	0.1	958	389	1.6	32	32	0.0	19	19	0.0
Daphnia retrocurva	527	26	0.7	5569	120	9.6	392	52	0.5	898	112	1.8
Diaphanosoma leuchtenbergianum	12	12	0.0	30	30	0.1	48	16	0.1	140	9	0.3
Eubosmina coregoni	1073	111	1.4	898	299	1.5	424	116	0.5	2489	580	5.1
Holopedium gibberum	70	21	0.1	284	15	0.5	88	25	0.1	112	56	0.2
Leptodora kindtii	23	23	0.0	105	45	0.2	32	0	0.0	65	9	0.1
Polyphemus pediculus	223	41	0.3	180	30	0.3	56	7	0.1	37	19	0.1
Rotifers												
Asplanchna spp.	35	11	0.1	105	75	0.2	328	53	0.4	234	140	0.5
Total	74200	49	100.0	58206	5928	100.0	79561	14945	100.0	49029	5109	100.0
Dry wt (mg/m^3)	56.1	0.2		92.1	8.6		56.9	10.1		42.1	5.1	
Dry wt (ug/individual)	0.8	0.0		1.6	0.0		0.7	0.0		0.9	0.0	

Table 22 continued.

Species	SDC-1-1			SDC-2-1			SDC-2-3			SDC-4-1		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	10041	3573	8.8	7267	1154	7.1	10870	2046	17.3	6318	53	8.9
Cyclopoid copepods												
Cyclops spp. C1-C5	799	394	0.7	511	12	0.5	3381	367	5.4	589	186	0.8
Cyclops bicuspidatus thomasi C6	0	0	0.0	0	0	0.0	631	180	1.0	0	0	0.0
Cyclops vernalis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	0	0	0.0	0	0	0.0	254	102	0.4	67	67	0.1
Tropocyclops prasinus mexicanus C6	994	691	0.9	1429	6	1.4	1215	432	1.9	1494	483	2.1
Calanoid copepods												
Diaptomus spp. C1-C5	1464	150	1.3	2064	317	2.0	5927	431	9.4	1813	275	2.6
Diaptomus ashlandi C6	0	0	0.0	0	0	0.0	233	20	0.4	0	0	0.0
Diaptomus minutus C6	742	170	0.6	1574	139	1.5	1214	52	1.9	1117	275	1.6
Diaptomus oregonensis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	225	56	0.2	195	8	0.2	684	304	1.1	431	175	0.6
Epischura lacustris C6	0	0	0.0	0	0	0.0	25	25	0.0	0	0	0.0
Eurytemora affinis C1-C5	591	321	0.5	1034	98	1.0	1093	97	1.7	4088	426	5.8
Eurytemora affinis C6	0	0	0.0	0	0	0.0	0	0	0.0	18	18	0.0
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	97600	32926	85.6	86157	4442	84.2	32734	900	52.0	53252	570	75.1
Ceriodaphnia quadrangula	0	0	0.0	15	15	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	0	0	0.0	15	15	0.0	25	25	0.0	37	37	0.1
Daphnia galeata mendotae	122	88	0.1	46	17	0.0	173	55	0.3	0	0	0.0
Daphnia retrocurva	436	335	0.4	305	131	0.3	2549	34	4.1	321	119	0.4
Diaphanosoma leuchtenbergianum	34	34	0.0	15	15	0.0	110	9	0.2	52	15	0.1
Eubosmina coregoni	376	95	0.3	1049	113	1.0	928	288	1.5	752	56	1.1
Holopedium gibberum	87	53	0.1	44	44	0.0	195	43	0.3	35	1	0.1
Leptodora kindtii	0	0	0.0	62	62	0.1	37	13	0.1	0	0	0.0
Polyphemus pediculus	139	72	0.1	226	23	0.2	190	190	0.3	248	45	0.4
Rotifers												
Asplanchna spp.	411	60	0.4	330	18	0.3	505	78	0.8	299	30	0.4
Total	114060	38641	100.0	102351	6164	100.0	62973	3788	100.0	70930	429	100.0
Dry wt (mg/m^3)	80.6	27.1		75.9	3.9		56.8	2.6		51.8	0.7	
Dry wt (ug/individual)	0.7	0.0		0.7	0.0		0.9	0.0		0.7	0.0	

Table 22 continued.

Species	SDC-7-1 #/m^3	SDC-7-1 $s_{\bar{x}}$	SDC-7-1 %	SDC-7-5 #/m^3	SDC-7-5 $s_{\bar{x}}$	SDC-7-5 %
Copepod nauplii	9624	1452	6.4	6685	989	6.8
Cyclopoid copepods						
Cyclops spp. C1-C5	661	53	0.4	4936	343	5.1
Cyclops bicuspidatus thomasi C6	0	0	0.0	2440	9	2.5
Cyclops vernalis C6	0	0	0.0	17	17	0.0
Tropocyclops prasinus mexicanus C1-C5	171	171	0.1	139	139	0.1
Tropocyclops prasinus mexicanus C6	3528	559	2.3	263	49	0.3
Calanoid copepods						
Diaptomus spp. C1-C5	2054	287	1.4	8259	376	8.4
Diaptomus ashlandi C6	0	0	0.0	852	86	0.9
Diaptomus minutus C6	423	91	0.3	911	8	0.9
Diaptomus oregonensis C6	0	0	0.0	183	60	0.2
Diaptomus sicilis C6	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	294	37	0.2	496	129	0.5
Epischura lacustris C6	28	28	0.0	48	13	0.1
Eurytemora affinis C1-C5	5484	625	3.6	888	367	0.9
Eurytemora affinis C6	14	14	0.0	115	24	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0
Harpacticoid copepods						
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0
Cladocerans						
Bosmina longirostris	126190	14290	83.6	62705	3254	64.2
Ceriodaphnia quadrangula	14	14	0.0	0	0	0.0
Chydorus sphaericus	28	28	0.0	17	17	0.0
Daphnia galeata mendotae	43	43	0.0	196	12	0.2
Daphnia retrocurva	489	118	0.3	4480	174	4.6
Diaphanosoma leuchtenbergianum	126	40	0.1	81	11	0.1
Eubosmina coregoni	562	66	0.4	3313	680	3.4
Holopedium gibberum	111	54	0.1	229	14	0.2
Leptodora kindtii	98	12	0.1	63	29	0.1
Polyphemus pediculus	209	67	0.1	179	5	0.2
Rotifers						
Asplanchna spp.	743	30	0.5	194	20	0.2
Total	150894	12447	100.0	97691	1708	100.0
Dry wt (mg/m^3)	106.7	9.6		96.7	1.3	
Dry wt (ug/individual)	0.7	0.0		1.0	0.0	

Table 22 continued.

Genus	NDC-1-2			NDC-4-3			NDC-4-4			NDC-7-3		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	13638	999	22.9	8736	681	14.2	7155	2797	18.7	2583	772	5.4
Cyclopoid copepods												
Cyclops C1-C5	1643	103	2.8	7034	1022	11.4	4558	233	11.9	2653	757	5.6
Cyclops C6	171	43	0.3	2604	141	4.2	2824	927	7.4	562	208	1.2
Tropocyclops C1-C5	264	104	0.4	18	18	0.0	67	67	0.2	96	96	0.2
Tropocyclops C6	1694	572	2.8	126	55	0.2	27	11	0.1	217	24	0.5
Calanoid copepods												
Diaptomus C1-C5	3787	194	6.4	9928	1445	16.1	8672	821	22.7	1533	117	3.2
Diaptomus C6	1526	403	2.6	2209	108	3.6	1755	159	4.6	956	21	2.0
Epischura C1-C5	410	104	0.7	270	92	0.4	44	6	0.1	187	60	0.4
Epischura C6	0	0	0.0	53	53	0.1	52	14	0.1	21	7	0.0
Eurytemora C1-C5	1818	631	3.1	698	336	1.1	63	13	0.2	509	41	1.1
Eurytemora C6	15	15	0.0	90	55	0.1	85	68	0.2	0	0	0.0
Limnocalanus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus C6	0	0	0.0	0	0	0.0	278	28	0.7	0	0	0.0
Harpacticoid copepods												
Canthocamptus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina	29988	1387	50.3	22770	1183	37.0	7936	2514	20.8	36129	3577	76.0
Ceriodaphnia	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus	47	17	0.1	0	0	0.0	0	0	0.0	0	0	0.0
Daphnia	*	*	*	*	*	*	3903	460	10.2	*	*	*
Diaphanosoma	109	13	0.2	36	0	0.1	0	0	0.0	48	34	0.1
Eubosmina	1110	84	1.9	1387	424	2.3	568	236	1.5	514	174	1.1
Holopedium	172	12	0.3	341	15	0.6	110	43	0.3	63	8	0.1
Leptodora	15	15	0.0	54	54	0.1	61	22	0.2	27	27	0.1
Polyphemus	143	82	0.2	215	34	0.4	17	17	0.0	208	95	0.4
Rotifers												
Asplanchna	877	11	1.5	163	163	0.3	0	0	0.0	194	109	0.4
Total	59645	1323	100.0	61492	281	100.0	38176	7719	100.0	47527	6313	100.0
Dry wt (mg/m^3)	49.3	2.0		72.8	1.3		59.6	8.1		39.8	6.0	
Dry wt (ug/individual)	0.8	0.0		1.2	0.0		1.6	0.1		0.8	0.0	

* See final page of table for this taxon

Table 22 continued.

Genus	SDC-1-2			SDC-4-3			SDC-4-4			SDC-7-3		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	9579	5392	9.6	10423	1240	17.0	6954	1200	17.7	6443	668	11.8
Cyclopoid copepods												
<u>Cyclops</u> C1-C5	2692	551	2.7	5470	326	8.9	4865	935	12.4	2438	318	4.5
<u>Cyclops</u> C6	78	47	0.1	1375	472	2.2	3047	17	7.8	607	17	1.1
<u>Tropocyclops</u> C1-C5	187	124	0.2	110	35	0.2	65	65	0.2	326	173	0.6
<u>Tropocyclops</u> C6	1896	87	1.9	479	65	0.8	107	13	0.3	882	116	1.6
Calanoid copepods												
<u>Diaptomus</u> C1-C5	4178	1187	4.2	6570	22	10.7	10200	1311	26.0	3613	463	6.6
<u>Diaptomus</u> C6	719	404	0.7	1589	67	2.6	3481	160	8.9	749	126	1.4
<u>Epischura</u> C1-C5	985	387	1.0	686	142	1.1	116	94	0.3	179	70	0.3
<u>Epischura</u> C6	0	0	0.0	19	19	0.0	39	16	0.1	43	22	0.1
<u>Eurytemora</u> C1-C5	2064	805	2.1	830	39	1.4	134	40	0.3	1417	377	2.6
<u>Eurytemora</u> C6	16	16	0.0	36	36	0.1	51	4	0.1	10	10	0.0
<u>Limnocalanus</u> C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
<u>Limnocalanus</u> C6	0	0	0.0	0	0	0.0	11	11	0.0	0	0	0.0
Harpacticoid copepods												
<u>Canthocamptus</u> C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
<u>Canthocamptus</u> C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
<u>Bosmina</u>	72408	7935	72.7	23279	2654	37.9	3957	207	10.1	33015	337	60.6
<u>Ceriodaphnia</u>	8	8	0.0	0	0	0.0	0	0	0.0	0	0	0.0
<u>Chydorus</u>	0	0	0.0	19	19	0.0	0	0	0.0	0	0	0.0
<u>Daphnia</u>	*	*	*	6346	1115	10.4	5051	189	12.9	1639	108	3.0
<u>Diaphanosoma</u>	281	155	0.3	169	132	0.3	34	12	0.1	42	20	0.1
<u>Eubosmina</u>	1675	384	1.7	3109	513	5.1	864	139	2.2	1666	127	3.1
<u>Holopedium</u>	102	23	0.1	293	105	0.5	145	51	0.4	189	123	0.4
<u>Leptodora</u>	78	47	0.1	37	1	0.1	85	9	0.2	96	13	0.2
<u>Polyphemus</u>	94	31	0.1	206	133	0.3	17	6	0.0	645	230	1.2
Rotifers												
<u>Asplanchna</u>	929	693	0.9	293	105	0.5	44	21	0.1	522	19	1.0
Total	99636	18196	100.0	61337	5560	100.0	39268	3432	100.0	54522	912	100.0
Dry wt (mg/m^3)	77.6	14.0		68.6	6.4		61.9	4.1		49.0	1.1	
Dry wt (ug/individual)	0.8	0.0		1.1	0.0		1.6	0.0		0.9	0.0	

* See final page of table for this taxon

Table 22 continued. Rare taxa and taxa counted as species at genus stations in July, 1976.

Taxa	Station	#/m^3	$S_{\bar{x}}$	%
Cyclops spp. C6	SDC-2-1	15	15	0.0
Daphnia galeata mendotae	NDC-1-2	48	48	0.1
Daphnia galeata mendotae	NDC-4-3	485	14	0.8
Daphnia galeata mendotae	NDC-7-3	35	7	0.1
Daphnia galeata mendotae	SDC-1-2	86	39	0.1
Daphnia retrocurva	NDC-1-2	2168	238	3.6
Daphnia retrocurva	NDC-4-3	4273	361	6.9
Daphnia retrocurva	NDC-7-3	993	299	2.1
Daphnia retrocurva	SDC-1-2	1582	102	1.6
Alona spp.	NDC-7-1	23	23	0.0

Table 23. Mean abundances and standard errors (N=2) determined from two replicate hauls at each of 14 lake survey stations on August 11, 1976. The percentage that each taxon represents of the total zooplankton counted at the station is also given.

Species	DC-1			DC-2			DC-3			DC-4		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	4184	288	17.5	8337	98	14.8	6395	342	8.9	4668	87	9.6
Cyclopoid copepods												
Cyclops spp. C1-C5	2863	651	12.0	3408	12	6.1	6103	50	8.5	7453	968	15.3
Cyclops bicuspidatus thomasi C6	76	26	0.3	106	49	0.2	337	44	0.5	604	171	1.2
Cyclops vernalis C6	8	8	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	681	492	2.8	1401	127	2.5	932	483	1.3	723	285	1.5
Tropocyclops prasinus mexicanus C6	839	69	3.5	4165	32	7.4	5257	406	7.4	3667	712	7.5
Calanoid copepods												
Diaptomus spp. C1-C5	2839	791	11.9	7626	526	13.6	10855	1154	15.2	6692	225	13.7
Diaptomus ashlandi C6	7	7	0.0	0	0	0.0	11	11	0.0	35	1	0.1
Diaptomus minutus C6	429	66	1.8	5389	103	9.6	3164	155	4.4	1356	59	2.8
Diaptomus oregonensis C6	17	17	0.1	79	51	0.1	109	86	0.1	227	25	0.5
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	99	99	0.4	545	78	1.0	302	58	0.4	193	59	0.4
Epischura lacustris C6	0	0	0.0	94	9	0.2	189	55	0.3	139	5	0.3
Eurytemora affinis C1-C5	520	41	2.2	490	76	0.9	206	108	0.3	669	231	1.4
Eurytemora affinis C6	0	0	0.0	55	30	0.1	71	26	0.1	35	1	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	2178	494	9.1	1445	253	2.6	3857	1611	5.4	2115	263	4.3
Ceriodaphnia quadrangula	181	50	0.8	283	28	0.5	296	94	0.4	483	123	1.0
Chydorus sphaericus	16	1	0.1	0	0	0.0	0	0	0.0	0	0	0.0
Daphnia galeata mendotae	165	82	0.7	489	49	0.9	587	48	0.8	388	152	0.8
Daphnia retrocurva	5015	137	21.0	8133	1604	14.5	11664	2591	16.3	7922	1589	16.2
Diaphanosoma leuchtenbergianum	2002	376	8.4	9033	88	16.1	15231	1757	21.3	7344	67	15.1
Eubosmina coregoni	1043	118	4.4	3232	900	5.8	2183	377	3.1	2097	245	4.3
Holopedium gibberum	327	79	1.4	843	91	1.5	1007	311	1.4	943	101	1.9
Leptodora kindtii	166	67	0.7	339	29	0.6	145	100	0.2	34	34	0.1
Polyphemus pediculus	22	22	0.1	108	5	0.2	84	62	0.1	18	18	0.0
Rotifers												
Asplanchna spp.	235	177	1.0	660	66	1.2	2572	33	3.6	976	33	2.0
Total	23926.	1090	100.0	56263	3378	100.0	71558	7917	100.0	48782	1186	100.0
Dry wt (mg/m^3)	23.5	1.6		62.3	4.1		78.6	9.4		52.6	1.4	
Dry wt (ug/individual)	1.0	0.0		1.1	0.0		1.1	0.0		1.1	0.0	

Table 23 continued.

Species	DC-5			DC-6			NDC.5-1			NDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	6167	722	10.9	8041	1414	13.7	3315	87	24.0	6417	816	19.1
Cyclopoid copepods												
Cyclops spp. C1-C5	10997	892	19.5	10795	1181	18.4	2067	327	15.0	2747	231	8.2
Cyclops bicuspidatus thomasi C6	764	90	1.4	1020	36	1.7	17	17	0.1	30	30	0.1
Cyclops vernalis C6	0	0	0.0	0	0	0.0	4	4	0.0	10	10	0.0
Tropocyclops prasinus mexicanus C1-C5	761	334	1.4	1010	172	1.7	288	84	2.1	1238	163	3.7
Tropocyclops prasinus mexicanus C6	2952	361	5.2	1049	212	1.8	512	182	3.7	1582	163	4.7
Calanoid copepods												
Diaptomus spp. C1-C5	11504	286	20.4	13209	974	22.5	1327	275	9.6	5971	979	17.8
Diaptomus ashlandi C6	132	20	0.2	1263	352	2.1	8	1	0.1	0	0	0.0
Diaptomus minutus C6	1544	224	2.7	934	169	1.6	55	20	0.4	900	13	2.7
Diaptomus oregonensis C6	336	1	0.6	305	50	0.5	0	0	0.0	19	1	0.1
Diaptomus sicilis C6	0	0	0.0	130	52	0.2	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	221	53	0.4	156	120	0.3	50	8	0.4	299	56	0.9
Epischura lacustris C6	73	12	0.1	36	36	0.1	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	251	54	0.4	118	118	0.2	210	63	1.5	679	30	2.0
Eurytemora affinis C6	43	13	0.1	0	0	0.0	21	21	0.1	18	18	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	18	18	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	39	39	0.1	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	2495	249	4.4	4146	443	7.1	2897	918	21.0	2314	364	6.9
Ceriodaphnia quadrangula	191	22	0.3	77	41	0.1	85	22	0.6	176	88	0.5
Chydorus sphaericus	0	0	0.0	0	0	0.0	11	3	0.1	0	0	0.0
Daphnia galeata mendotae	403	159	0.7	485	303	0.8	0	0	0.0	95	6	0.3
Daphnia retrocurva	6718	805	11.9	7506	651	12.8	1644	156	11.9	4884	310	14.5
Diaphanosoma leuchtenbergianum	5877	768	10.4	4473	176	7.6	574	301	4.2	3609	205	10.7
Eubosmina coregoni	2099	218	3.7	1842	167	3.1	297	58	2.1	1522	20	4.5
Holopedium gibberum	731	1	1.3	472	38	0.8	139	26	1.0	400	46	1.2
Leptodora kindtii	171	110	0.3	79	79	0.1	39	31	0.3	95	6	0.3
Polyphemus pediculus	45	16	0.1	39	39	0.1	4	4	0.0	10	10	0.0
Rotifers												
Asplanchna spp.	2022	224	3.6	1568	71	2.7	176	22	1.3	574	95	1.7
Total	56494	1028	100.0	58812	4262	100.0	13800	2522	100.0	33601	952	100.0
Dry wt (mg/m^3)	61.3	0.4		64.8	6.5		11.3	2.2		32.4	0.5	
Dry wt (ug/individual)	1.1	0.0		1.1	0.0		0.8	0.0		1.0	0.0	

Table 23 continued.

Species	NDC-7-1			NDC-7-5			SDC.5-1			SDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	5025	196	20.6	7592	642	13.8	4234	1980	24.7	6892	488	14.7
Cyclopoid copepods												
Cyclops spp. C1-C5	2145	213	8.8	5108	140	9.3	1678	558	9.8	4994	191	10.6
Cyclops bicuspidatus thomasi C6	40	16	0.2	1007	21	1.8	40	33	0.2	46	30	0.1
Cyclops vernalis C6	6	6	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	1154	362	4.7	760	193	1.4	115	28	0.7	253	64	0.5
Tropocyclops prasinus mexicanus C6	944	52	3.9	1455	178	2.6	331	32	1.9	2144	24	4.6
Calanoid copepods												
Diaptomus spp. C1-C5	4641	159	19.0	13954	1969	25.3	1821	850	10.6	7241	971	15.4
Diaptomus ashlandi C6	0	0	0.0	920	2	1.7	0	0	0.0	26	7	0.1
Diaptomus minutus C6	152	16	0.6	1231	96	2.2	120	11	0.7	1232	282	2.6
Diaptomus oregonensis C6	12	12	0.1	274	203	0.5	11	4	0.1	33	33	0.1
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	9	9	0.0
Epischura lacustris C1-C5	193	32	0.8	274	168	0.5	59	42	0.4	287	54	0.6
Epischura lacustris C6	0	0	0.0	69	1	0.1	0	0	0.0	43	24	0.1
Eurytemora affinis C1-C5	238	84	1.0	432	78	0.8	325	111	1.9	831	36	1.8
Eurytemora affinis C6	6	6	0.0	86	16	0.2	23	20	0.1	19	19	0.0
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	9	9	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	2033	101	8.3	7324	162	13.3	3159	168	18.4	1532	531	3.3
Ceriodaphnia quadrangula	167	43	0.7	17	17	0.0	130	1	0.8	231	136	0.5
Chydorus sphaericus	0	0	0.0	0	0	0.0	2	2	0.0	0	0	0.0
Daphnia galeata mendotae	65	9	0.3	517	198	0.9	109	65	0.6	231	15	0.5
Daphnia retrocurva	1553	215	6.4	6861	692	12.4	3090	1528	18.0	10485	2080	22.3
Diaphanosoma leuchtenbergianum	3981	538	16.3	1027	143	1.9	614	301	3.6	7091	554	15.1
Eubosmina coregoni	1414	102	5.8	2362	14	4.3	750	193	4.4	1858	91	3.9
Holopedium gibberum	39	11	0.2	52	16	0.1	263	16	1.5	619	119	1.3
Leptodora kindtii	53	3	0.2	207	65	0.4	37	7	0.2	122	28	0.3
Polyphemus pediculus	6	6	0.0	0	0	0.0	9	6	0.1	0	0	0.0
Rotifers												
Asplanchna spp.	561	70	2.3	3688	354	6.7	215	76	1.3	760	110	1.6
Total	24431	1843	100.0	55218	4018	100.0	17141	5610	100.0	46990	5202	100.0
Dry wt (mg/m^3)	22.5	1.7		58.1	5.2		15.0	5.0		49.3	5.8	
Dry wt (ug/individual)	0.9	0.0		1.1	0.0		0.9	0.0		1.0	0.0	

Table 23 continued.

Species	SDC-7-1			SDC-7-5		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	10093	652	37.5	4162	120	6.6
Cyclopoid copepods						
Cyclops spp. C1-C5	5398	833	20.1	14079	165	22.4
Cyclops bicuspidatus thomasi C6	8	8	0.0	1252	322	2.0
Cyclops vernalis C6	6	6	0.0	0	0	0.0
Tropocyclops prasinus mexicanus C1-C5	1580	1048	5.9	1297	592	2.1
Tropocyclops prasinus mexicanus C6	614	26	2.3	1413	66	2.3
Calanoid copepods						
Diaptomus spp. C1-C5	1998	158	7.4	15573	210	24.7
Diaptomus ashlandi C6	0	0	0.0	96	33	0.1
Diaptomus minutus C6	20	3	0.1	1412	193	2.2
Diaptomus oregonensis C6	0	0	0.0	254	2	0.4
Diaptomus sicilis C6	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	31	20	0.1	473	345	0.8
Epischura lacustris C6	0	0	0.0	127	62	0.2
Eurytemora affinis C1-C5	195	27	0.7	429	44	0.7
Eurytemora affinis C6	14	3	0.1	63	31	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0
Harpacticoid copepods						
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0
Cladocerans						
Bosmina longirostris	4165	753	15.5	8236	618	13.1
Ceriodaphnia quadrangula	394	95	1.5	1460	209	2.3
Chydorus sphaericus	14	3	0.1	0	0	0.0
Daphnia galeata mendotae	64	20	0.2	413	60	0.7
Daphnia retrocurva	998	400	3.7	6843	1177	10.9
Diaphanosoma leuchtenbergianum	408	98	1.5	2843	84	4.5
Eubosmina coregoni	413	92	1.5	856	214	1.4
Holopedium gibberum	22	11	0.1	810	8	1.3
Leptodora kindtii	67	34	0.3	191	65	0.3
Polyphemus pediculus	0	0	0.0	16	16	0.0
Rotifers						
Asplanchna spp.	419	86	1.6	650	105	1.0
Total	26920	4305	100.0	62950	169	100.0
Dry wt (mg/m^3)	18.7	3.3		67.9	0.2	
Dry wt (ug/individual)	0.7	0.0		1.1	0.0	

Table 23 continued.   Rare taxa and taxa counted as species at genus stations in August, 1976.

Taxa	Station	#/m^3	$S_{\bar{x}}$	%
Latona setifera	NDC.5-1	4	4	0.0
Alona spp.	DC-1	16	1	0.1
Alona spp.	NDC.5-1	58	8	0.4
Alona spp.	NDC.5-2	10	10	0.0
Alonella spp.	SDC.5-1	7	7	0.0

Table 24. Mean abundances and standard errors (N=2) determined from two replicate hauls at each of 14 lake survey stations on September 24, 1976. The percentage that each taxon represents of the total zooplankton counted at the station is also given.

Species	DC-1			DC-2			DC-3			DC-4		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	2265	213	6.7	2993	265	10.1	1823	297	7.1	1848	4	5.6
Cyclopoid copepods												
Cyclops spp. C1-C5	1968	192	5.8	3338	610	11.3	3009	22	11.8	6669	1415	20.4
Cyclops bicuspidatus thomasi C6	63	32	0.2	152	1	0.5	252	24	1.0	576	222	1.8
Cyclops vernalis C6	24	8	0.1	35	7	0.1	30	30	0.1	25	25	0.1
Tropocyclops prasinus mexicanus C1-C5	203	12	0.6	194	55	0.7	311	184	1.2	389	1	1.2
Tropocyclops prasinus mexicanus C6	1221	188	3.6	734	136	2.5	1508	216	5.9	1531	419	4.7
Calanoid copepods												
Diaptomus spp. C1-C5	1577	107	4.7	2040	549	6.9	3229	118	12.6	8894	2629	27.1
Diaptomus ashlandi C6	0	0	0.0	0	0	0.0	0	0	0.0	17	17	0.1
Diaptomus minutus C6	233	42	0.7	312	20	1.1	294	93	1.1	1198	221	3.7
Diaptomus oregonensis C6	0	0	0.0	7	7	0.0	21	21	0.1	61	27	0.2
Diaptomus sicilis C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	938	127	2.8	338	311	1.1	303	271	1.2	1742	243	5.3
Epischura lacustris C6	0	0	0.0	7	7	0.0	0	0	0.0	121	3	0.4
Eurytemora affinis C1-C5	886	274	2.6	638	72	2.2	389	156	1.5	17	17	0.1
Eurytemora affinis C6	63	17	0.2	62	7	0.2	52	32	0.2	17	0	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	7392	839	21.8	2701	474	9.1	1848	450	7.2	812	4	2.5
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	5	5	0.0	0	0	0.0
Chydorus sphaericus	845	554	2.5	90	20	0.3	61	18	0.2	18	18	0.1
Daphnia galeata mendotae	95	64	0.3	125	41	0.4	168	30	0.7	700	9	2.1
Daphnia retrocurva	1008	136	3.0	568	53	1.9	803	168	3.1	1282	810	3.9
Diaphanosoma leuchtenbergianum	235	67	0.7	243	36	0.8	298	20	1.2	546	74	1.7
Eubosmina coregoni	14608	1897	43.1	14706	314	49.8	11070	838	43.2	5748	146	17.6
Holopedium gibberum	0	0	0.0	7	7	0.0	5	5	0.0	43	8	0.1
Leptodora kindtii	148	21	0.4	215	20	0.7	98	8	0.4	191	39	0.6
Polyphemus pediculus	16	16	0.1	7	7	0.0	0	0	0.0	8	8	0.0
Rotifers												
Asplanchna spp.	39	9	0.1	14	0	0.1	30	19	0.1	301	70	0.9
Total	33864	471	100.0	29533	1639	100.0	25607	2579	100.0	32754	5841	100.0
Dry wt (mg/m^3)	-	-		-	-		-	-		-	-	
Dry wt (ug/individual)	-	-		-	-		-	-		-	-	

Table 24 continued.

Species	DC-5			DC-6			NDC.5-1			NDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	2249	61	7.8	4933	45	12.3	2899	354	8.2	3539	280	8.1
Cyclopoid copepods												
Cyclops spp. C1-C5	4141	350	14.4	7352	658	18.3	2287	258	6.5	2876	17	6.5
Cyclops bicuspidatus thomasi C6	1013	254	3.5	1329	191	3.3	66	28	0.2	20	20	0.0
Cyclops vernalis C6	8	8	0.0	0	0	0.0	19	0	0.1	10	10	0.0
Tropocyclops prasinus mexicanus C1-C5	287	98	1.0	296	111	0.7	256	88	0.7	427	43	1.0
Tropocyclops prasinus mexicanus C6	1498	10	5.2	5154	553	12.8	921	266	2.6	1273	156	2.9
Calanoid copepods												
Diaptomus spp. C1-C5	9168	360	31.9	14796	937	36.8	1164	15	3.3	1633	169	3.7
Diaptomus ashlandi C6	61	12	0.2	664	130	1.6	0	0	0.0	0	0	0.0
Diaptomus minutus C6	512	162	1.8	232	47	0.6	85	46	0.2	96	41	0.2
Diaptomus oregonensis C6	124	36	0.4	285	80	0.7	0	0	0.0	0	0	0.0
Diaptomus sicilis C6	0	0	0.0	51	51	0.1	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	723	271	2.5	179	35	0.4	920	190	2.6	848	171	1.9
Epischura lacustris C6	59	43	0.2	95	13	0.2	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	23	7	0.1	0	0	0.0	1480	466	4.2	1109	340	2.5
Eurytemora affinis C6	15	1	0.1	0	0	0.0	75	18	0.2	19	1	0.0
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	1124	191	3.9	585	113	1.4	8722	1536	24.7	12844	1237	29.2
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Chydorus sphaericus	8	8	0.0	0	0	0.0	1376	458	3.9	153	62	0.4
Daphnia galeata mendotae	946	129	3.3	1151	143	2.9	113	18	0.3	125	70	0.3
Daphnia retrocurva	1951	90	6.8	1966	158	4.9	1292	354	3.7	940	98	2.1
Diaphanosoma leuchtenbergianum	580	142	2.0	523	73	1.3	153	115	0.4	295	57	0.7
Eubosmina coregoni	4010	481	14.0	571	271	1.4	13215	1157	37.4	17472	688	39.7
Holopedium gibberum	15	1	0.1	0	0	0.0	9	9	0.0	19	1	0.0
Leptodora kindtii	40	40	0.1	31	10	0.1	170	17	0.5	218	2	0.5
Polyphemus pediculus	8	8	0.0	0	0	0.0	19	19	0.1	10	10	0.0
Rotifers												
Asplanchna spp.	163	61	0.6	52	9	0.1	38	0	0.1	48	11	0.1
Total	28733	2529	100.0	40246	1284	100.0	35308	341	100.0	43983	2079	100.0
Dry wt (mg/m^3)	-	-		-	-		-	-		-	-	
Dry wt (ug/individual)	-	-		-	-		-	-		-	-	

Table 24 continued.

Species	NDC-7-1			NDC-7-5			SDC.5-1			SDC.5-2		
	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%	#/m^3	$s_{\bar{x}}$	%
Copepod nauplii	6268	37	11.4	2964	211	7.4	2481	130	10.4	2684	322	8.3
Cyclopoid copepods												
Cyclops spp. C1-C5	3850	136	7.0	7122	385	17.8	2146	240	9.0	3606	160	11.1
Cyclops bicuspidatus thomasi C6	60	4	0.1	556	70	1.4	51	37	0.2	169	6	0.5
Cyclops vernalis C6	0	0	0.0	16	0	0.0	12	12	0.1	92	34	0.3
Tropocyclops prasinus mexicanus C1-C5	377	12	0.7	387	30	1.0	242	67	1.0	423	61	1.3
Tropocyclops prasinus mexicanus C6	1047	356	1.9	2803	277	7.0	746	16	3.1	993	33	3.1
Calanoid copepods												
Diaptomus spp. C1-C5	329	92	0.6	9250	149	23.2	799	27	3.3	1155	149	3.6
Diaptomus ashlandi C6	0	0	0.0	48	0	0.1	0	0	0.0	0	0	0.0
Diaptomus minutus C6	307	82	0.6	1055	132	2.6	148	21	0.6	151	24	0.5
Diaptomus oregonensis C6	0	0	0.0	64	0	0.2	0	0	0.0	10	10	0.0
Diaptomus sicilis C6	0	0	0.0	8	8	0.0	0	0	0.0	9	9	0.0
Epischura lacustris C1-C5	410	130	0.7	2210	349	5.5	238	15	1.0	496	12	1.5
Epischura lacustris C6	0	0	0.0	80	48	0.2	0	0	0.0	0	0	0.0
Eurytemora affinis C1-C5	2656	151	4.8	201	39	0.5	336	43	1.4	672	52	2.1
Eurytemora affinis C6	28	28	0.1	81	17	0.2	7	7	0.0	28	8	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Harpacticoid copepods												
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Cladocerans												
Bosmina longirostris	11850	1399	21.5	1981	265	5.0	7642	1509	32.0	6304	1052	19.4
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0	7	7	0.0	0	0	0.0
Chydorus sphaericus	135	5	0.2	0	0	0.0	158	39	0.7	75	3	0.2
Daphnia galeata mendotae	103	38	0.2	540	43	1.4	74	10	0.3	121	24	0.4
Daphnia retrocurva	710	19	1.3	1677	201	4.2	168	70	0.7	729	13	2.2
Diaphanosoma leuchtenbergianum	232	92	0.4	645	51	1.6	102	38	0.4	274	93	0.8
Eubosmina coregoni	26401	7227	47.8	7768	60	19.5	8340	1463	34.9	14194	829	43.7
Holopedium gibberum	11	11	0.0	0	0	0.0	0	0	0.0	0	0	0.0
Leptodora kindtii	358	35	0.6	81	16	0.2	176	7	0.7	288	56	0.9
Polyphemus pediculus	46	18	0.1	16	0	0.0	15	1	0.1	0	0	0.0
Rotifers												
Asplanchna spp.	43	43	0.1	371	2	0.9	7	7	0.0	18	18	0.1
Total	55223	9058	100.0	39925	1026	100.0	23906	501	100.0	32491	1251	100.0
Dry wt (mg/m^3)	-	-		-	-		-	-		-	-	
Dry wt (ug/individual)	-	-		-	-		-	-		-	-	

Table 24 continued.

Species	SDC-7-1 #/m³	SDC-7-1 $s_{\bar{x}}$	SDC-7-1 %	SDC-7-5 #/m³	SDC-7-5 $s_{\bar{x}}$	SDC-7-5 %
Copepod nauplii	3558	189	9.1	2824	467	6.5
Cyclopoid copepods						
Cyclops spp. C1-C5	1402	92	3.6	5427	458	12.5
Cyclops bicuspidatus thomasi C6	35	35	0.1	1506	151	3.5
Cyclops vernalis C6	0	0	0.0	18	18	0.0
Tropocyclops prasinus mexicanus C1-C5	137	74	0.4	300	87	0.7
Tropocyclops prasinus mexicanus C6	204	77	0.5	2943	39	6.8
Calanoid copepods						
Diaptomus spp. C1-C5	202	55	0.5	12115	732	27.9
Diaptomus ashlandi C6	0	0	0.0	179	24	0.4
Diaptomus minutus C6	124	40	0.3	1526	462	3.5
Diaptomus oregonensis C6	0	0	0.0	412	122	0.9
Diaptomus sicilis C6	0	0	0.0	0	0	0.0
Epischura lacustris C1-C5	89	5	0.2	1336	136	3.1
Epischura lacustris C6	0	0	0.0	65	27	0.1
Eurytemora affinis C1-C5	1195	236	3.0	112	35	0.3
Eurytemora affinis C6	0	0	0.0	29	10	0.1
Limnocalanus macrurus C1-C5	0	0	0.0	0	0	0.0
Limnocalanus macrurus C6	0	0	0.0	0	0	0.0
Harpacticoid copepods						
Canthocamptus spp. C1-C5	0	0	0.0	0	0	0.0
Canthocamptus spp. C6	0	0	0.0	0	0	0.0
Cladocerans						
Bosmina longirostris	24587	4844	62.6	1836	216	4.2
Ceriodaphnia quadrangula	0	0	0.0	0	0	0.0
Chydorus sphaericus	11	11	0.0	0	0	0.0
Daphnia galeata mendotae	90	27	0.2	1025	233	2.4
Daphnia retrocurva	243	201	0.6	3268	597	7.5
Diaphanosoma leuchtenbergianum	165	25	0.4	521	98	1.2
Eubosmina coregoni	7116	1726	18.1	7443	1945	17.1
Holopedium gibberum	11	11	0.0	28	9	0.1
Leptodora kindtii	132	15	0.3	94	2	0.2
Polyphemus pediculus	11	11	0.0	9	9	0.0
Rotifers						
Asplanchna spp.	0	0	0.0	416	48	1.0
Total	39311	3194	100.0	43434	2858	100.0
Dry wt (mg/m³)	-	-		-	-	
Dry wt (ug/individual)	-	-		-	-	

Table 24 continued. Rare taxa and taxa counted as species at genus stations in September, 1976.

Taxa	Station	#/m^3	$S_{\bar{x}}$	%
Mesocyclops edax C6	DC-5	8	8	0.0
Eurycercus lamellatus	DC-1	16	0	0.1
Eurycercus lamellatus	NDC.5-1	9	9	0.0
Eurycercus lamellatus	SDC.5-1	4	4	0.0
Macrothrix laticornis	SDC.5-1	7	7	0.0
Alona spp.	DC-1	23	23	0.1
Alona spp.	DC-2	7	7	0.0
Alona spp.	NDC.5-1	19	19	0.1
Alona spp.	NDC.5-2	10	10	0.0

TABLE 25. Comparison of the density of zooplankton (number per cubic meter) measured in the April major surveys before and after the start of plant operation, using the Mann-Whitney U-test. Two operational data values (April/75 and April/76) are available for each comparison, as well as 2 to 4 preoperational values. See Table 29 for the preoperational years included. The taxonomic categories used above are not all mutually exclusive.

	Zones								
Taxon	1	2	3	4	5	6	7	8	1–8
Copepod nauplii	NS	*	NS	NS	*	NS	*	NS	3
Cyclopoid C1-6	NS	NS	NS	NS	NS	NS	NS	NS	0
Calanoid C1-6	NS	*	*	*	*	*	*	NS	6
Cladocerans	–	–	–	–	–	–	–	–	–
	0	2	1	1	2	1	2		9
Cyclopoid C1-5	NS	NS	NS	NS	NS	NS	NS	NS	0
Cyclops spp. C6	NS	NS	NS	NS	NS	NS	NS	NS	0
Diaptomus spp. C1-5	NS	*	NS	NS	*	NS	NS	NS	2
Diaptomus spp. C6	NS	*	NS	*	NS	*	NS	NS	3
Bosmina longirostris	–	–	–	–	–	–	–	–	–
Daphnia spp.	–	–	–	–	–	–	–	–	–
	0	2	0	1	1	1	0	0	5
Total zooplankton	NS	*	*	*	*	*	*	NS	6

* significant difference, p<.05

NS not significant

– not tested

TABLE 26. Comparison of the density of zooplankton (number per cubic meter) before and ofter the start of plant operation in four of the minor survey months, using the Mann-Whitney U-test. Two operational years are available for each comparison, as well as 2 to 4 preoperational values. See Tables 30 and 31 for the preoperational years used. The taxonomic categories used below are not all mutually exclusive.

	Month			
Taxon	May	June	August	September
Copepod nauplii	NS	*	NS	NS
Cyclopoid C1-6	NS	*	NS	*
Calanoid C1-6	*	*	NS	NS
Cladocerans	NS	NS	NS	NS
	1	3	0	1
Cyclopoid C1-5	NS	*	NS	*
Cyclops spp. C6	NS	NS	NS	NS
Diaptomus spp. C1-5	NS	NS	ND	*
Bosmina longirostris	NS	NS	NS	NS
Daphnia spp.	–	–	NS	NS
	0	1	1	2
Total zooplankton	*	*	NS	NS

* significant different, p<.05

NS not significant

– taxon not tested

TABLE 27. Comparison of the density of zooplankton (number per cubic meter) measured in the July major surveys before and after the start of plant operation, using the Mann-Whitney U-test. Two operational data values (July/75 and July/76) are available for each comparison, as well as 2 to 4 preoperational values. See Table 29 for the preoperational years included. The taxonomic categories used below are not all mutually exclusive.

Taxon	Zones 1	2	3	4	5	6	7	8	1-8
Copepod nauplii	NS	NS	NS	NS	NS	NS	NS	NS	0
Cyclpoid C1-6	NS	*	NS	NS	*	NS	NS	*	3
Calanoid C1-6	*	NS	NS	NS	NS	NS	NS	NS	1
Cladocerans	NS	NS	NS	NS	NS	NS	NS	*	1
	1	1	0	0	1	0	0	2	5
Cyclopoid C1-5	NS	*	NS	NS	*	NS	NS	*	3
Cyclops spp. C6	*	*	*	NS	NS	NS	NS	NS	3
Diaptomus spp. C1-5	NS	*	NS	NS	*	NS	NS	NS	2
Diaptomus spp. C6	NS	*	NS	*	NS	NS	NS	NS	2
Bosmina longirostris	NS	NS	NS	NS	NS	NS	NS	*	1
Daphnia spp.	-	-	-	-	-	-	-	-	-
	1	4	1	1	2	0	0	2	11
Total zooplankton	NS	NS	NS	NS	NS	NS	NS	*	1

* significant different, p<.05

NS not significant

\- taxon not tested

TABLE 28. Comparison of the density of zooplankton (number per cubic meter) measured in the October major surveys before and after the start of plant operation, using the Mann-Whitney U-test. One operational data value (Oct./75) is available for each comparison, as well as 2 to 3 preoperational values. See Table 32 for the preoperational years used. The taxonomic categories used below are not all mutually exclusive.

Taxon	Zones 1	2	3	4	5	6	7	8	1-8
Copepod nauplii	NS	NS	NS	NS	NS	*	*	-	2
Cyclopoid C1-6	*	NS	NS	NS	NS	NS	NS	-	1
Calanoid CL-6	*	NS	NS	NS	NS	NS	NS	-	1
Cladocerans	NS	*	*	NS	NS	NS	NS	-	2
	2	1	1	0	0	1	1	-	6
Cyclopoid C1-5	*	NS	NS	*	NS	NS	NS	-	2
Cyclops spp. C6	NS	*	NS	NS	NS	NS	NS	-	1
Diaptomus spp. C1-5	NS	NS	*	NS	NS	*	NS	-	2
Diaptomus spp. C6	NS	NS	NS	NS	NS	NS	NS	-	0
Bosmina longirostris	NS	NS	NS	NS	NS	NS	*	-	1
Daphnia spp.	*	*	*	NS	*	NS	NS	-	4
	2	2	2	1	1	1	1	-	10
Total zooplankton	NS	NS	*	NS	NS	NS	NS	-	1

* significant difference, $p<.05$

NS not significant

- taxon not tested

TABLE 29. Years of data available for the U-tests comparing zooplankton densities before and after the start of plant operation (marked by the vertical dotted line), for the months of April and July.

Taxon	71	72	73	74	75	76
Copepod nauplii		+	+	+	+	+
Cyclopoid C1-6	+	+	+	+	+	+
Calanoid C1-6	+	+	+	+	+	+
Cladocerans	+	+	+	+	+	+
Cyclopoid C1-5			+	+	+	+
Cyclops spp. C6			+	+	+	+
Diaptomus spp. C1-5			+	+	+	+
Diaptomus spp. C6			+	+	+	+
Bosmina longirostris		+	+	+	+	+
Daphnia spp.	+	+	+	+	+	+
Total zooplankton		+	+	+	+	+

+ data for all zones available and used in analyses

TABLE 30. Years of data available for the U-tests comparing zooplankton densities before and after the start of plant operation (marked by the vertical dotted line), for the months of May, June and August.

Taxon	Year 71	72	73	74	75	76
Copepod nauplii		+	+	+	+	+
Cyclopoid C1-6		+	+	+	+	+
Calanoid C1-6		+	+	+	+	+
Cladocerans		+	+	+	+	+
Cyclopoid C1-5			+	+	+	+
Cyclops spp. C6			+	+	+	+
Diaptomus spp. C1-5			+	+	+	+
Diaptomus spp. C6			+	+	+	+
Bosmina longirostris		+	+	+	+	+
Daphnia spp.		+	+	+	+	+
Total zooplankton		+	+	+	+	+

TABLE 31. Years of data available for the U-tests comparing zooplankton densities before and after the start of plant operation (marked by the vertical dotted line), for the month of September.

Taxon	71	72	73	74	75	76
Copepod nauplii	+	+	+	+	+	+
Cyclopoid C1-6	+	+	+	+	+	+
Calanoid C1-6	+	+	+	+	+	+
Cladocerans	+	+	+	+	+	+
Cyclopoid C1-5	+		+	+	+	+
Cyclops spp. C6	+		+	+	+	+
Diaptomus spp. C1-5			+	+	+	+
Diaptomus spp. C6	+	+	+	+	+	+
Bosmina longirostris	+	+	+	+	+	+
Daphnia spp.	+	+	+	+	+	+
Total zooplankton	+	+	+	+	+	+

TABLE 32. Years of data available for the U-tests comparing zooplankton densities before and after the start of plant operation (marked by the vertical dotted line), for the month of October.

Taxon	Year 71	72	73	74	75	76
Copepod nauplii		+	+	+	+	
Cyclopoid C1-6		+	+	+	+	
Calanoid C1-6		+	+	+	+	
Cladocerans		+	+	+	+	
Cyclopoid C1-5		+	+	+	+	
Cyclops spp. C6		+	+	+	+	
Diaptomus spp. C1-5			+	+	+	
Diaptomus spp. C6		+	+	+	+	
Bosmina longirostris		+	+	+	+	
Daphnia spp.		+	+	+	+	
Total zooplankton		+	+	+	+	

Appendix B-2

Phytoplankton

Environmental Operating Report - July-December 1976

PHYTOPLANKTON

ENTRAINMENT - Ronald Rossmann

The Environmental Technical Specifications for the Donald C. Cook Nuclear Plant require an assessment of phytoplankton abundance, viability, and species composition to be made on a monthly basis on samples collected in early morning, at mid-day, and in late evening. To this end, samples are collected at morning twilight, noon, and evening twilight from the intake and discharge forebays. Samples for microscopic counting are collected in duplicate and those for viability studies in triplicate. This report discusses the results of microscopic counting for January through May 1976 and viability studies for July through November 1976. Included within this report is a comparison of the extraction efficiency of chlorophyll by two different techniques. The first, the one currently employed, uses sonification to break up phytoplankton cells during extraction in 90% acetone. The second utilizes a tissue grinder to break up the cells during extraction into the acetone. The greater efficiency of the second method warrants this change in our methodology.

Disposition of Samples Collected

An effort was made to adhere to the Technical Specifications for phytoplankton entrainment. In the semi-annual report for January-June 1976, a table was included showing the dispostion of all samples for microscopic counting. Table 1 is an update of that table. Of the 132 required samples for the period of January through November 1976, all samples were collected. Of these, the January through May samples have been counted with the exception of the January morning twilight discharge A replicate. This one was lost due to sample preparation problems. For the field season of 1976, no plume samples were required because of a change in the Technical Specifications.

Of the 120 samples required for viability analysis, all were collected for the period of July 1976 through November 1976. Of these, three samples were lost during analysis. These samples are: 1) one intake replicate for morning twilight in July, 2) one intake replicate for the evening twilight incubated samples in September, and 3) one discharge replicate for the noon samples in September. All analyses of these samples are complete. In addition to the required samples, 18 extra samples were collected in July for a time variation study; 9 extra samples were collected in September for a comparison of sample preparation by grinding and sonification; and 27 extra samples in November for continuation of the grinding versus sonification study. Three of these last 27 were lost during analysis.

Phytoplankton Numbers and Species

Phytoplankton abundance and species composition data are summarized in Table 2. Only major groups are presented here. The diatoms were dominant for those months of 1976 reported here. For 1976, phytoplankton mean total numbers were less than those for the same period of 1975. A spring bloom did not occur as it had in 1975. Lake warming in 1976 was about one month ahead of that in 1975 (Table 3). This appears to be responsible for differences noted between the two years.

Figures 1 through 9 illustrate the monthly means and associated standard errors for 1975 and 1976. In general, spring blooms are less pronounced, numbers of cells are less, and blooms and declines of the population for each major phytoplankton group are earlier in 1976 than 1975. Specifically the following observations have been made: coccoid blue-green algae are lower in May 1976 than May 1975; filamentous blue-green algae are higher in April 1976 than April 1975; the summer bloom of filamentous blue-green algae occurs in May in 1976 rather than in June as in 1975; the coccoid green algae summer bloom appears to be starting in May in 1976 rather than in June as in 1975; filamentous green algae are higher in May 1976 than May 1975 which may be indicative of an early bloom in 1976; flagellates (mostly green algae) are higher in February 1975 than February 1976 and lower in April 1976 than April 1975 which suggests that their spring bloom is delayed or suppressed and that the increase in June 1975 is equivalent to the greatly accentuated increase in May 1976; centric diatoms are lower in February 1976 than February 1975 with either no or a late spring bloom; centric diatoms had a winter bloom in December 1975 and January 1976; pennate diatoms are fewer in February, March, and May of 1976 than those months of 1975; they may have had a suppressed early spring bloom in April 1976 rather than the clearly evident bloom in May 1975; they had a winter bloom in January 1976; others, which are primarily coccoid green algae, are higher in February 1976 than February 1975; total phytoplankton are lower in concentration in February, March and April of 1976 than during those months of 1975; and a winter bloom during January 1976 is evident. Though many major differences exist in January through May between 1975 and 1976 samples, these should not be interpreted to be plant-induced. Instead, they appear to be related to an early warming of Lake Michigan in 1976.

Comparison of 1976 with 1975 diversities and numbers of forms shows the two years to be distinctly different. In 1976, mean diversities are slightly higher and numbers of forms are distinctly higher than those of 1975. These differences are either the result of the early warming of the lake in 1976 and/or the increased experience of our technicians in counting phytoplankton and/or a real increase in the number of forms present. More data are necessary to draw any further conclusions about the differences observed between 1975 and 1976.

Viability of Phytoplankton

Phytoplankton viability, expressed as the ratio of phaeophytin *a* to chlorophyll *a*, is summarized in Table 5. This table not only contains the intake and discharge mean concentrations for each sampling period but also a Student's *t*-test of the differences between these means for each sampling period. For the period of July through November 1976, a significant (0.05 level of significance) between intake and discharge occurred three times out of a possible 20 or 15 percent of the time. Of these occurrences, two showed an increase in the ratio and one a decrease. Of those that showed an increase, one was an incubated sample. Thus these data illustrate a possible minor plant effect which inhibited phytoplankton growth in 10 percent of the samples and stimulated growth in 5 percent of the samples.

Grinding Versus Sonification of Samples

Sonification was chosen as the technique to break up phytoplankton cells for extraction of the cell contents. A recent comparison between grinding and sonfication for sample preparation suggests that this was the wrong choice and that the samples should be ground using a tissue grinder to break up the cells. A comparison of these sample preparation alternatives was made in both September and November of 1976. In September, three sets of samples were collected in triplicate. One set served as a control; the sample was simply extracted into 10 ml of 90% acetone. The second set was handled as normal; that is, sonification in 10 ml of 90% acetone for 45 seconds. The last set was ground for three minutes with a tissue grinder in 10 ml of 90% acetone. Table 6 contains the results of this study. Using a Student's *t*-test to compare the ground to sonified samples, significant differences between the two preparation methods were found. Chlorophyll *a* and chlorophyll *c* were higher in the ground sample set. This study was alarming enough to warrant a second study.

Because of the apparent incomplete extraction of the chlorophylls from samples prepared by sonification, a second set of samples was collected in November 1976 to further investigate the problem. These samples were divided into six groups: 1) a control set with no preparation, 2) a set that was sonified for a period of 45 seconds in an ice bath, 3) another set that was sonified in an ice bath for 45 seconds and shaken vigorously, 4) a fourth set that was sonified for three minutes in an ice bath, 5) a set that was ground for three minutes, and 6) a last set that was ground for three minutes in an ice bath. With the hope that chlorophyll *a* and chlorophyll *c* concentrations similar to those for ground samples could be obtained by either increasing the sonification time or by vigorous shaking, three different groups were sonified. When the first group was ground for three minutes, some of the samples warmed considerably. Because some of the chlorophyll may have been destroyed due to this heating, a second set was ground in an ice bath to prevent this problem. Table 7 contains the results of this study.

At this time, no judgment can be made about the variability of chlorophyll *b* extraction with sample handling technique because the phytoplankton possessing this chlorophyll, green algae, were not abundant when these samples were collected. Sonification, with shaking, and grinding yielded the highest mean chlorophyll *a* concentrations. Grinding increased the extractability of chlorophyll *c*. The control and the sonified (45 sec.) gave the highest phaeophytin *a* yields. Use of an ice bath for grinding decreased the amount of phaeophytin *a* measured. Sonification with shaking and a longer sonification time decreased the amount of phaeophytin *a* extracted. The lowest phaeophytin *a* to chlorophyll *a* ratio was obtained from samples ground in an ice bath. Using a Student's *t*-test to determine what significant differences exist between our current technique of sonifying for 45 seconds versus our proposed technique of grinding for 3 minutes, significant (0.01 level of significance) differences between the two were found. Both chlorophyll *a* and chlorophyll *c* are extracted more completely using the grinding technique of sample preparation. Differences between these two sets of samples is believed to result from incomplete destruction of diatom tests and release of cell contents during sonification and from preferential extraction of cell contents from dead or dying phytoplankton when the samples are sonified. Because of these results, samples will be ground beginning in January 1977. This is warranted because a greater and more consistent recovery of the chlorophylls and less degradation of chlorophyll *a* to phaeophytin *a* will be obtained. This will permit a more accurate assessment of phytoplankton viability. Additional comparisons between sonified and ground samples in an ice bath will be made to more completely document this extraction problem.

Time Variation of Samples

Eighteen samples were collected in the intake forebay during a five-minute time span to investigate whether or not significant natural variations in phytoplankton viability occurred during sampling due to patchiness of the phytoplankton. These were collected in July 1976. These samples were arranged into six groups of three consecutive samples, yielding six cases.

Figures 10 through 14 summarize the variability of the six cases representing the collection time span of five minutes. Standard error bars are associated with each mean. For chlorophyll *a*, case 3 is lower than case 1. Chlorophyll *b* for case 6 is relatively high. Chlorophyll *c* for case 3 is lower than that of case 5. Phaeophytin *a* and the phaeophytin *a*/chlorophyll *a* ratio are lower for case 1 relative to cases 5 and 6. Therefore, within a five-minute time period, it is possible to collect two groups of samples that are different. This implies that heterogeneity exists in samples collected during our normal 15 to 30-minute collection period in the intake and discharge forebays. However, a confirmation of this phenomenon using the grinding technique for sample preparation is necessary and will be attempted in the future.

Conclusion

1) Phytoplankton concentrations are lower in 1976 and 1975.
2) Spring and summer phytoplankton blooms occur earlier in 1976 than 1975 and/or are not as pronounced.
3) A winter bloom of diatoms occurred.
4) Lake Michigan warmed faster in 1976 than 1975.
5) Diversity and numbers of forms counted is greater in 1976 than 1975 reflecting the increased experience of the laboratory technicians who count our samples, and/or early warming of the lake in 1976 and/or a real increase in the number of forms present.
6) A significant difference between intake and discharge viability was found in 15% of the cases, in the months of July through November 1976. Ten percent were decreases and 5 percent were increases in viability. These may represent phytoplankton patchiness and not a plant effect.
7) Starting in 1977, samples for viability analysis will be ground in an ice bath with a tissue grinder.
8) Variations in chlorophyll and phaeophytin occur within a five-minute period possibly as a result of phytoplankton patchiness.
9) No clearly defined plant impact of the phytoplankton was noted for the period of July through November 1976.

LAKE SURVEY DATA - John C. Ayers

During the 1976 field season major seasonal surveys were carried out over the full 36-station sampling grid in April, July, and October. Monthly short surveys over the 11-station reduced sampling grid were carried out in May, June, August, and September.

All of the samples from 1975 have been processed and the data analysed. Results of the 1975 short surveys were reported in the Enrivonmental Operating Report covering January through June 1976. A part of the results of the major seasonal surveys of 1975 are reported in this EOR. Samples from the surveys of 1976 have been processed through September and the complete data of April through June (and the short survey stations of July) are available.

Data reduction is now computerized, and data of 1972 and 1973 have been reworked. The seasonal abundances of the major algal groups in 1972 through 1975 are reported here.

Missing Data

In October 1976 high wind and sea conditions prevented the taking of samples at stations DC-6, NDC-4-4, SDC-4-4, and SDC-7-5.

Dominant and Codominant Phytoplankters

In each phytoplankton sample one species or group is typically present in substantially greater numbers than the others. We have called these species or groups "dominant." In many samples one or more species or groups will come close to matching the numbers of the dominant form; we have called these slightly less abundant species or forms "codominants."

Consideration of the dominant and codominant forms in the seasonal surveys of 1972 through 1975 (Table 8) shows normal variation in the dominants and codominants, rather than any effect of Cook Plant Operation.

The Aprils of all four years showed the spring dominance of diatoms and flagellates which is expected.

In July of operational 1975 the forms having more than one occurrence as dominant or codominant were two forms of green algae, one blue-green, and flagellates. In preoperational July 1974 forms having multiple occurrences as dominants were a diatom, a blue-green, and flagellates. In July 1973 the multidominant forms were four diatoms and flagellates. In July 1972 multidominant forms were four diatoms, one green alga, one blue-green, and flagellates. If there is anything of significance in the sequence of summer dominants, it is the pronounced drop in diatom dominance between the preoperational years 1973 and 1974. Table 5 of Appendix B-2 of the Cook environmental Operating Report covering January-June 1976 shows blue-greens moving into dominance in August, September, and October of preoperational 1974, a condition which repeated in operational 1975. In July 1975 the diatoms crashed a month earlier than usual, a condition well within the range of normal variation.

In the Octobers of the four years the multidominants were: 1972, two blue-greens, a diatom, and flagellates; 1973, two diatoms and flagellates; 1974, three blue-greens, a diatom, and flagellates; and 1975, two blue-greens, a diatom, and flagellates. Of this series, the perhaps-significant things are that blue-greens were not dominant or codominant in October 1973 while they were in all the other years (whether preoperational or operational), and that the multidominants of operational 1975 were the same as in preoperational 1972.

Inner-Outer Graphical Comparisons

Johnston (1973, pp. 14-17) illustrated, with benthos data, a method for comparing seasonal abundance of organisms in the central region of the Cook Plant survey area with those in the reference regions for each of three depth zones (0-8 m, 8-16 m, 16-21 m) of the area; this method is here applied to the phytoplankton of the seasonal surveys of preoperational 1972-1974 and operational 1975.

The method consists of dividing the survey stations into groups according to depth zones and proximity to the plant. Stations less than two miles north or south of a central transect extending seven miles from the Cook Plant perpendicular to shore are defined as the "inner" stations which might be affected by plant operation. Stations two miles or more north or south of the plant are defined as north and south reference regions or (lumped together) as the "outer" stations. Zero-to-8 m depths are designated "Zone 0" ; 8 to 16 m as "Zone 1"; and 16 to 24 m as "Zone 2." For each depth zone there are inner and outer station groups.

The means and standard errors of phytoplankton abundances at each depth-zone-and-station-group combination are plotted on a time axis. By this method the biological situation can be followed through successive years and judgment of the effect of plant operation can be made on the bases of temporal (preoperational vs. operational) variations and spatial (inner vs. outer) variations in phytoplankton abundances.

The phytoplankton abundances used are: total cells per ml and the nine major algal groups of the phytoplankton summary table (Table 9), coccoid blue-greens, filamentous blue-greens, coccoid greens, filamentous greens, flagellates, centric diatoms, pennate diatoms, desmids, and other algae. The use of algal major groups instead of individual species bypasses difficulties stemming from inability to always identify to species, and is justifiable on the basis that members of each group have more or less similar functions in the ecosystem.

The depth zones and station groups used are:

Depth zone	Depth range	Inner station group	Outer station group
0	0 to 8 m	DC-0	NDC-2-0
		DC-1	NDC-2-1
		NDC-.5-0	NDC-4-0
		NDC-.5-1	NDC-4-1
		NDC-.5-2	NDC-7-1
		NDC-1-0	SDC-2-0
		NDC-1-1	SDC-2-1
		SDC-.5-0	SDC-4-0
		SDC-.5-1	SDC-4-1
		SDC-.5-2	SDC-7-1
		SDC-1-0	
		SDC-1-1	
1	8 to 16 m	DC-2	NDC-2-3
		NDC-1-2	NDC-7-3
		SDC-1-2	SDC-2-3
			SDC-7-3
2	16 to 24 m	DC-3	NDC-4-3
		DC-4	NDC-7-5
			SDC-4-3
			SDC-7-5

In general, the station groups are well represented in the several surveys but inclement weather, construction dredges on station locations, failure of sample preservation, sample breakage, and (in one survey in 1972) accidental omission of stations have resulted in differing numbers of station data being available (N in Table 9).

Table 9 presents, for the seasonal surveys of preoperational 1972 through 1974 and operational 1975, the means, standard errors, and numbers of cases of total cells per ml and nine major groups of phytoplankton. These are graphed in Figures 15-28 with error bars showing plus and minus one standard error. Data points for each month are slightly offset to avoid overlap, and an arrow rising from the horizontal axis indicates beginning of plant operation in early 1975.

The graphs bring out annual variations in abundances much more clearly than do tabulations of abundances, but even more importantly, they very consistently show a pronounced parallelism between the curves for inner (near the plant) and outer (away from the plant) station groups. In most of the cases the difference between inner and outer means was less than three standard errors. In only two cases were the differences great enough to possibly be truly detectable; these were: total algae in zone 2 in April 1975 and centric diatoms in zone 2 in April 1975. It is to be noted that zone 2 is well offshore from the plant, and that this difference was not present in zones 0 or 1 much nearer the plant.

There was no consistent difference in numerical superiority between means of inner and outer station groups in the preoperational years or in operational 1975.

Coccoid blue-greens, which increased notably in October 1975, were also notably increased in preoperational October 1974. Coccoid greens which increased in zones 0 and 1 in July of operational 1975 had been equally high in these zones in preoperational July 1973. Filamentous blue-greens increased in all three zones in July of 1975 but in each zone the increase was greater in the outer group of stations away from the plant.

There is no evidence from the spatial (inner vs. outer) or temporal (preoperational vs. operational) abundances of ten phytoplankton categories that operation of Cook Plant has had any adverse impact upon the phytoplankton of the region.

Very low numbers of phytoplankton in July 1972, the first month of use of the Sanford, Sands, and Goldman (1969) settle-freeze method of phytoplankton preparation) have been doubted in previous reports as representing unfamiliarity with the method. That this may not be the case is strongly suggested by similar low numbers in July 1975 and by virtually identical diatom crashes in the Julys of 1972 and 1975.

References

Johnston, E. M. 1973. Benton Harbor Power Plant Limnological Studies. Part XVIII. Effect of a Thermal Discharge on Benthos Populations: Statistical Methods for Assessing the Impact of the Cook Nuclear Plant. Univ. of Michigan, Great Lakes Res. Div., Special Report 44 (XVIII). 20 p.

Sanford, G. K., A. Sands, and C. R. Goldman. 1969. A Settle-Freeze Method for Concentrating Phytoplankton in Quantitative Studies. Limnol. and Oceanogr., 14(5): 790-794.

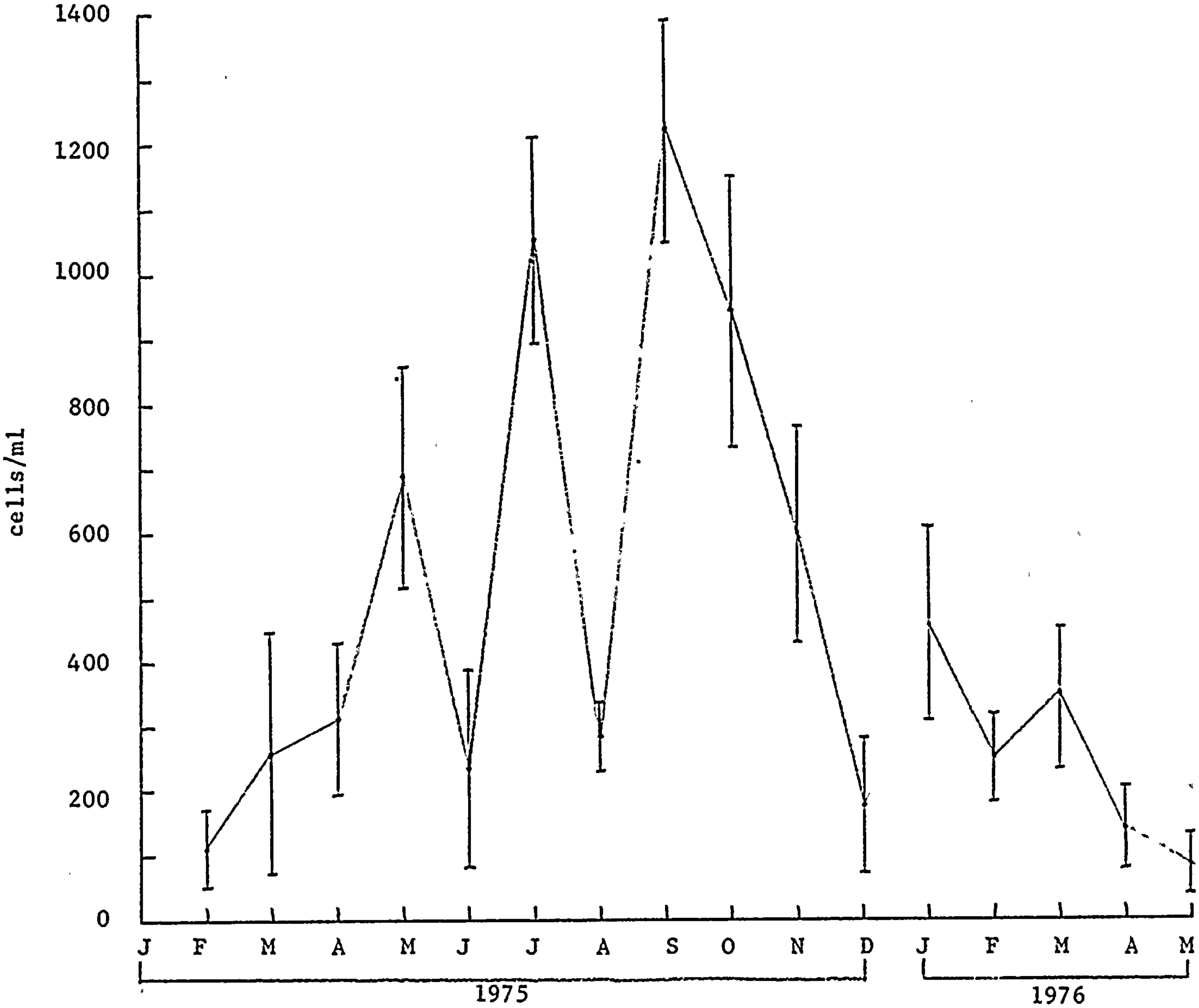

Figure 1. Density (cells/ml) of coccoid blue-green algae in entrainment samples, February, 1975 - May, 1976.

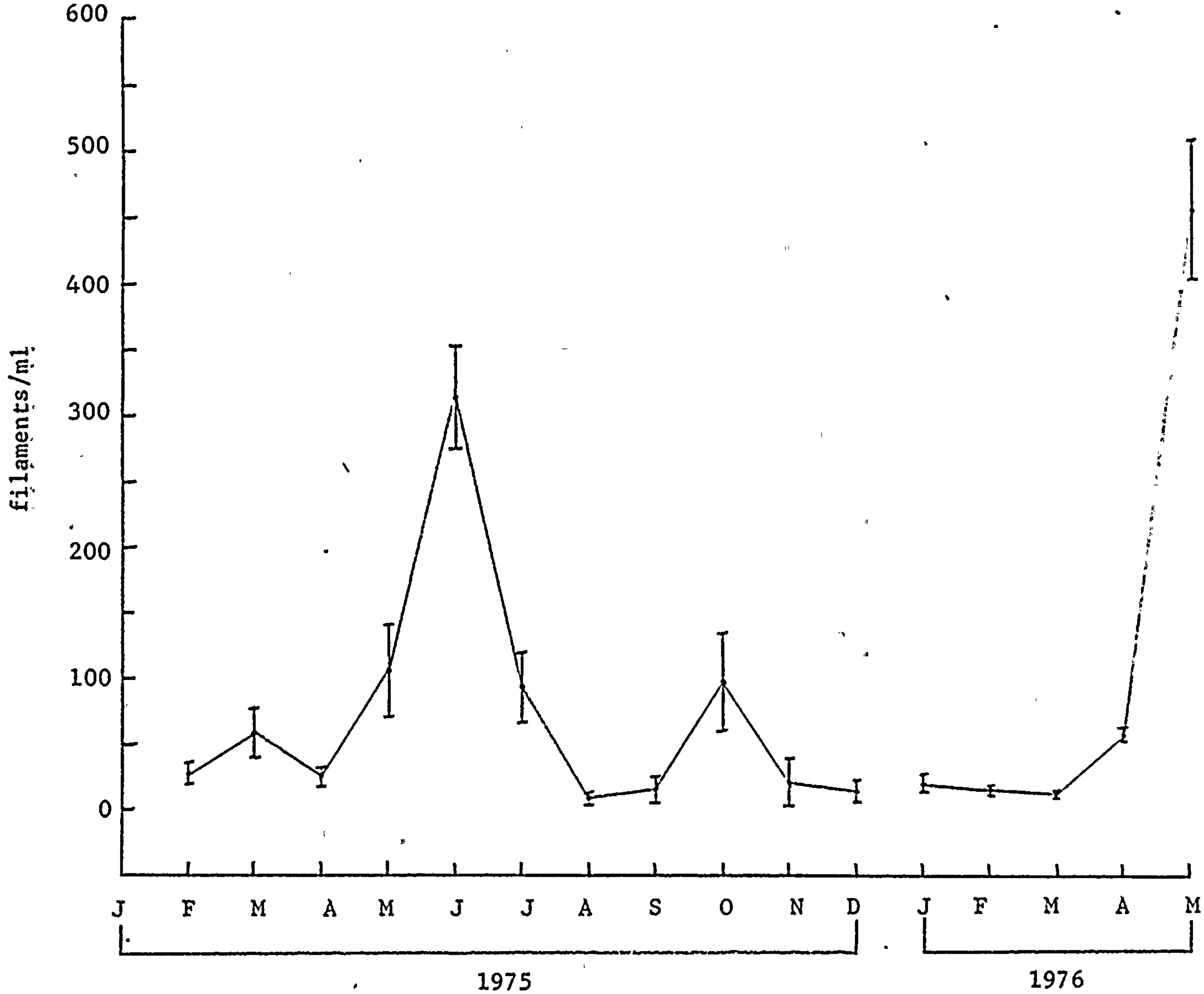

Figure 2. Density (cells/ml) of filamentous blue-green algae in entrainment samples, February, 1975 - May, 1976.

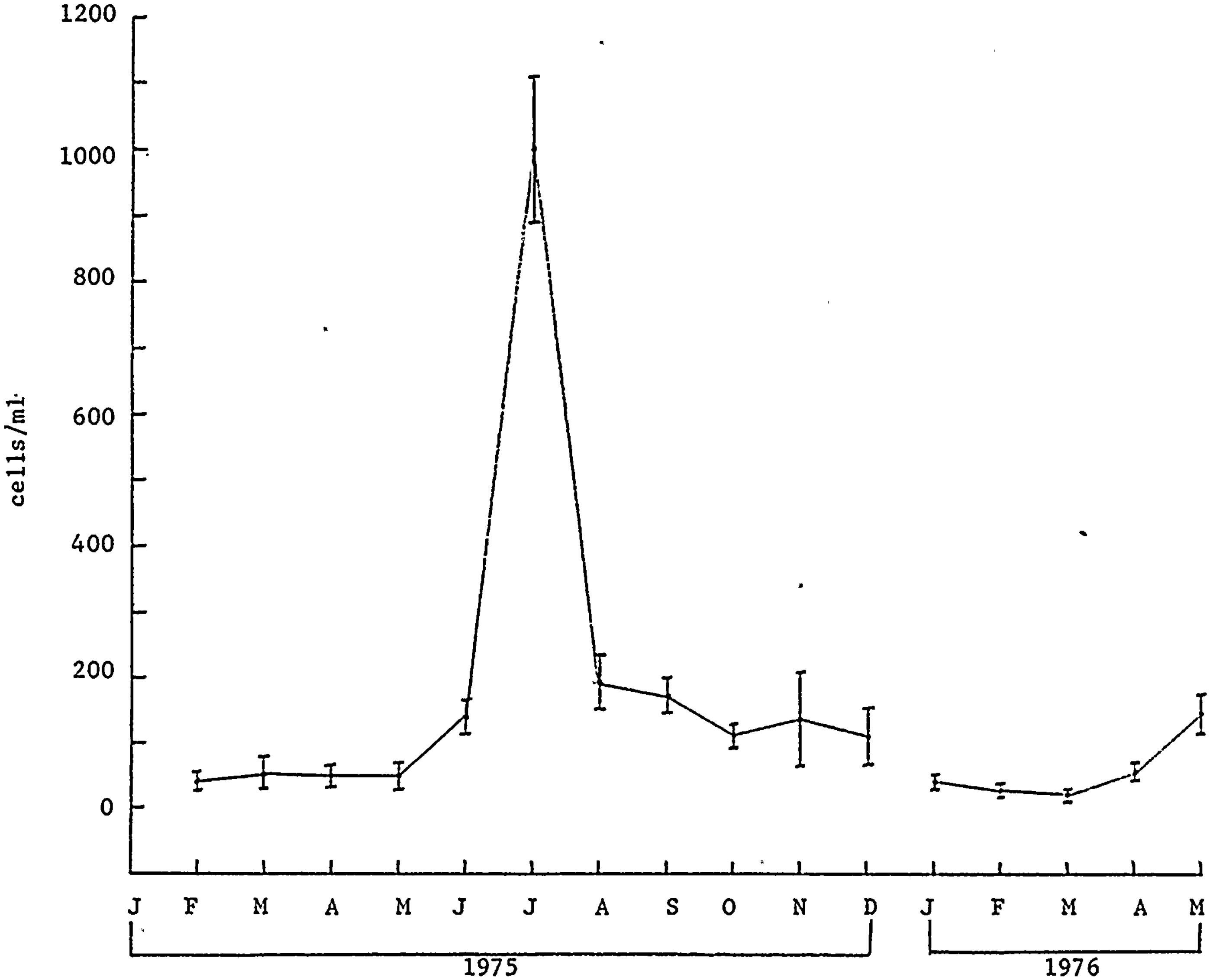

Figure 3. Density (cells/ml) of coccoid green algae in entrainment samples, February, 1975 - May, 1976.

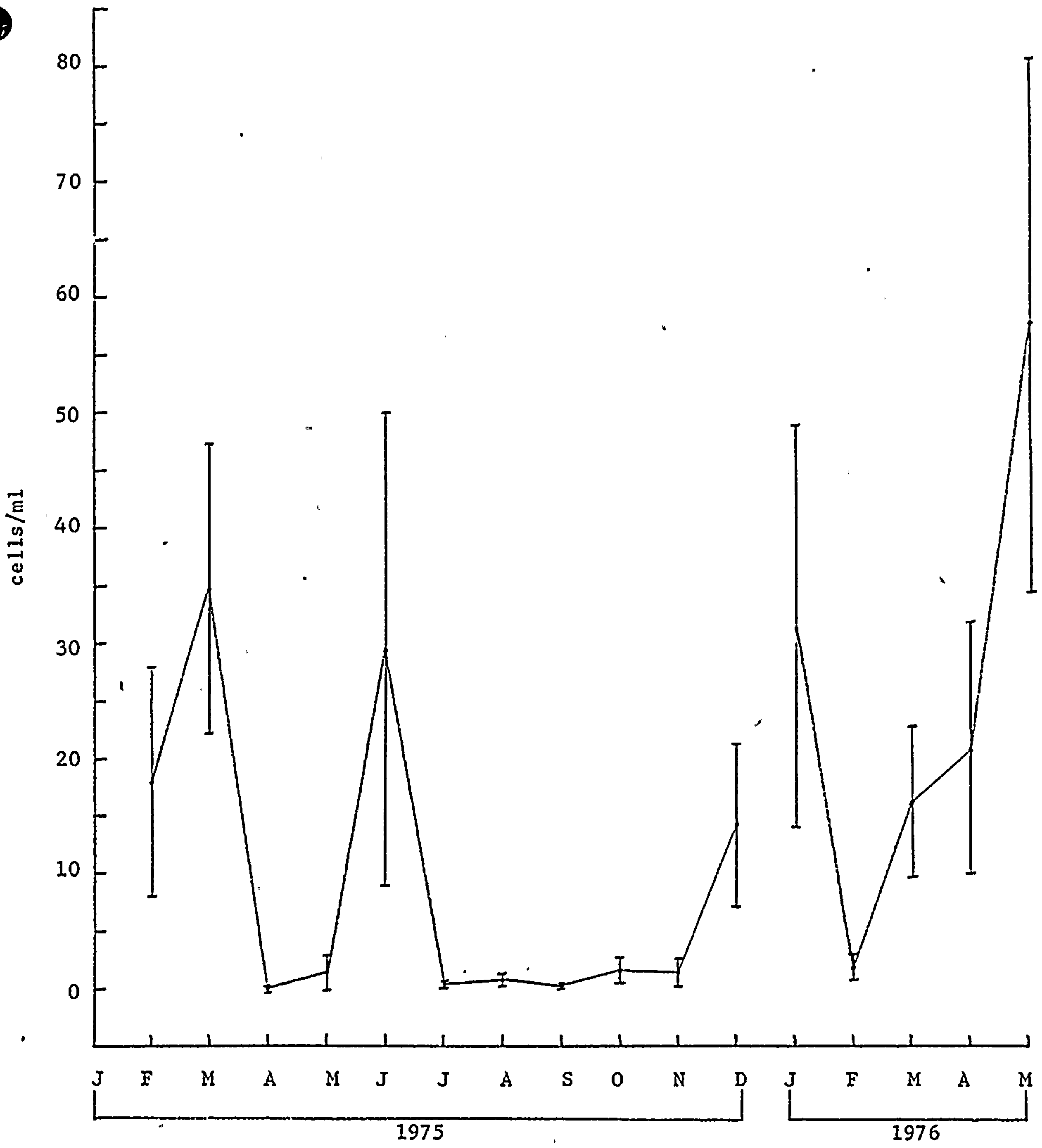

Figure 4. Density (cells/ml) of filamentous green algae in entrainment samples, February, 1975 - May, 1976.

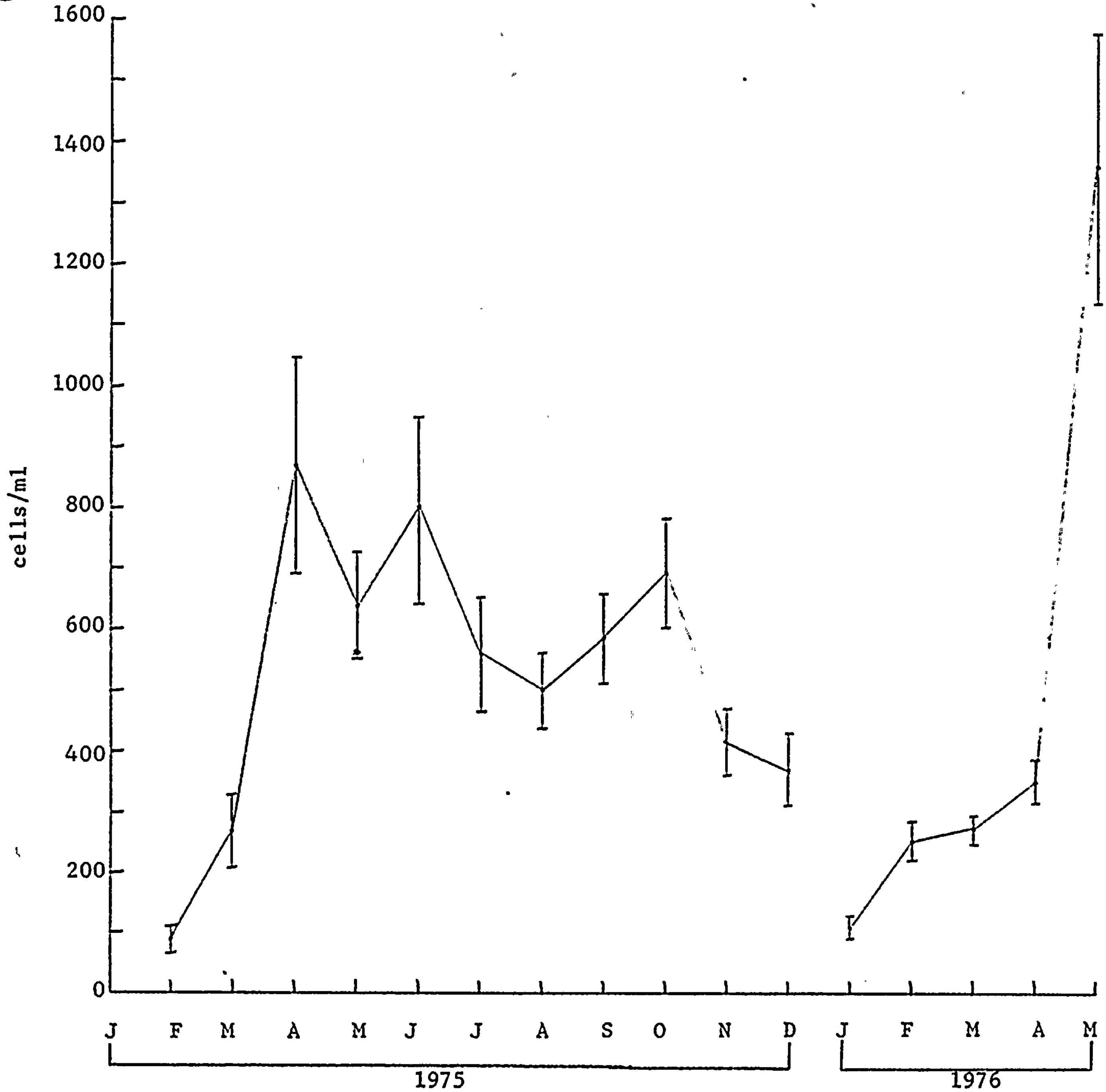

Figure 5. Density (cells/ml) of flagellated algae in entrainment samples, February, 1975 - May, 1976.

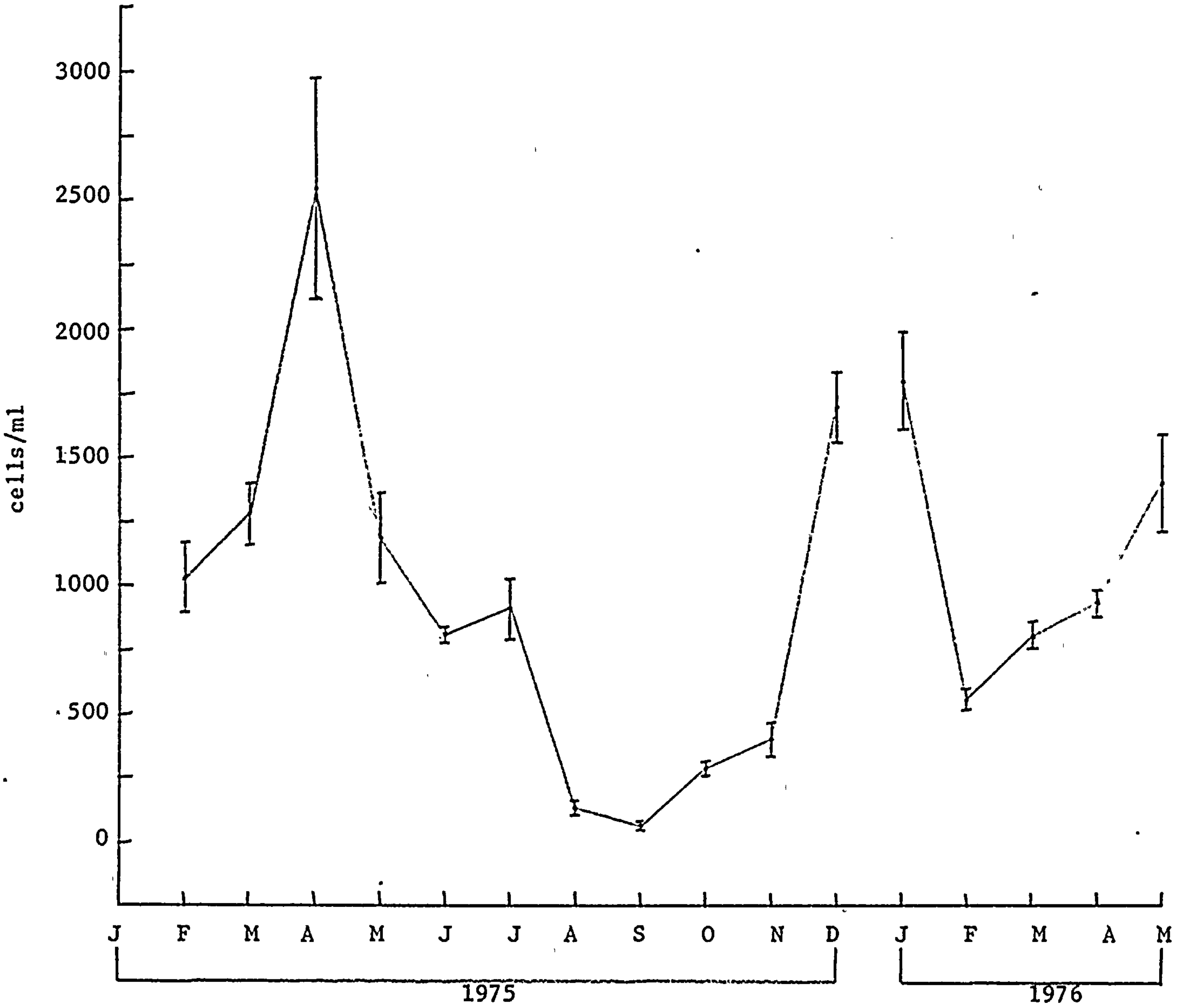

Figure 6. Density (cells/ml) of centric diatoms in entrainment samples, February, 1975 - May, 1976.

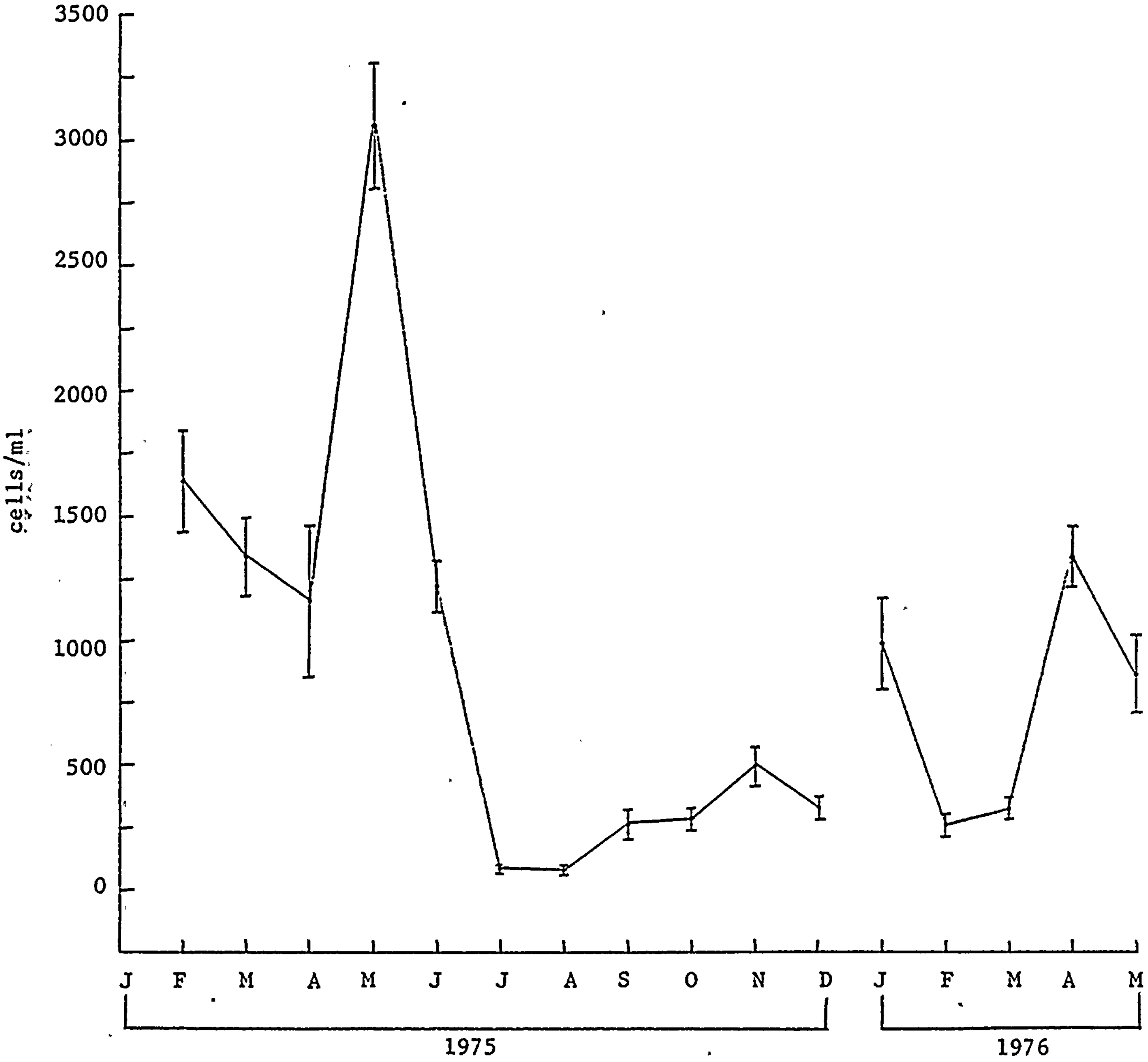

Figure 7. Density (cells/ml) of pennate diatoms in entrainment samples, February, 1975 - May, 1976.

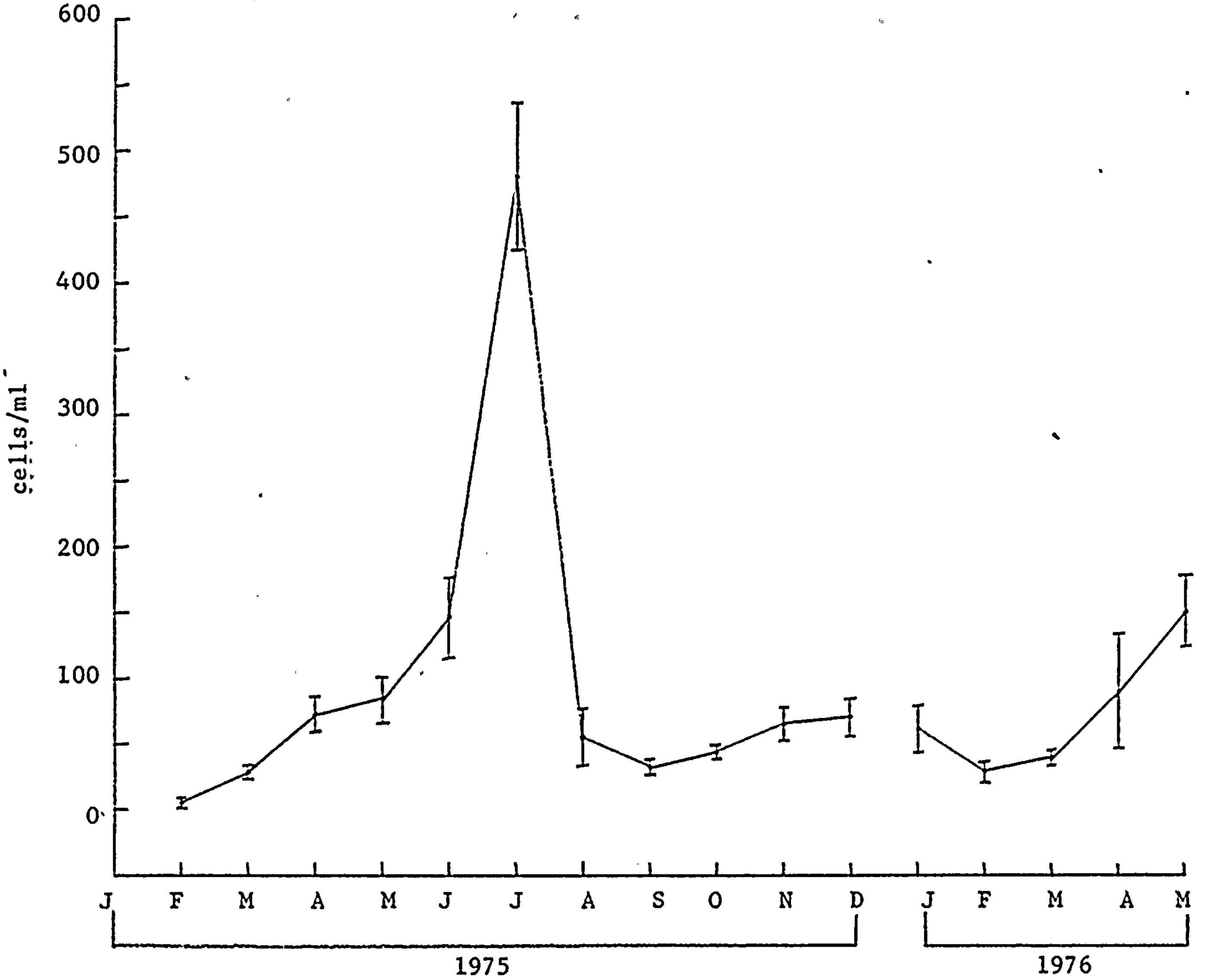

Figure 8. Density (cells/ml) of other algae in entrainment samples, February, 1975 - May, 1976.

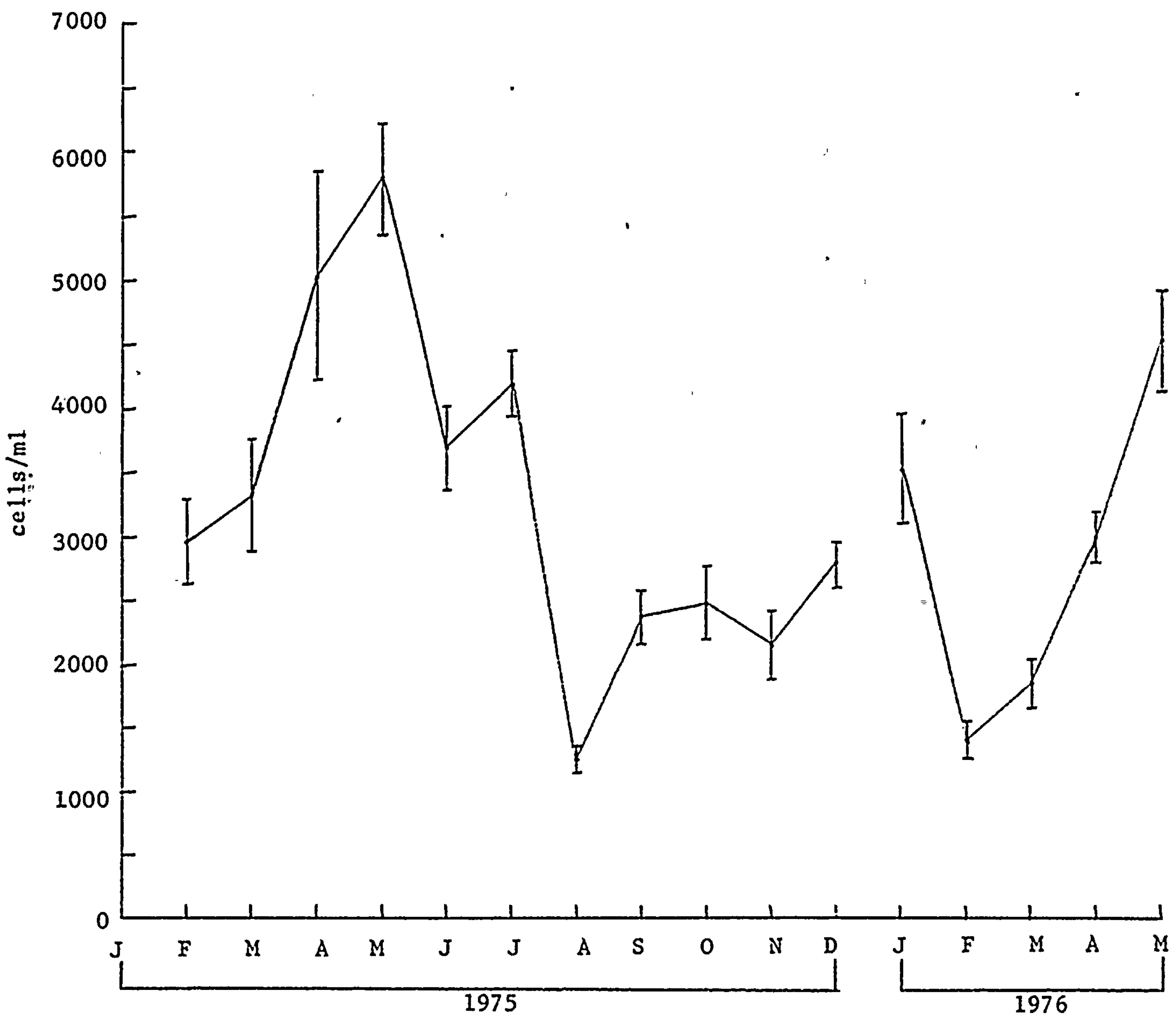

Figure 9. Density (cells/ml) of total phytoplankton in entrainment samples, February, 1975 - May, 1976.

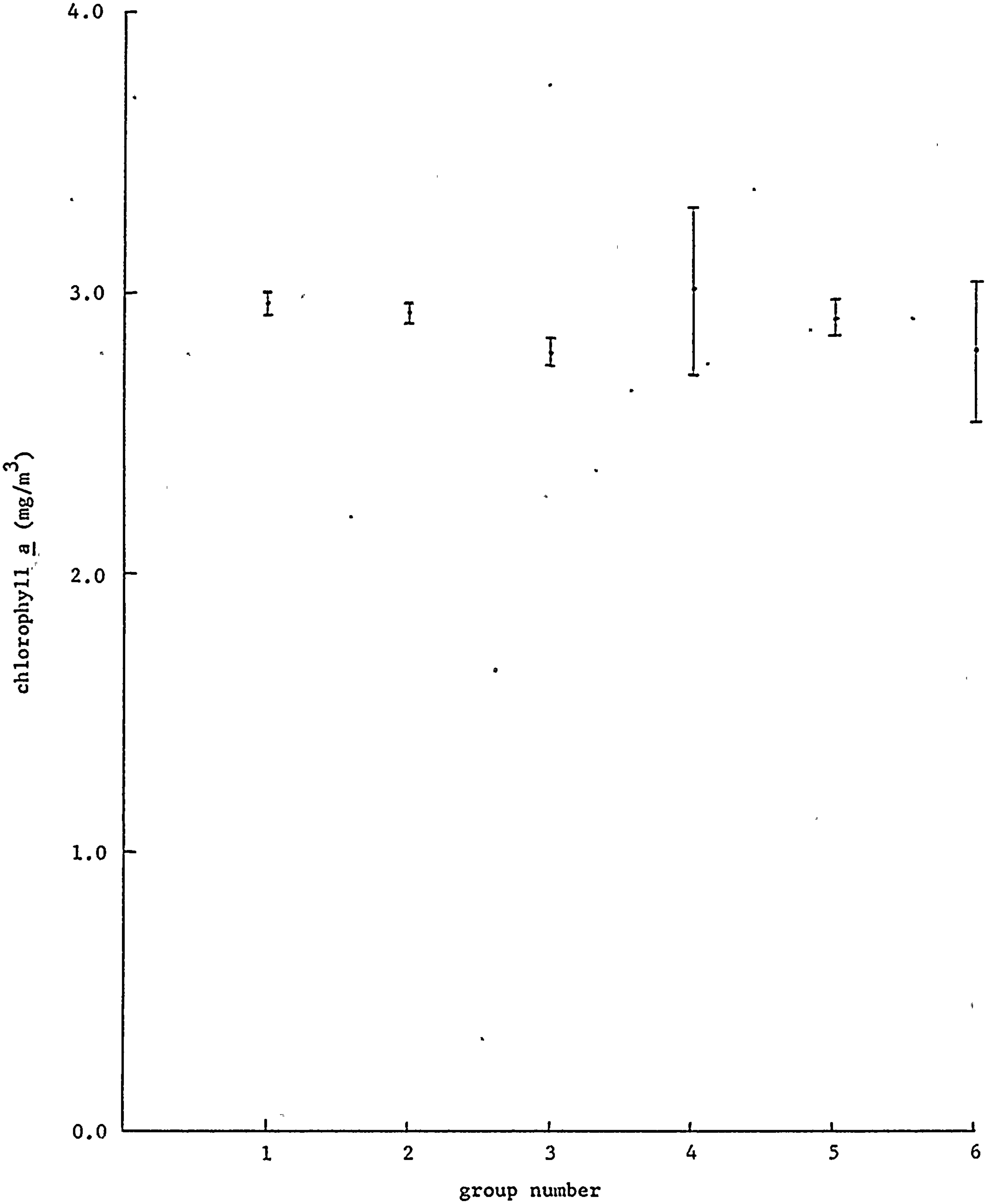

Figure 10. Chlorophyll a concentrations measured in 6 groups of 3 consecutive samples, formed from a set of 18 samples drawn in succession from the intake forebay during a 5-minute period. The mean ± standard error is plotted for each group of 3.

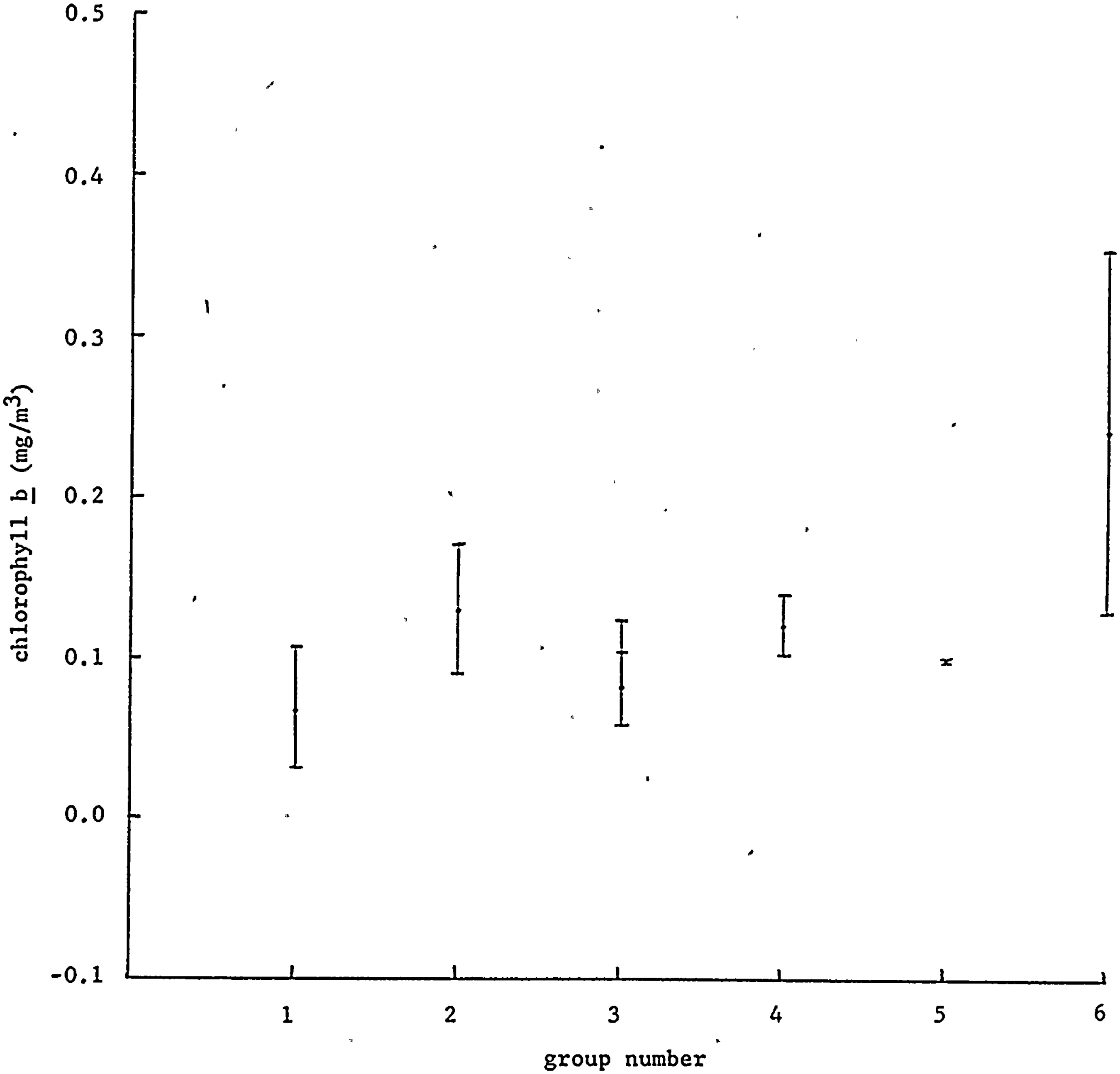

Figure 11. Chlorophyll b concentrations measured in 6 groups of 3 consecutive samples, formed from a set of 18 samples drawn in succession from the intake forebay during a 5-minute period. The mean ± standard error is plotted for each group of 3.

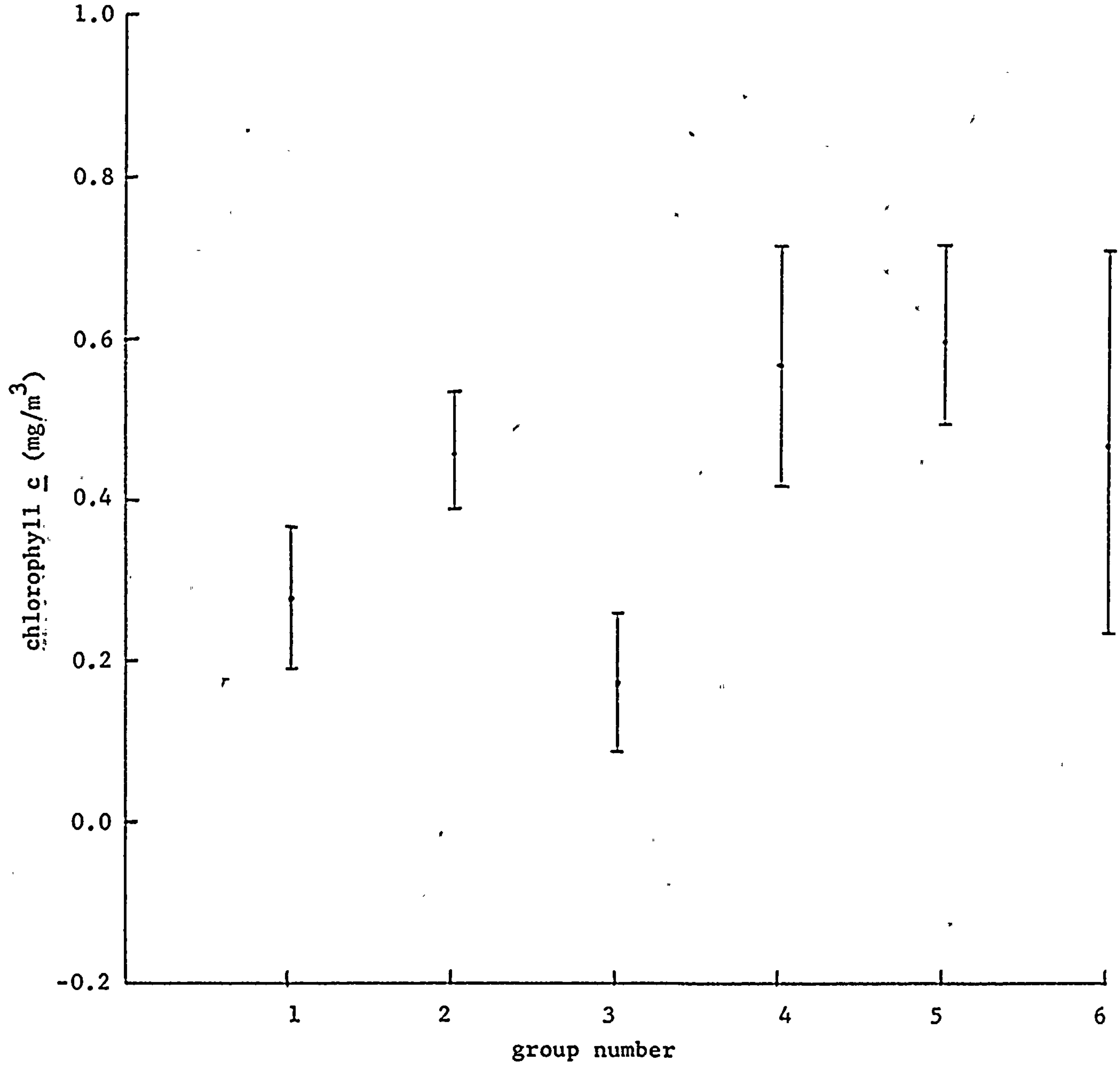

Figure 12. Chlorophyll c concentrations measured in 6 groups of 3 consecutive samples, formed from a set of 18 samples drawn from the intake forebay during a 5-minute period. The mean ± standard error is plotted for each group of 3.

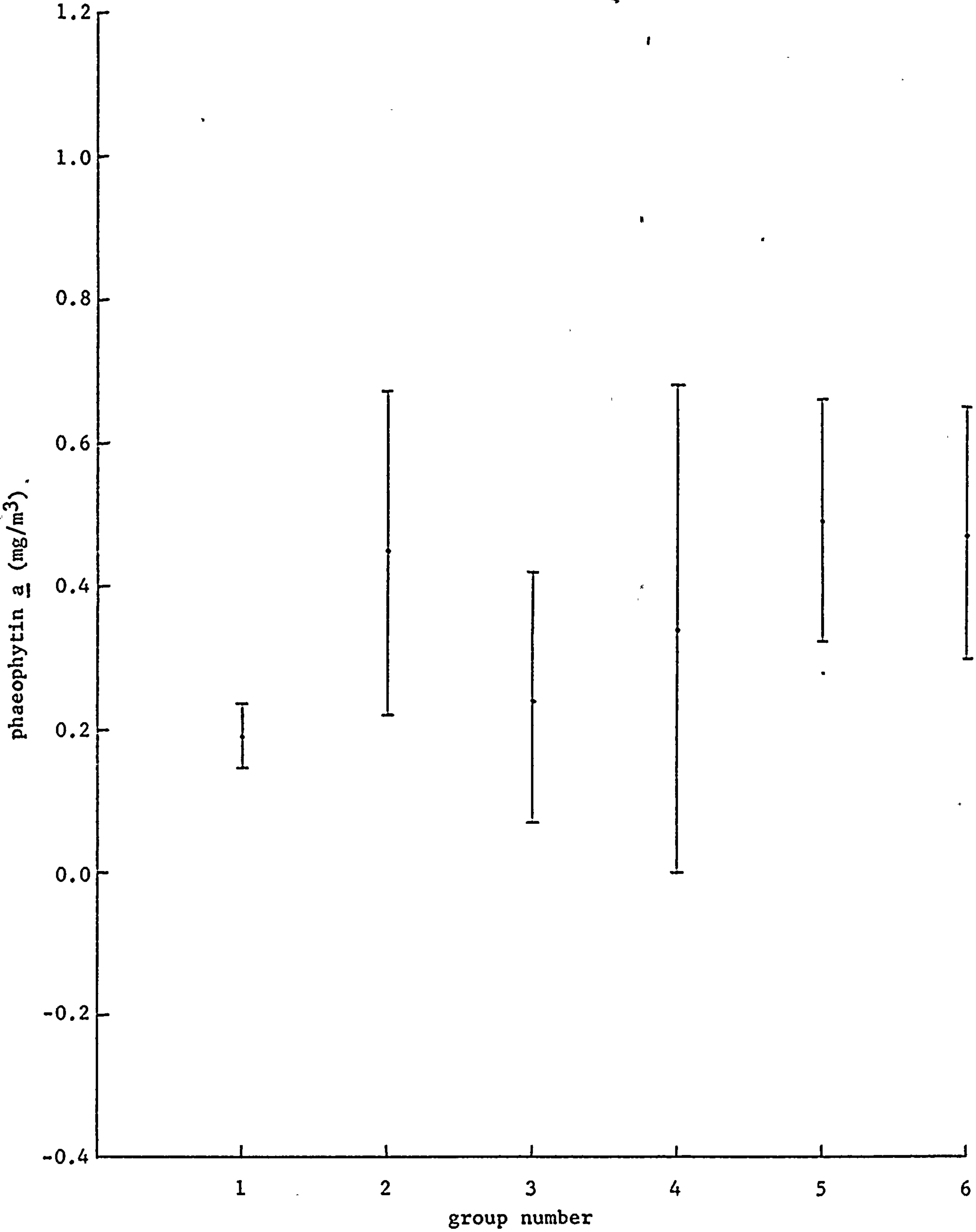

Figure 13. Phaeophytin a concentrations measured in 6 groups of 3 consecutive samples, formed from a set of 18 samples drawn in succession from the intake forebay during a 5-minute period. The mean ± standard error is plotted for each group of 3.

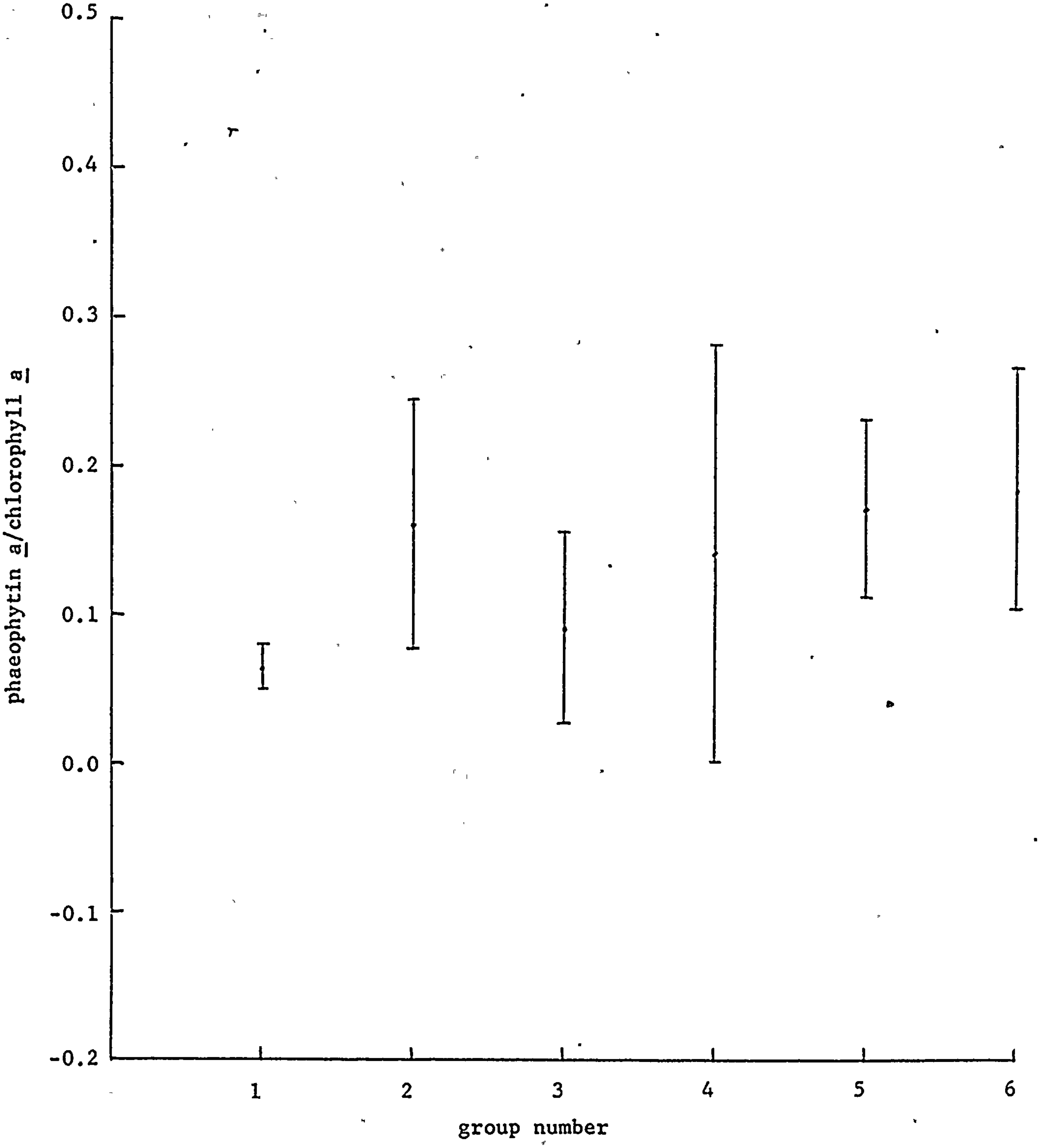

Figure 14. Variation of the phaeophytin *a* to chlorophyll *a* ratio during a 5-minute sampling period for 6 groups of 3 consecutive samples, formed from a set of 18 samples drawn in succession from the intake forebay. The mean ± standard error is plotted for each group of 3.

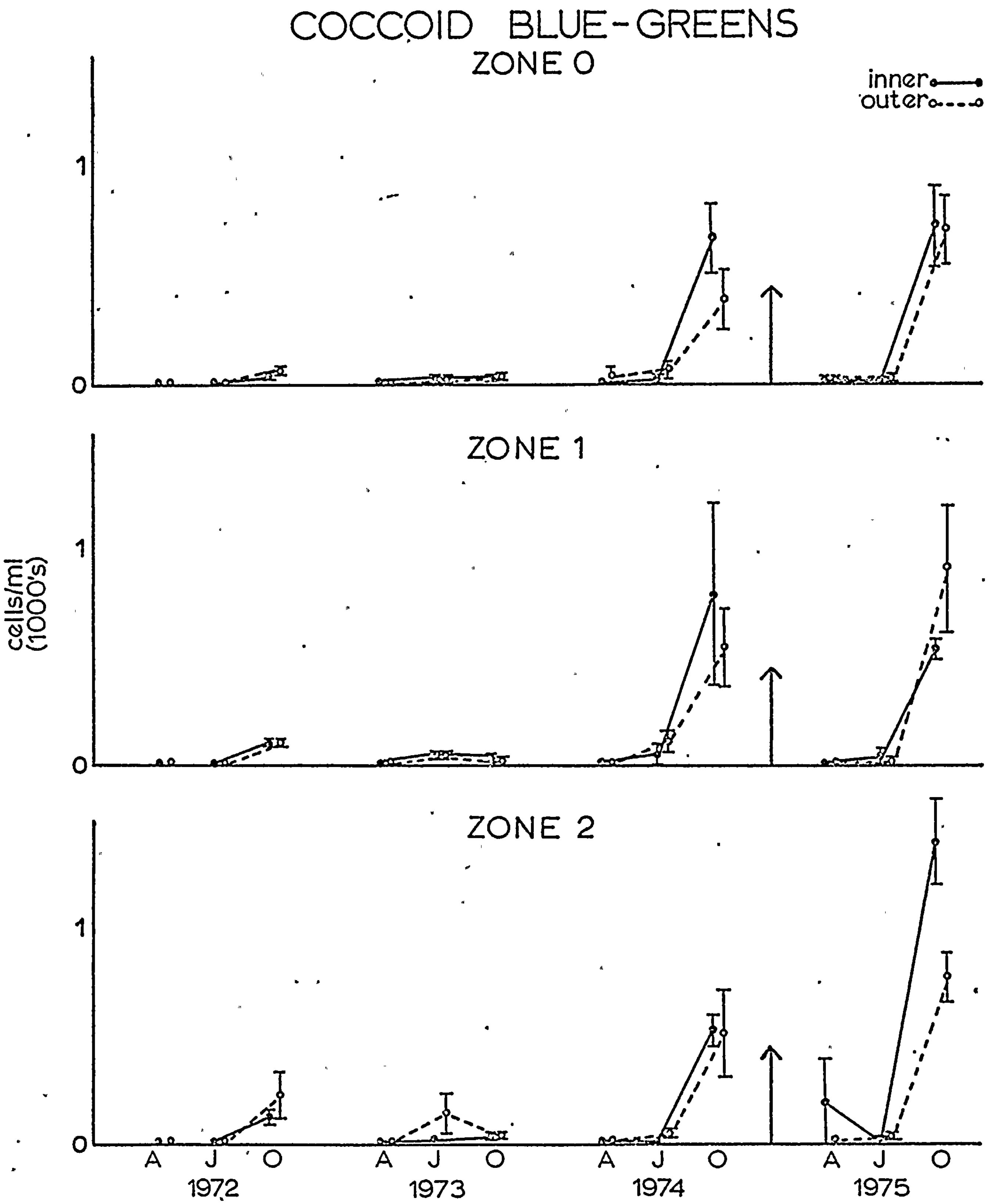

FIGURE 15. Mean density of coccoid blue-green algae (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

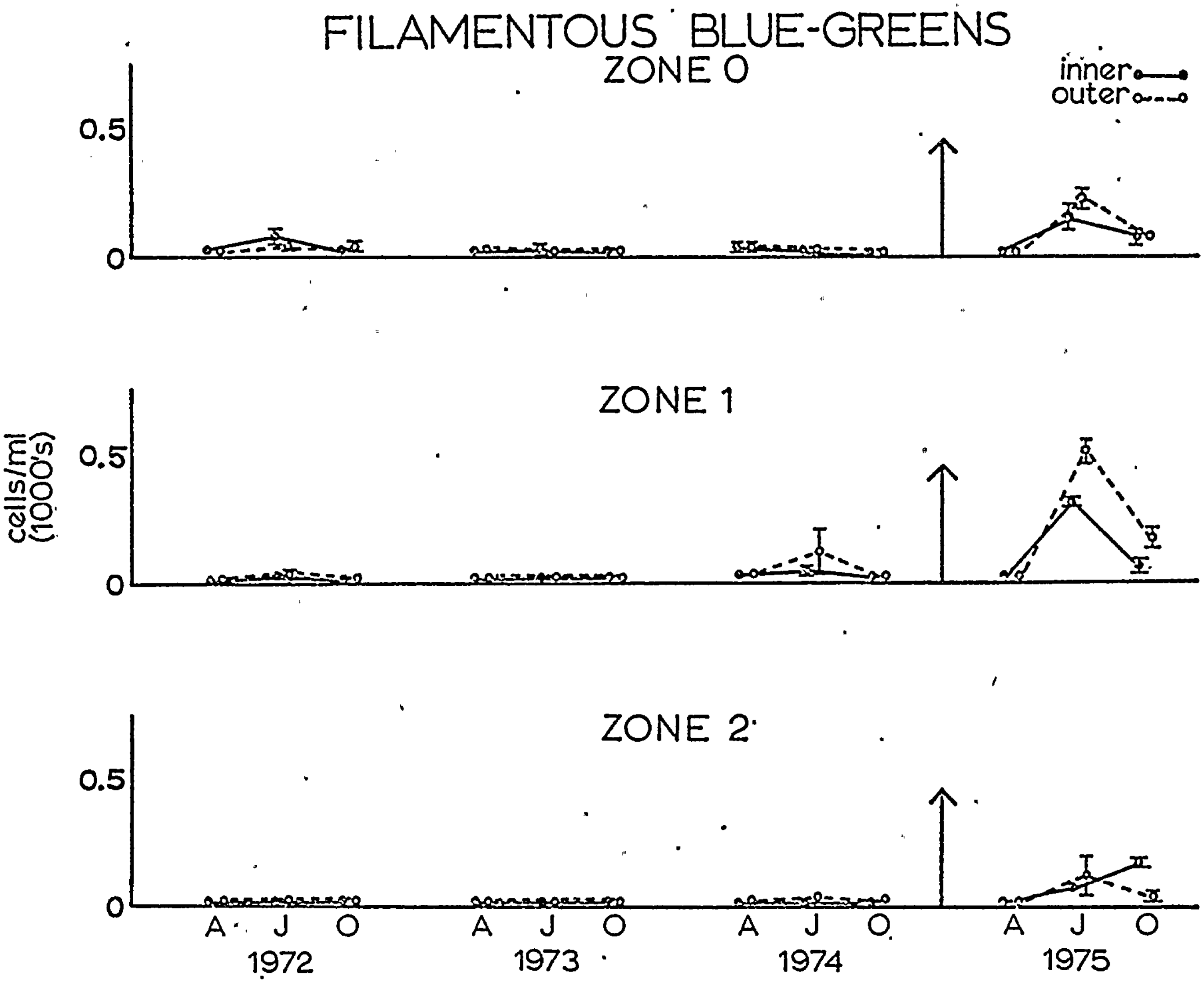

FIGURE 16. Mean density of filamentous blue-green algae (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

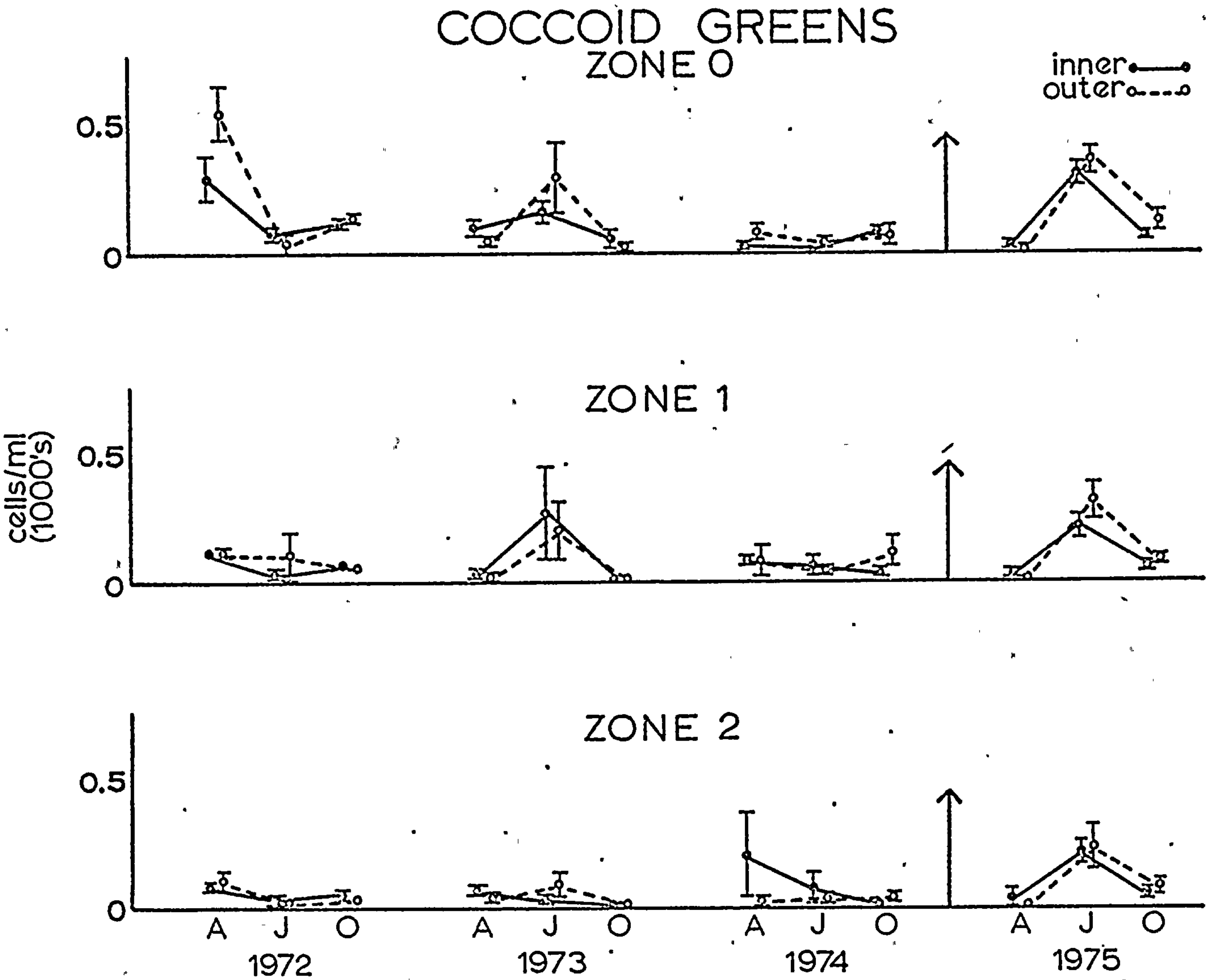

FIGURE 17. Mean density of coccoid green algae (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

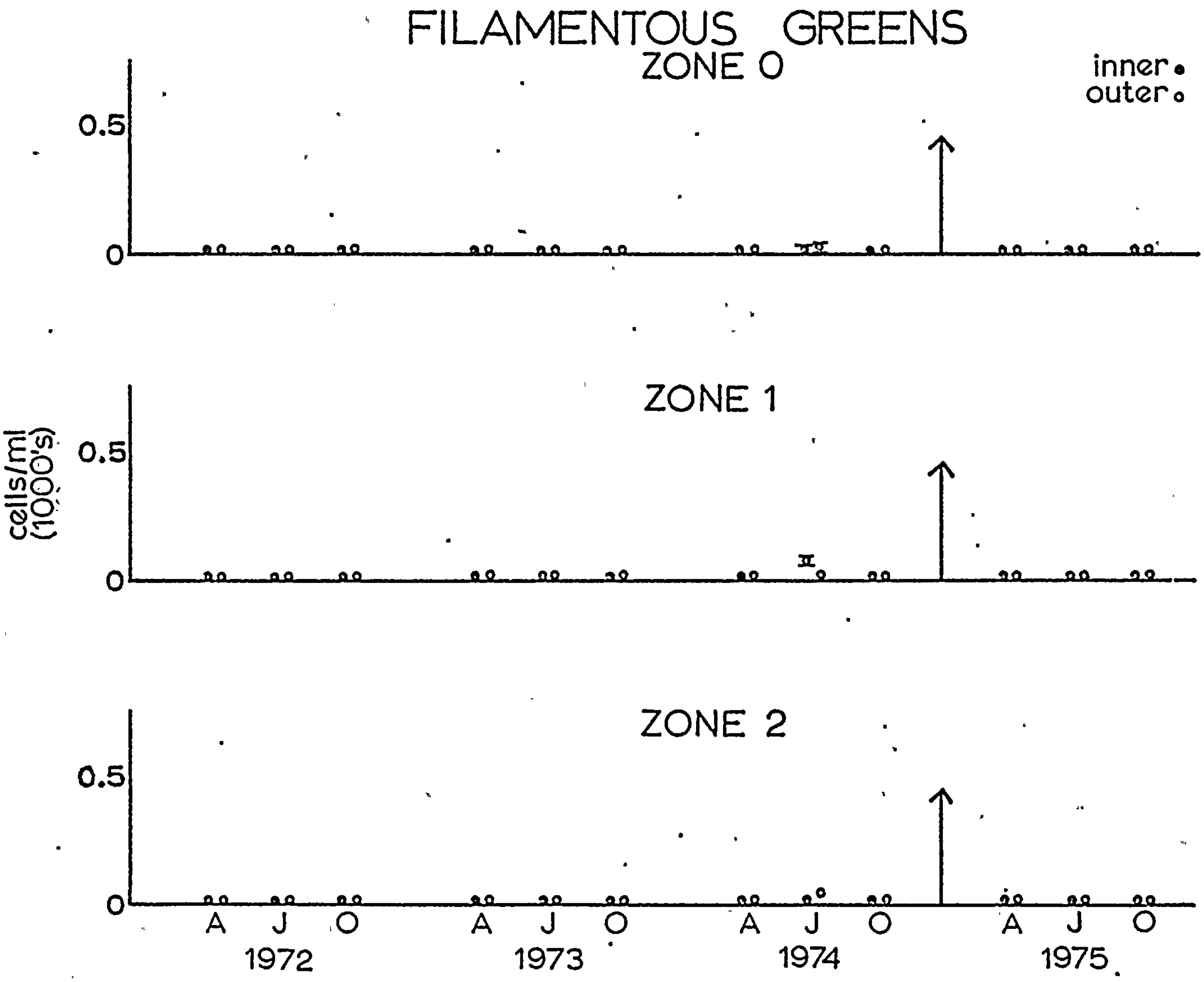

FIGURE 18. Mean density of filamentous green algae (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

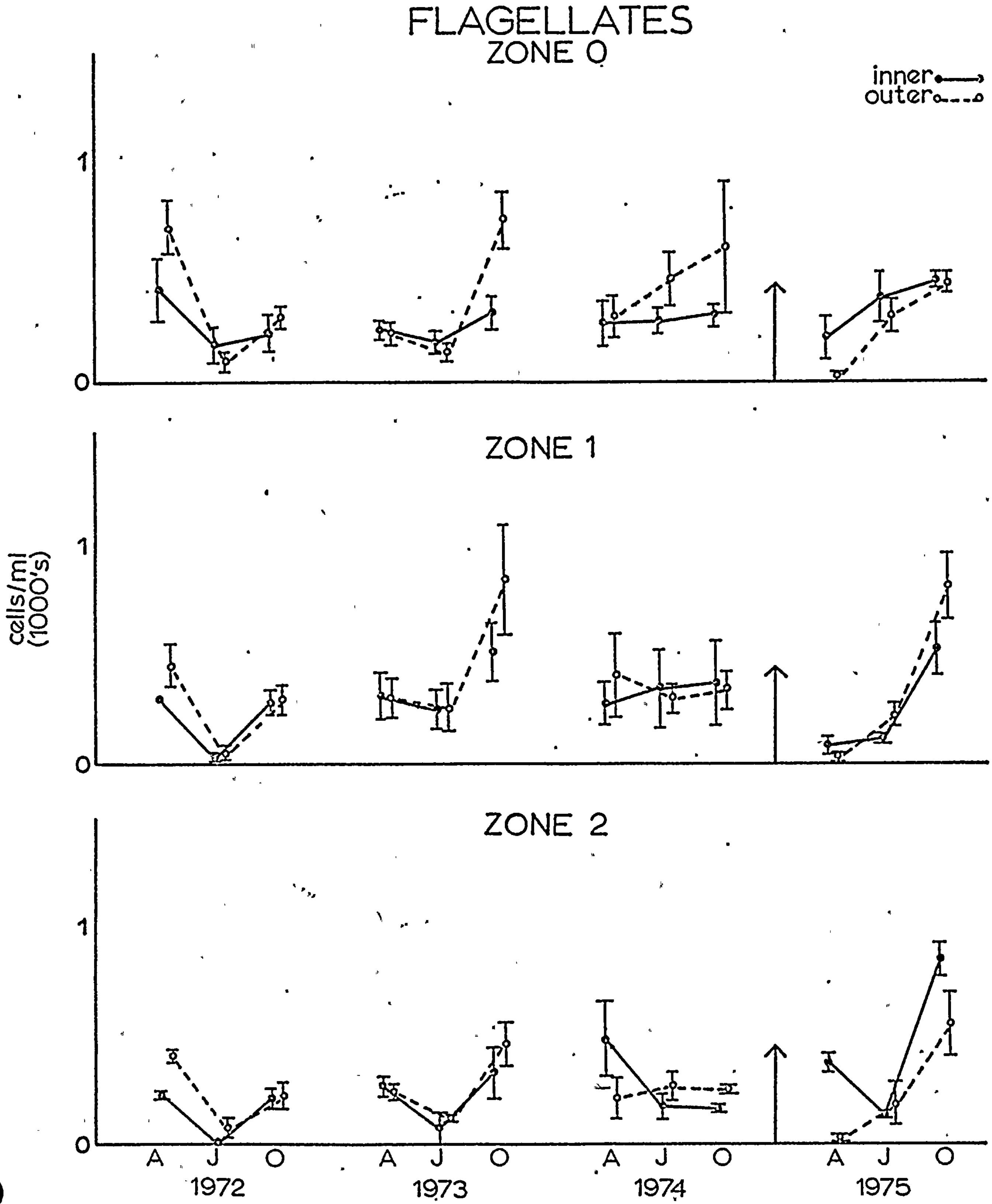

FIGURE 19. Mean density of flagellates (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

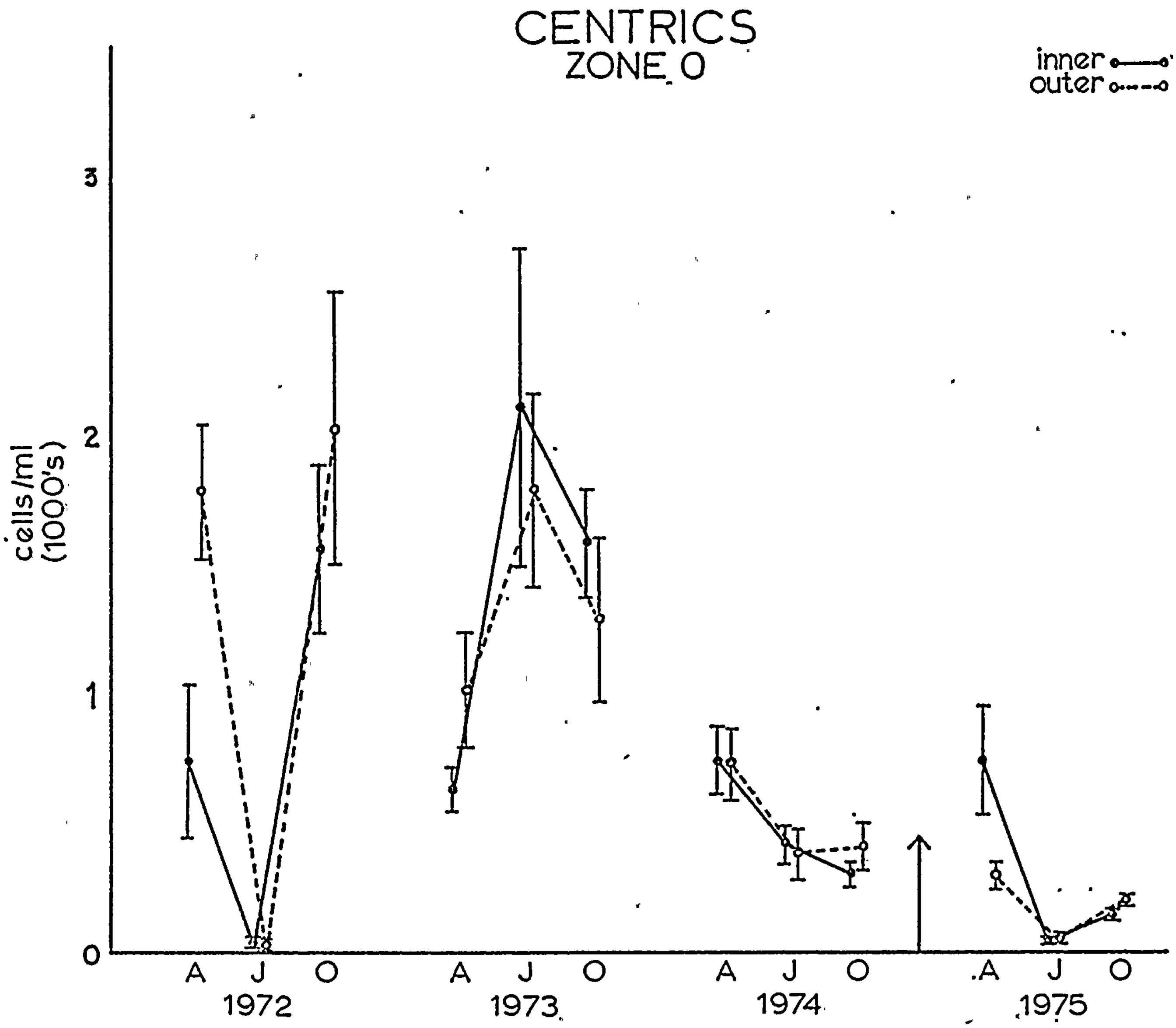

FIGURE 20. Mean density of centric diatoms (cells/ml) in zone 0, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

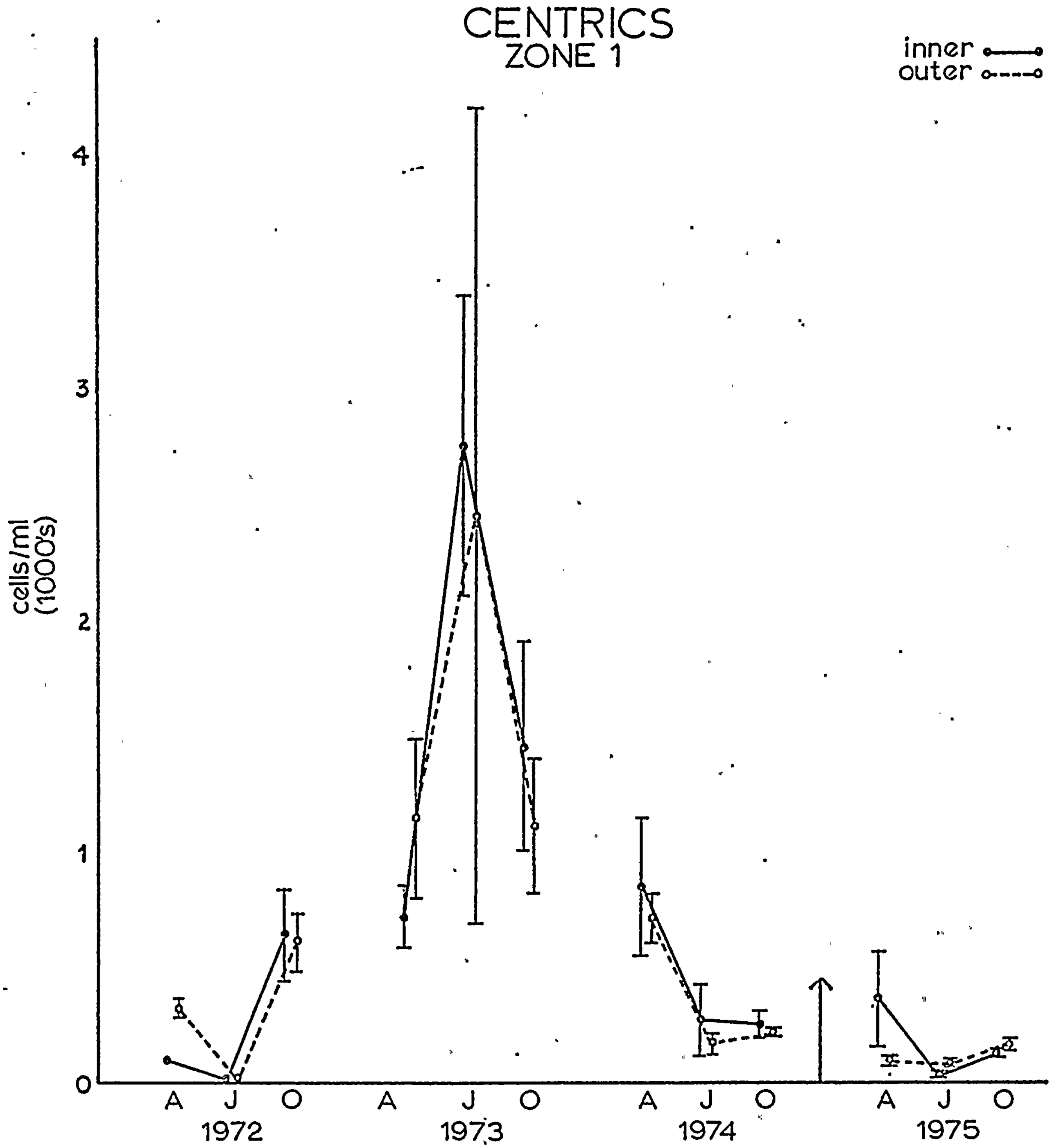

FIGURE 21. Mean density of centric diatoms (cells/ml) in zone 1, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

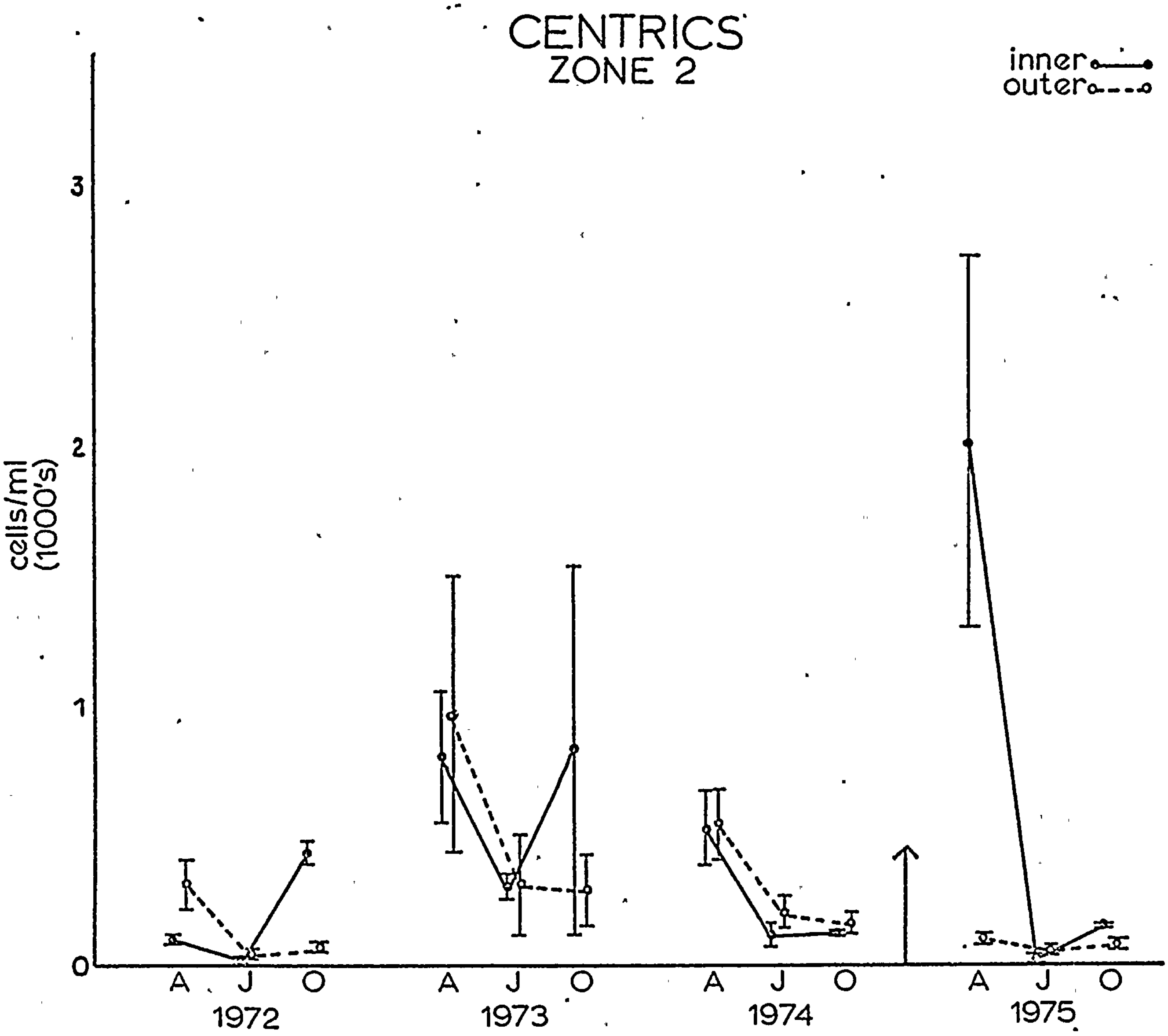

FIGURE 22. Mean density of centric diatoms (cells/ml) in zone 2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

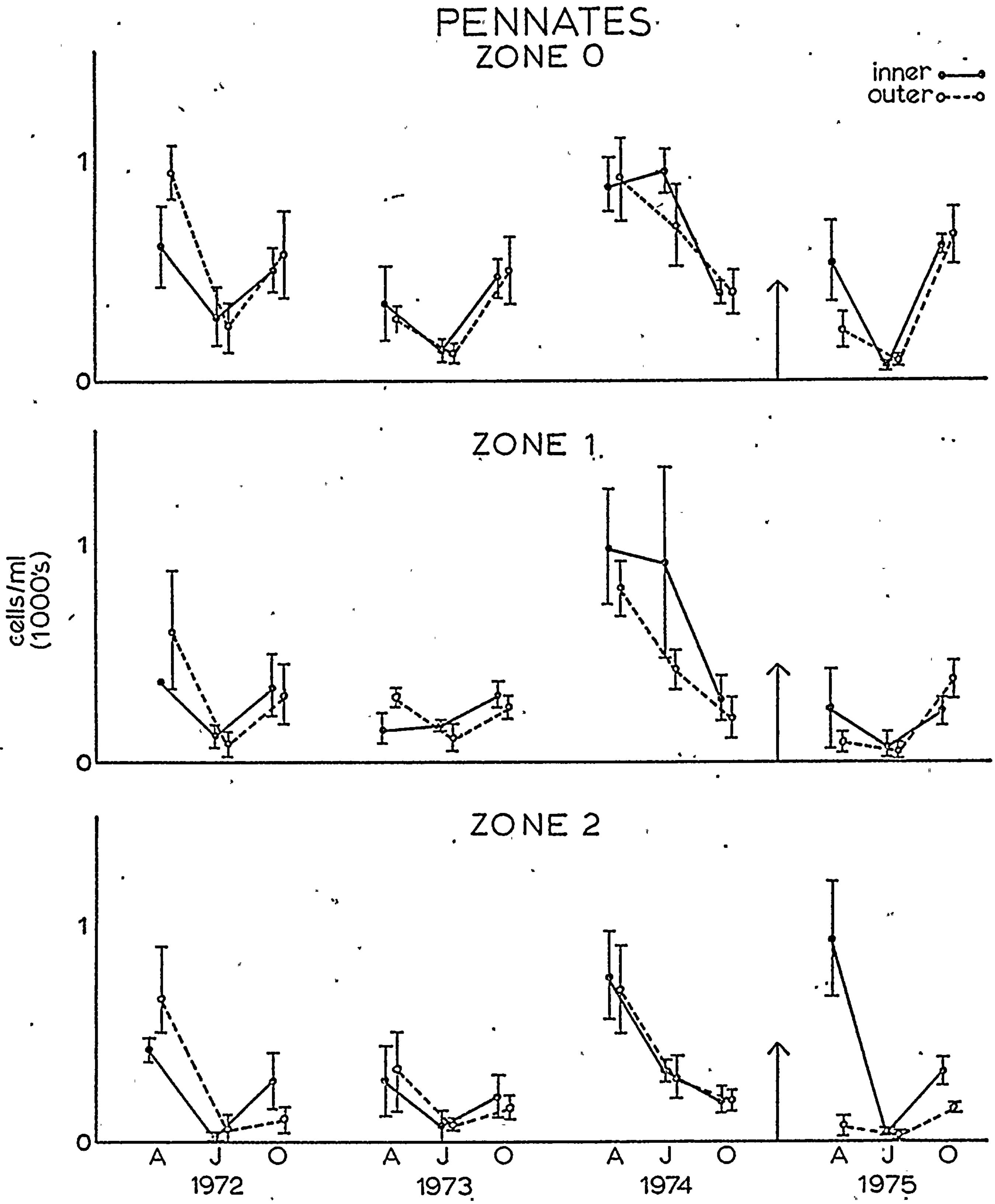

FIGURE 23. Mean density of pennate diatoms (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

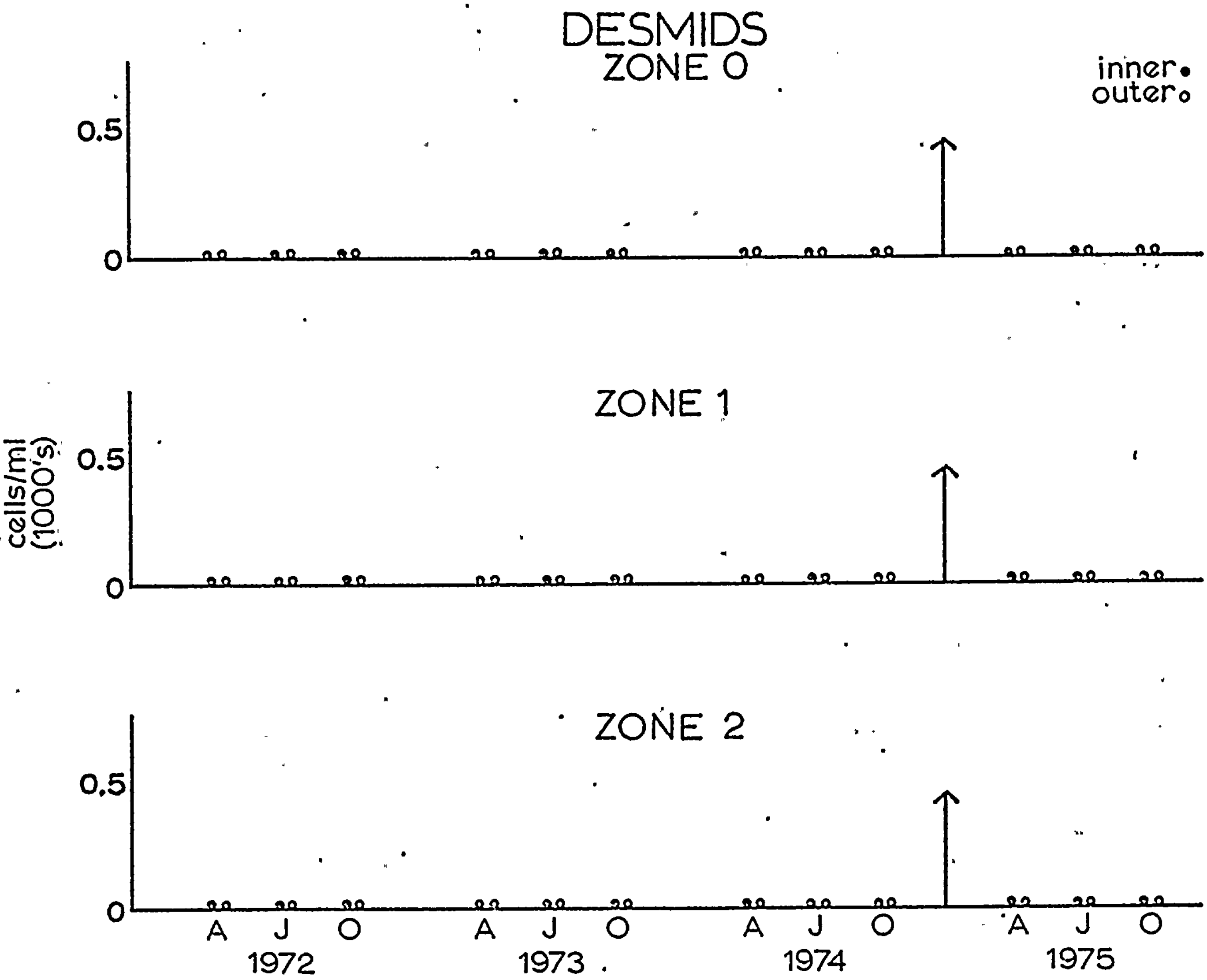

FIGURE 24. Mean density of desmids (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

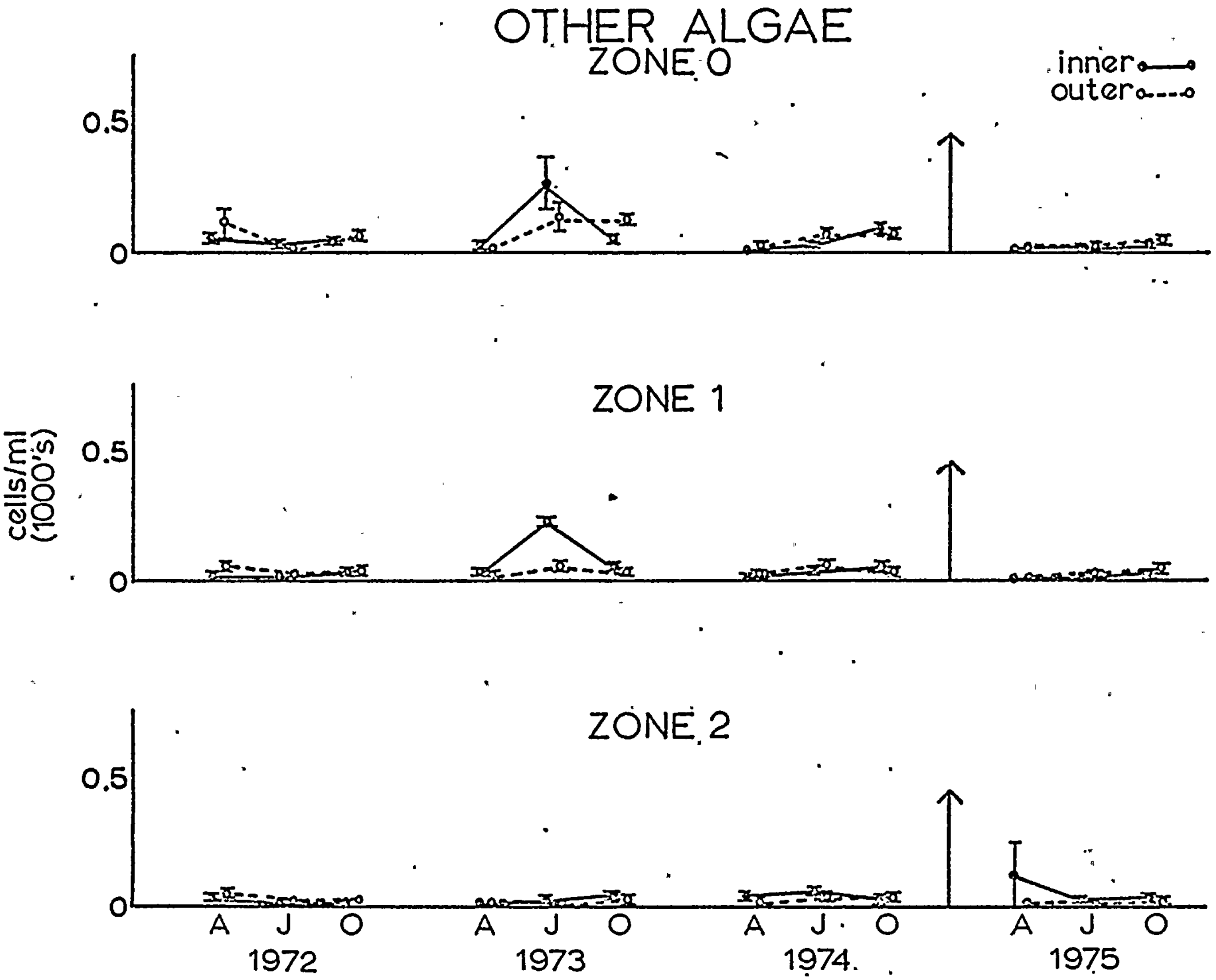

FIGURE 25. Mean density of other algae (cells/ml) in zones 0-2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

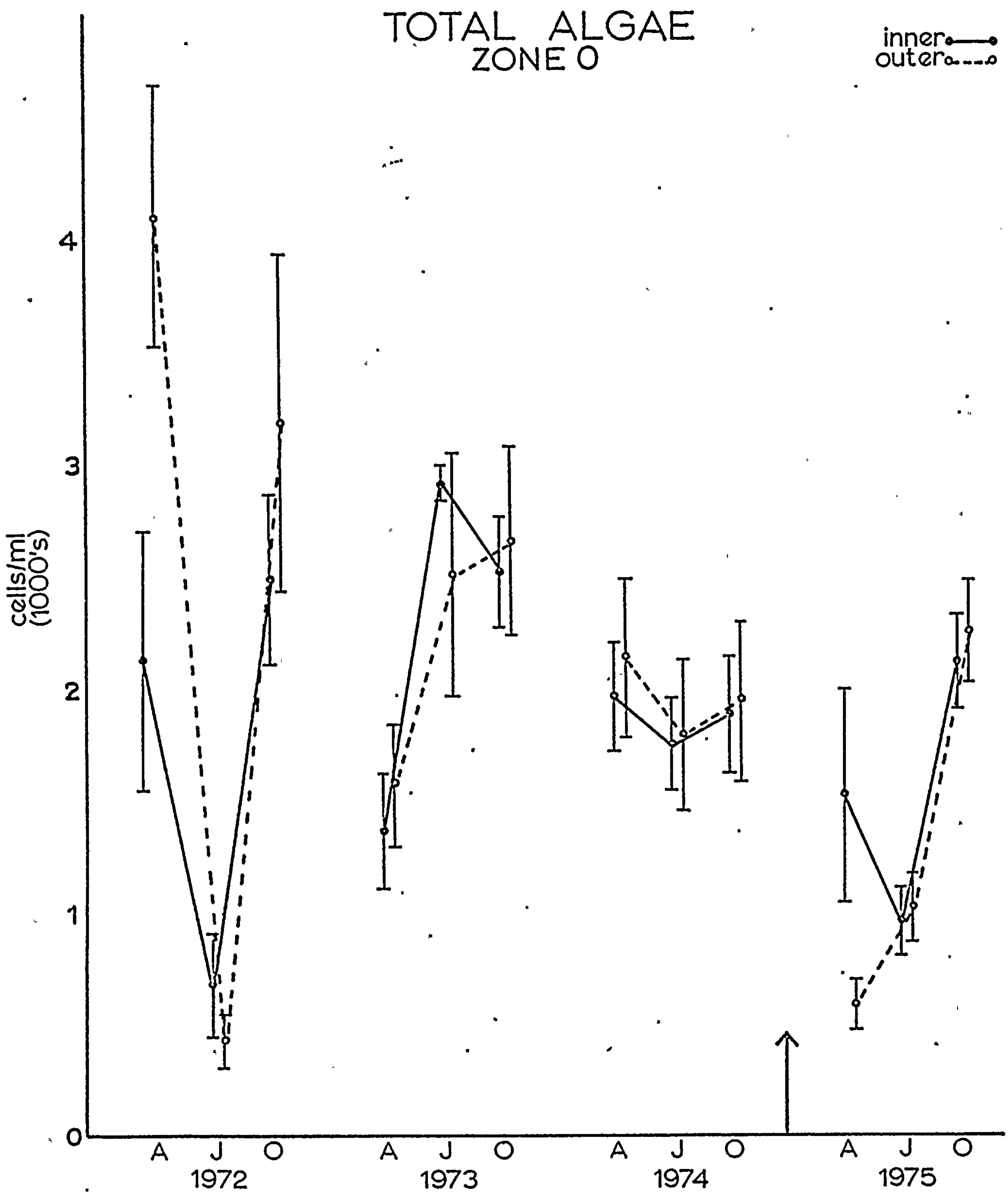

FIGURE 26. Mean density of total algae (cells/ml) in zones 0, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

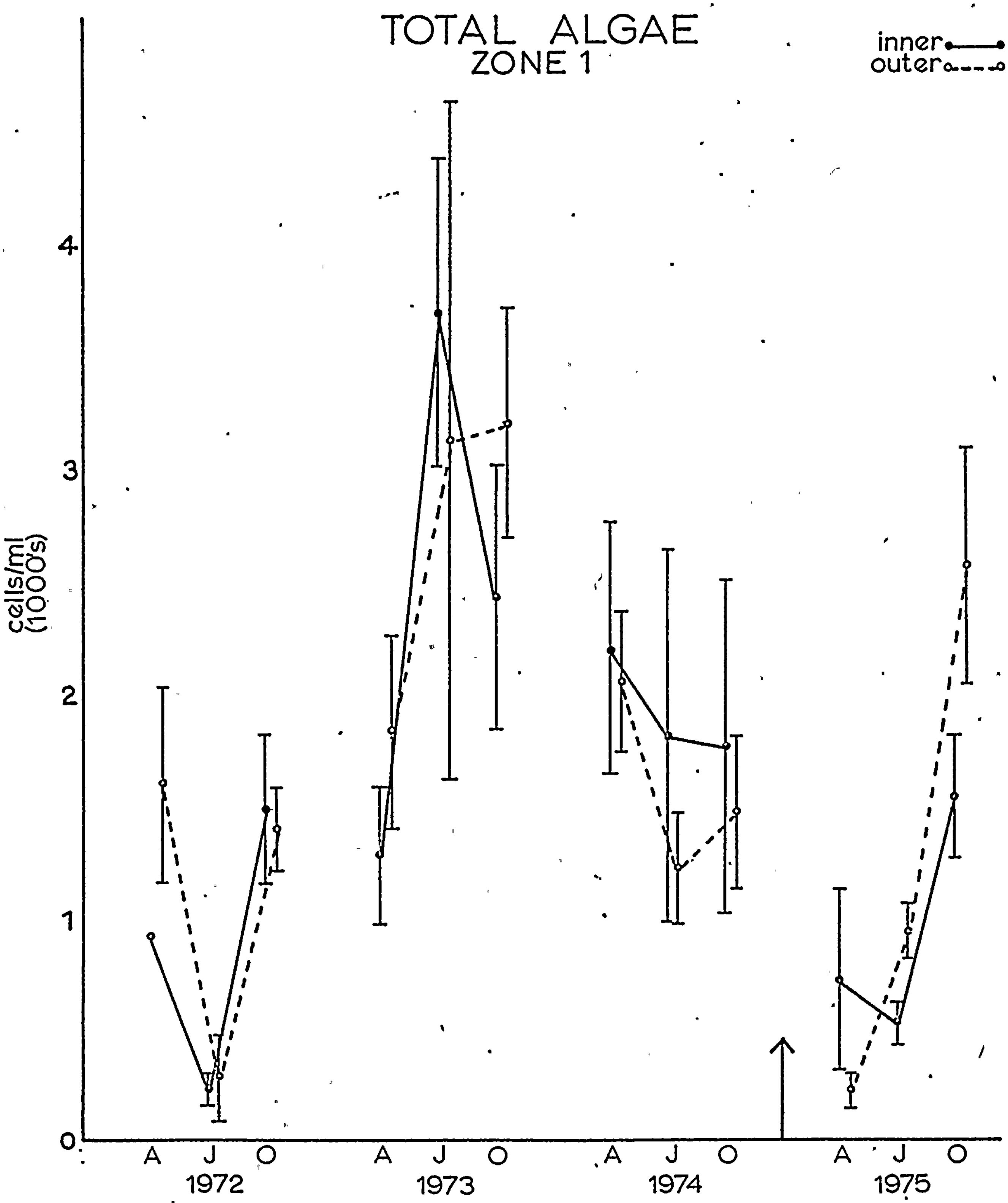

FIGURE 27. Mean density of total algae (cells/ml) in zone 1, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

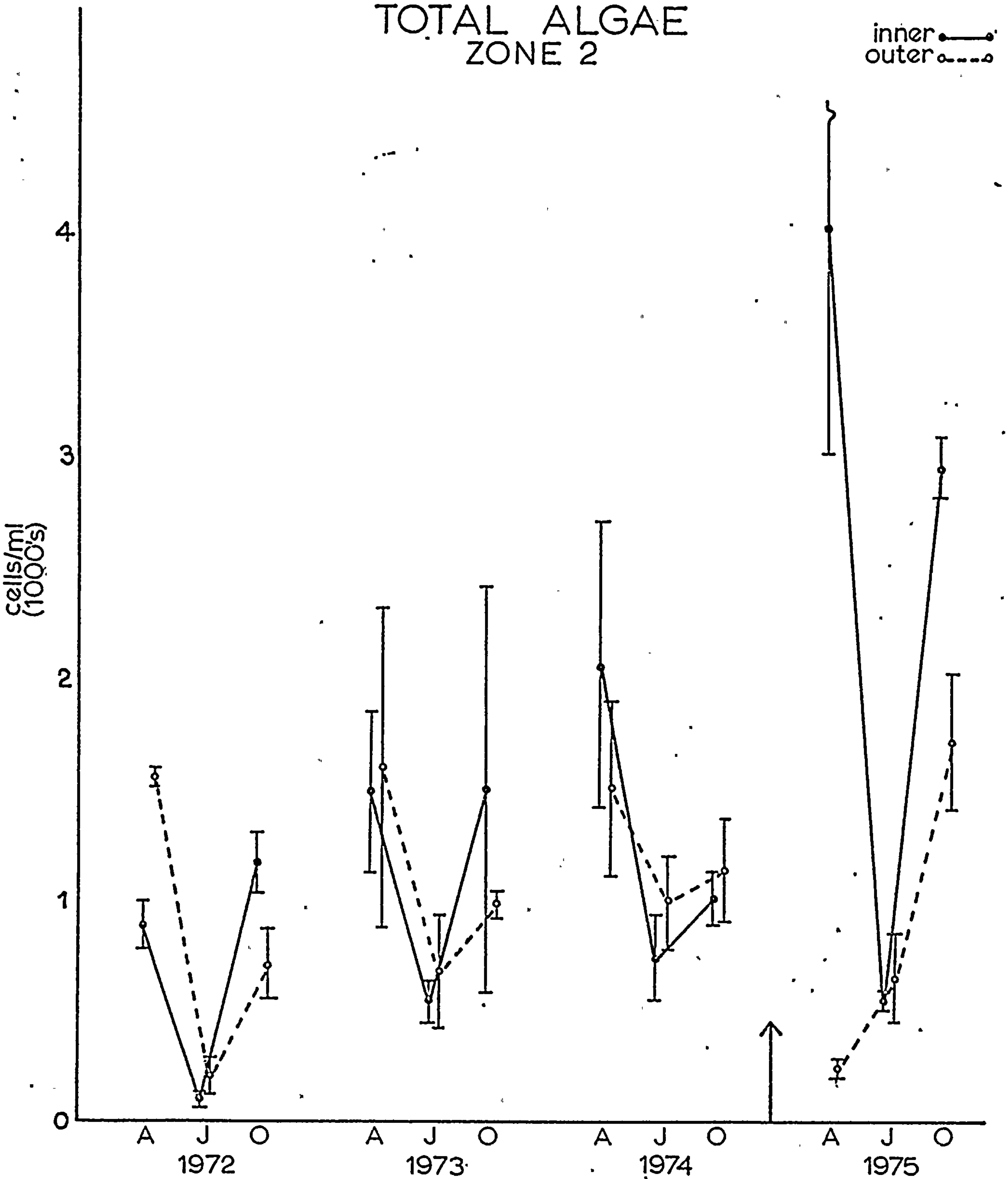

FIGURE 28. Mean density of total algae (cells/ml) in zone 2, determined in the major surveys of 1972-1975 (April, July, October). The bars show the standard error; see Table 9 for sample sizes.

TABLE 1. Completeness of samples for microscopic counting (2/75 through 11/76).

	SAMPLE STATUS[1]				
Month and Sample	Not Collected	Lost	Not Yet Counted	Counted But Not Yet Available	Complete
February 1975					
Evening Twilight	IB				IA
	DB				DA
Morning Twilight	IB				IA
	DB				DA
Noon	IB				IA
	DB				DA
Plume					
March 1975					
Evening Twilight	IB				IA
	DB				DA
Morning Twilight	IB				IA
	DB				DA
Noon	IB				IA
	DB				DA
Plume					
April 1975					
Evening Twilight	IB				IA
	DB				DA
Morning Twilight	IB				IA
	DB				DA
Noon	IB				IA
	DB				DA
Plume	PB				PA
May 1975					
Evening Twilight	IB	IA			
	DB				DA
Morning Twilight	IB				IA
	DB				DA
Noon	IB				IA
	DB				DA
Plume	PB				PA
June 1975					
Evening Twilight					IA IB
					DA DB
Morning Twilight					IA IB
					DA DB
Noon					IA IB
					DA DB
Plume	PA PB				

[1] A and B are replicate designations
I is Intake
D is Discharge
P is Plume

TABLE 1 continued.

	SAMPLE STATUS[1]				
Month and Sample	Not Collected	Lost	Not Yet Counted	Counted But Not Yet Available	Complete
July 1975					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume	PA PB				
August 1975					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume	PA PB				
September 1975					
Evening Twilight	IB DB				IA DA
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume					PA PB
October 1975					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume	PA PB				
November					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume	PA PB				

[1] A and B are replicate designations
I is Intake
D is Discharge
P is Plume

TABLE 1 continued.

	SAMPLE STATUS[1]				
Month and Sample	Not Collected	Lost	Not Yet Counted	Counted But Not Yet Available	Complete
December 1975					
Evening Twilight		IB			IA DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume					
January 1976					
Evening Twilight					IA IB DA DB
Morning Twilight		DA			IA IB DB
Noon					IA IB DA DB
Plume					
February 1976					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume					
March 1976					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
Plume					
April 1976					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB

[1] A and B are replicate designations
I is Intake
D is Discharge
P is Plume

TABLE 1 continued.

	SAMPLE STATUS[1]				
Month and Sample	Not Collected	Lost	Not Yet Counted	Counted But Not Yet Available	Complete
May 1976					
Evening Twilight					IA IB DA DB
Morning Twilight					IA IB DA DB
Noon					IA IB DA DB
June 1976					
Evening Twilight			IA IB DA DB		
Morning Twilight			IA IB DA DB		
Noon			IA IB DA DB		
July 1976					
Evening Twilight			IA IB DA DB		
Morning Twilight			IA IB DA DB		
Noon			IA IB DA DB		
August 1976					
Evening Twilight			IA IB DA DB		
Morning Twilight			IA IB DA DB		
Noon			IA IB DA DB		
September 1976					
Evening Twilight			IA IB DA DB		
Morning Twilight			IA IB DA DB		
Noon			IA IB DA DB		

[1] A and B are replicate designations
I is Intake
D is Discharge
P is Plume

TABLE 1 continued.

SAMPLE STATUS[1]

Month and Sample	Not Collected	Lost	Not Yet Counted	Counted But Not Yet Available	Complete
October 1976					
Evening Twilight			IA IB DA DB		
Morning Twilight			IA IB DA DB		
Noon			IA IB DA DB		
November 1976					
Evening Twilight			IA IB DA DB		
Morning Twilight			IA IB DA DB		
Noon			IA IB DA DB		

[1] A and B are replicate designations
I is Intake
D is Discharge
P is Plume

Table 2.

NUMBER OF PHYTOPLANKTON CELLS PER ML IN EACH MAJOR GROUP:

DATE	STATION	COUNTER	COC.B.G.	FIL.B.G.	COC.GRN.	FIL.GRN.	FLAGELL.	CENTRICS	PENNATES	DESMIDS	OTHER	TOTAL
JAN 76	I5A P.M.	D.R.	232.1	9.9	19.9	9.9	33.2	1157.3	868.8	0.0	9.9	2341.2
JAN 76	I5B P.M.	D.R.	26.5	19.9	19.9	9.9	29.8	1717.8	779.3	0.0	0.0	2603.2
JAN 76	DA P.M.	D.R.	265.3	9.9	19.9	0.0	195.7	1150.7	587.0	0.0	16.6	2245.0
JAN 76	DB P.M.	D.R.	99.5	9.9	76.3	19.9	59.7	1472.4	666.5	0.0	13.3	2417.5
JAN 76	I5A A.M.	D.R.	225.5	26.5	19.9	172.4	132.6	2686.1	1545.3	0.0	53.1	4861.4
JAN 76	I5B A.M.	D.R.	0.0	99.5	0.0	19.9	139.3	2467.2	1001.5	0.0	172.4	3899.8
JAN 76	DB A.M.	D.R.	663.2	26.5	59.7	0.0	99.5	2520.3	2520.3	0.0	119.4	6008.8
JAN 76	I5A NOON	D.R.	663.2	3.3	0.0	116.1	149.2	1532.1	719.6	0.0	43.1	3226.6
JAN 76	I5B NOON	D.R.	1459.1	9.9	136.0	0.0	43.1	2629.7	1333.1	0.0	149.2	5760.1
JAN 76	DA NOON	D.R.	192.3	13.3	66.3	0.0	202.3	1280.0	321.7	0.0	79.6	2155.5
JAN 76	DB NOON	D.R.	1246.9	13.3	46.4	0.0	122.7	1276.7	560.4	0.0	29.8	3296.2
FEB 76	I5A P.M.	D.R.	344.9	43.1	23.2	0.0	150.9	726.2	502.4	1.7	38.1	1830.5
FEB 76	I5B P.M.	D.R.	868.8	28.2	114.4	0.0	131.0	711.3	449.3	1.7	97.8	2402.5
FEB 76	DA P.M.	D.R.	54.7	13.3	6.6	0.0	247.1	515.7	250.4	0.0	5.0	1092.7
FEB 76	DB P.M.	D.R.	348.2	8.3	13.3	6.6	190.7	572.0	182.4	0.0	16.6	1338.[illegible]
FEB 76	I5A A.M.	D.R.	82.9	1.7	0.0	0.0	364.8	460.9	147.6	0.0	9.9	1067.8
FEB 76	I5B A.M.	S.W.	62.2	9.9	27.4	4.1	58.9	266.9	131.8	0.0	9.1	570.[illegible]
FEB 76	DA A.M.	D.R.	504.1	9.9	13.3	0.0	363.1	515.7	212.2	0.0	13.3	1631.5
FEB 76	DB A.M.	D.R.	0.0	6.6	9.9	0.0	310.1	510.7	132.6	0.0	29.8	999.[illegible]
FEB 76	I5A NOON	D.R.	265.3	9.9	14.9	13.3	371.4	855.6	550.5	0.0	9.9	2090.8
FEB 76	I5B NOON	D.R.	311.7	29.8	19.9	0.0	147.6	452.7	172.4	0.0	64.7	1195.[illegible]
FEB 76	DA NOON	D.R.	121.0	24.9	5.0	0.0	354.8	653.3	255.3	0.0	23.2	1437.5
FEB 76	DB NOON	S.W.	81.2	11.6	106.1	0.0	330.0	474.2	197.3	0.0	39.8	1240.[illegible]
MAR 76	I5A P.M.	D.R.	928.5	9.9	89.5	0.0	278.6	1213.7	477.5	0.0	43.1	3040.9
MAR 76	I5B P.M.	D.R.	1.7	14.9	1.7	16.6	197.3	746.1	179.1	0.0	18.2	1175.6
MAR 76	DA P.M.	D.R.	1160.6	13.3	23.2	66.3	391.3	769.3	189.0	0.0	69.6	2682.7
MAR 76	DB P.M.	D.R.	82.9	11.6	13.3	6.6	132.6	621.8	233.8	0.0	9.9	1112.6
MAR 76	I5A A.M.	D.R.	26.5	16.6	24.9	6.6	266.9	711.3	399.6	0.0	21.6	1474.0
MAR 76	I5B A.M.	D.R.	331.6	9.9	0.0	1.7	333.3	966.7	434.4	0.0	18.2	2095.8
MAR 76	DA A.M.	D.R.	325.0	19.9	8.3	0.0	344.9	880.4	144.3	1.7	49.7	1774.1
MAR 76	DB A.M.	D.R.	339.9	36.5	58.0	58.0	203.9	729.5	447.7	0.0	49.7	1923.4
MAR 76	I5A NOON	D.R.	0.0	3.3	16.6	0.0	404.6	1104.3	679.8	0.0	46.4	2255.3
MAR 76	I5B NOON	D.R.	3.3	8.3	5.0	0.0	154.2	606.9	192.3	3.3	38.1	1011.4
MAR 76	DA NOON	D.R.	331.6	3.3	5.0	24.9	237.1	605.2	271.9	0.0	38.1	1517.1
MAR 76	DB NOON	D.R.	630.1	13.3	29.8	16.6	275.2	732.9	298.5	0.0	76.3	2072.6
APR 76	I5A P.M.	D.R.	0.0	56.4	132.6	0.0	729.5	1210.4	2132.3	6.6	96.2	4364.0
APR 76	I5B P.M.	D.R.	0.0	56.4	36.5	16.6	308.4	1057.8	1273.4	0.0	33.2	2782.2
APR 76	DA P.M.	D.R.	0.0	69.6	66.3	0.0	328.3	1164.0	1993.0	0.0	13.3	3634.5
APR 76	DB P.M.	D.R.	165.8	56.4	39.8	6.6	411.2	931.8	1389.5	0.0	46.4	3047.5
APR 76	I5A A.M.	D.R.	0.0	66.3	82.9	43.1	308.4	822.4	1687.9	3.3	547.2	3561.5
APR 76	I5B A.M.	D.R.	26.5	26.5	0.0	0.0	228.8	961.7	716.3	0.0	16.6	1976.4
APR 76	DA A.M.	D.R.	533.9	56.4	132.6	0.0	281.9	1130.8	1263.4	0.0	106.1	3505.1
APR 76	DB A.M.	D.R.	0.0	53.1	76.3	126.0	334.9	852.2	1207.1	0.0	112.7	2762.3
APR 76	I5A NOON	D.R.	596.9	39.8	29.8	0.0	301.8	669.9	1041.3	0.0	13.3	2692.7
APR 76	I5B NOON	D.R.	0.0	46.4	26.5	0.0	295.1	805.8	1200.4	0.0	16.6	2390.9
APR 76	DA NOON	D.R.	325.0	99.5	16.6	6.6	351.5	839.0	1376.2	0.0	43.1	3057.5
APR 76	DB NOON	D.R.	66.3	68.0	54.7	18.2	326.6	719.6	804.2	0.0	48.1	2105.7
MAY 76	I5A P.M.	D.R.	0.0	368.1	96.2	281.9	908.6	1001.5	590.3	0.0	53.1	3299.5
MAY 76	I5B P.M.	D.R.	0.0	533.9	13.3	16.6	2109.1	948.4	348.2	3.3	338.2	4311.0
MAY 76	DA P.M.	D.R.	348.2	427.8	99.5	13.3	1910.1	875.5	815.8	6.6	106.1	4602.3
MAY 76	DB P.M.	D.R.	0.0	334.9	255.3	119.4	2268.2	1183.9	683.1	0.0	225.5	5070.4
MAY 76	I5A A.M.	S.W.	0.0	321.7	155.9	29.8	2553.4	1011.4	689.8	3.3	89.5	4854.3
MAY 76	I5B A.M.	D.R.	0.0	593.6	169.1	19.9	2079.2	1081.1	533.9	0.0	228.8	4705.6
MAY 76	DA A.M.	S.W.	0.0	646.6	318.3	16.6	557.1	1326.5	656.6	3.3	82.9	3607.9
MAY 76	DB A.M.	D.R.	265.3	809.1	334.9	39.8	1037.9	2148.9	2052.7	3.3	268.6	6960.5
MAY 76	I5A NOON	D.R.	0.0	334.9	59.7	0.0	965.0	1382.8	530.6	0.0	96.2	3369.2
MAY 76	I5B NOON	D.R.	0.0	232.1	86.2	89.5	613.5	1505.5	640.0	0.0	66.3	3233.2
MAY 76	DA NOON	D.R.	0.0	248.7	36.5	0.0	547.2	1187.2	892.0	0.0	169.1	3080.7
MAY 76	DB NOON	D.R.	431.1	636.7	119.4	66.3	696.4	3170.2	1936.6	0.0	86.2	7142.9

Table 3. Comparison of 1975 and 1976 temperatures in intake forebay at time of monthly entrainment samples collection (°C).

Month	1975	1976
January	--[1]	2.2
February	3.9[2]	1.9
March	6.0[2]	3.9
April	4.0	7.4
May	11.4	12.3

[1]Plant not operating at the time of sampling.

[2]Plant in deicing mode of operation.

Table 4. Comparison of 1975 and 1976 Phytoplankton densities and numbers of forms.

	1975[1]				1976[2]			
	Diversity		Number of Forms		Diversity		Number of Forms	
Month	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
February	4.35	.0473	51.1	1.90	4.46	.0591	57.2	1.64
March	4.30	.0544	51.7	1.89	4.34	.0633	59.2	1.59
April	4.21	.0569	48.3	1.38	4.30	.0446	55.8	1.34
May	3.76	.288	47.4	1.78	4.37	.112	60.2	2.84

[1] 9 replicates Feb. and March; 6 replicates in April; 5 replicates in May.

[2] 12 replicates each month.

TABLE 5. MONTHLY RESULTS OF CHLOROPHYLL A AND PHAEOPHYTIN A ANALYSES. AT EACH OF THE STATED TIMES (EST), N1 REPLICATE SAMPLES WERE TAKEN FROM THE INTAKE FOREBAY AND N2 REPLICATE SAMPLES WERE TAKEN FROM THE DISCHARGE FOREBAY. THE RATIO OF THE CONCENTRATIONS OF PHAEOPHYTIN A AND CHLOROPHYLL A WAS COMPUTED FOR EACH SAMPLE; THE MEAN AND STANDARD ERROR OF THE RATIOS IS INCLUDED FOR BOTH THE INTAKE AND DISCHARGE SAMPLES. FOR EACH SAMPLING TIME, THE MEANS WERE COMPARED USING A TWO-SAMPLE T-TEST. A SIGNIFICANT DIFFERENCE BETWEEN THE INTAKE AND DISCHARGE MEANS (P<0.05) IS INDICATED BY A SINGLE STAR (*); SIGNIFICANCE AT THE 0.01 LEVEL IS INDICATED BY TWO STARS (**). INC. IS SHORT FOR INCUBATION TIME IN HOURS AFTER TIME OF COLLECTION; MG/M3 IS MILLIGRAMS PER CUBIC METER.

				CHLOROPHYLL A (MG/M3)		PHAEOPHYTIN A (MG/M3)		PHAEOPHYTIN A/CHLOROPHYLL A RATIO				
DATE	TIME	INC.	N1,N2	INTAKE MEAN	DISCH. MEAN	INTAKE MEAN	DISCH. MEAN	INTAKE MEAN	STD. ERROR	DISCH. MEAN	STD. ERROR	STUDENT'S T
07/12/76	2250	0	3, 3	12.067	12.170	5.143	4.780	0.431	0.054	0.415	0.133	0.109
07/12/76	2250	37	3, 3	11.700	9.900	3.433	4.340	0.297	0.046	0.443	0.129	-1.070
07/13/76	0355	0	2, 3	10.095	10.530	2.280	2.127	0.227	0.069	0.205	0.022	0.378
07/13/76	1235	0	3, 3	7.327	7.087	1.937	1.483	0.264	0.006	0.213	0.040	1.283
08/09/76	2145	0	3, 3	3.223	2.937	0.538	0.533	0.167	0.006	0.183	0.035	-0.456
08/09/76	2145	36	3, 3	3.033	2.187	0.439	0.550	0.144	0.011	0.256	0.045	-2.415
08/10/76	0355	0	3, 3	4.553	3.950	0.405	0.988	0.092	0.046	0.252	0.026	-2.991 *
08/10/76	1205	0	3, 3	4.020	2.980	0.600	0.951	0.154	0.056	0.329	0.093	-1.609
09/22/76	2145	0	3, 3	3.760	3.493	0.088	0.184	0.026	0.026	0.052	0.022	-0.782
09/22/76	2145	38	2, 3	2.585	2.497	0.440	0.574	0.171	0.044	0.247	0.114	-0.506
09/23/76	0610	0	3, 3	4.677	4.220	1.653	2.090	0.355	0.025	0.508	0.119	-1.260
09/23/76	1145	0	3, 2	6.177	5.480	1.873	2.260	0.304	0.029	0.433	0.191	-0.879
10/11/76	2040	0	3, 3	3.397	3.020	0.009	0.188	0.003	0.003	0.067	0.036	-1.812
10/11/76	2040	38	3, 3	2.923	2.793	0.024	0.050	0.009	0.009	0.025	0.025	-0.608
10/12/76	0630	0	3, 3	3.877	3.097	0.009	0.033	0.003	0.003	0.009	0.009	-0.694
10/12/76	1220	0	3, 3	3.910	3.860	0.348	0.274	0.091	0.046	0.069	0.021	0.424
11/08/76	1900	0	3, 3	3.337	3.257	0.714	0.530	0.214	0.023	0.166	0.033	1.201
11/08/76	1900	41	3, 3	3.037	2.603	0.278	0.825	0.091	0.036	0.322	0.047	-3.872 *
11/09/76	0810	0	3, 3	3.173	2.790	0.215	0.304	0.073	0.060	0.111	0.046	-0.498
11/09/76	1310	0	3, 3	3.063	4.003	0.703	0.182	0.231	0.047	0.045	0.016	3.761 *

Table 6. Sonification versus grinding for sample preparation (July 1976)

Variable	Control[1]		Ground[2]		Sonified[3]		Student's *t*[4]
	Mean	Standard Error	Mean	Standard Error	Mean	Standard Error	Ground vs. Sonified
Chlorophyll *a*	6.14	0.214	7.37	0.269	6.05	0.160	4.22*
Chlorophyll *b*	0.398	0.0716	0.519	0.0486	0.426	0.0856	0.927
Chlorophyll *c*	1.07	0.144	1.80	0.0876	1.11	0.0393	7.18**
Phaeophytin *a*	2.20	0.460	1.92	0.134	2.10	0.139	-0.932
Chlorophyll *a*/ Phaeophytin *a*	0.364	0.0893	0.263	0.0271	0.349	0.0321	-2.05

[1] Sample extracted in 90 % acetone, 3 replicates

[2] Sample ground and extracted in 90 % acetone, 3 replicates

[3] Sample sonified and extracted in 90 % acetone, 3 replicates

[4] One star (*) is 0.05 level of significance. Two stars (**) is 0.01 level of significance.

Table 7. Grinding versus sonification for sample preparation (November 1976).

Variable	Control[1]		Sonified(45sec)[2]		Sonified & Shaken(45sec)[3]		Sonified(3min)[4]		Ground(3min)[5]		Ground in Ice Bath(3min)[6]		Student's *t*[7]
	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Ground (3min) vs. Sonified (45 sec)
Chlorophyll *a*	2.88	0.143	2.62	0.154	3.45	0.0900	3.07	0.151	3.69	0.102	3.71	0.0100	-5.51**
Chlorophyll *b*	0.0376	0.0242	0.	0.	0.	0.	0.	0.	0.0206	0.0123	0.	0.	-
Chlorophyll *c*	0.494	0.0977	0.484	0.0709	0.590	0.0685	0.455	0.128	0.902	0.100	0.920	0.0385	-3.49**
Phaeophytin *a*	0.977	0.168	1.20	0.241	0.408	0.139	0.406	0.0883	0.632	0.159	0.356	0.0960	1.89
Chlorophyll *a*/Phaeophytin *a*	0.352	0.0684	0.489	0.122	0.120	0.0435	0.130	0.0235	0.176	0.0469	0.0530	0.0141	2.22

[1] 6 replicates
[2] 6 replicates
[3] 2 replicates
[4] 3 replicates
[5] 5 replicates
[6] 2 replicates
[7] One star (*) is 0.05 level of significance. Two stars (**) is 0.01 level of significance.

TABLE 8. Dominant and codominant phytoplankters in the seasonal surveys of 1972 through 1975.

Survey	Species or group	Dominant or codominant occurrences
12 APRIL 1972	*Tabellaria fenestrata* (diatom)	13
	Chlamydomonas sp. (flagellate)	8
	Cyclotella sp. (diatom)	7
	Stephanodiscus sp. (diatom)	6
	Gloeocystis sp. (green alga)	4
16 JULY 1972	*Tabellaria fenestrata* (diatom)	14
	Gloeocystis sp. (green alga)	5
	Chlamydomonas sp. (flagellate)	5
	Fragilaria intermedia (diatom)	4
	Fragilaria capucina (diatom)	4
	Fragilaria crotonensis (diatom)	3
	Dinobryon sp. (flagellate)	3
	Flagellates	2
	Anabaena sp. (blue-green alga)	2
	Glenodinium sp. (flagellate)	1
	Oocystis sp. (green alga)	1
15 OCT 1972	*Melosira granulata* (diatom)	26
	Chroococcus limneticus (blue-green alga)	4
	Flagellates	3
	Chroococcus sp. (blue-green alga)	2
25 APRIL 1973	*Stephanodiscus minutus* (diatom)	21
	Flagellates	12
	Cyclotella sp. (diatom)	5
	Stephanodiscus sp. (diatom)	
	Fragilaria crotonensis (diatom)	1
	Gloeocystis sp. (green alga)	1
	Chlamydomonas sp. (flagellate)	1
	Melosira granulata (diatom)	1
	Tabellaria fenestrata v. *intermedia* (diatom)	1
19 JULY 1973	*Stephanodiscus tenuis* (diatom)	19
	Cyclotella stelligera (diatom)	10
	Melosira granulata v. *angustissima* (diatom)	4
	Chlamydomonas sp. (flagellate)	4
	Cyclotella sp. (diatom)	2
	Cyclotella atomus (diatom)	1
	Anacystis incerta (blue-green alga)	1
	Flagellates	1
	Gloeocystis sp. (green alga)	1
	Coccomyxa coccoides (green alga)	1

TABLE 8. continued

Survey	Species or group	Dominant or codominant occurrences
23 OCT 1973	*Melosira granulata* v. *angustissima* (diatom)	20
	Flagellates	9
	Chlamydomonas sp. (flagellate)	3
	Fragilaria crotonensis (diatom)	2
	Melosira granulata (diatom)	1
20 APRIL 1974	*Fragilaria crotonensis* (diatom)	20
	Flagellates	18
	Stephanodiscus tenuis (diatom)	11
	Synedra filiformis (diatom)	3
	Fragilaria intermedia v. *fallax* (diatom)	1
	Melosira granulata (diatom)	1
	Melosira italica (diatom)	1
	Stephanodiscus minutus (diatom)	1
11 JULY 1974	*Fragilaria crotonensis* (diatom)	27
	Flagellates	21
	Anacystis incerta (blue-green)	2
	Anabaena flos-aquae (blue-green)	1
	Cyclotella stelligera (diatom)	1
	Tabellaria fenestrata v. *intermedia* (diatom)	1
	Thalassiosira pseudonana (diatom)	1
	Stephanodiscus tenuis (diatom)	1
9 OCT 1974	*Anacystis incerta* (blue-green)	22
	Flagellates	21
	Gomphosphaeria lacustris (blue-green)	11
	Anacystis thermalis (blue-green)	3
	Fragilaria crotonensis (diatom)	2
	Asterionella formosa (diatom)	1
	Melosira granulata (diatom)	1
	Stephanodiscus minutus (diatom)	1
	Stephanodiscus tenuis (diatom)	1

TABLE 8. continued

Survey	Species or group	Dominant or codominant occurences
17 APRIL 1975	Flagellates	24
	Stephanodiscus tenuis (diatom)	17
	Fragilaria crotonensis (diatom)	15
	Stephanodiscus minutus (diatom)	8
	Cyclotella stelligera (diatom)	7
	Tabellaria flocculosa (diatom)	3
	Tabellaria fenestrata v. *intermedia* (diatom)	1
	Melosira islandica (diatom)	1
	Anacystis incerta (blue-green)	1
	Fragilaria capucina (diatom)	1
	Fragilaria intermedia (diatom)	1
	Synedra filiformis (diatom)	1
17 JULY 1975	*Gloeocystis* sp. (green alga)	20
	Flagellates	15
	Anabaena flos-aquae (blue-green)	10
	Green coccoid unknown	4
	Fragilaria crotonensis (diatom)	1
	Cyclotella stelligera (diatom)	1
	Gloeocystis planctonica (green alga)	1
17 OCT 1975	*Anacystis incerta* (blue-green)	22
	Gomphosphaeria lacustris (blue-green)	15
	Fragilaria crotonensis (diatom)	9
	Flagellates	5
	Anabaena flos-aquae (blue-green)	1
	Gloeocystis sp. (green alga)	1
	Ochromonas sp. (flagellate)	1
	Synedra filiformis (diatom)	1

TABLE 9. Means, standard errors, and numbers of cases of phytoplankton abundances by seasons, depth zones, and inner or outer station-groups in Cook Plant surveys during preoperational 1972 through 1974 and operational 1975. B-G = blue-greens, Filam. = filamentous. Phytoplankton units are cells per ml. Standard errors are computed only when N = 2 or more.

Zone	Inner, outer	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
					12 APRIL 1972						
0	Inner										
	Mean	1.29	2.71	273.29	1.00	449.43	741.57	609.29	3.14	50.00	2131.71
	S.E	0.97	1.85	91.96	0.58	135.67	300.33	166.25	1.56	18.68	573.39
	N	7	7	7	7	7	7	7	7	7	7
	Outer										
	Mean	2.50	11.00	541.50	7.50	669.00	1784.50	964.00	5.00	117.50	4102.50
	S.E.	1.13	5.49	120.65	5.68	120.15	257.84	117.63	1.69	46.04	184.82
	N	4	4	4	4	4	4	4	4	4	4
1	Inner										
	Mean	0	0	135	2	301	90	378	5	19	930
	S.E.	---	---	---	---	---	---	---	---	---	---
	N	1	1	1	1	1	1	1	1	1	1
	Outer										
	Mean	1.00	9.00	131.50	1.50	464.00	302.00	638.00	1.00	56.50	1604.50
	S.E.	0.00	3.00	16.50	0.50	96.00	45.00	272.00	1.00	12.50	439.50
	N	2	2	2	2	2	2	2	2	2	2

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
2 Inner										
Mean	0.50	5.00	89.50	3.50	246.00	99.50	423.00	3.50	26.50	897.00
S.E.	0.50	0.00	29.50	1.50	10.00	19.50	42.00	1.50	3.50	102.00
N	2	2	2	2	2	2	22	2	2	2
Outer										
Mean	0.00	6.00	111.50	2.50	428.00	316.00	642.00	1.00	48.50	1556.00
S.E.	0.00	4.00	38.50	0.50	28.00	89.50	80.00	0.00	9.50	25.00
N	2	2	2	2	2	2	2	2	2	2
16 JULY 1972										
0 Inner										
Mean	0.38	71.25	73.75	3.25	188.25	24.88	288.63	0.63	22.25	673.25
S.E.	0.26	25.64	24.85	1.13	75.48	10.68	110.63	0.50	12.83	225.10
N	8	8	8	8	8	8	8	8	8	8
Outer										
Mean	0.11	31.89	42.44	0.89	98.67	15.44	240.11	0.00	4.56	434.11
S.E.	0.11	11.42	31.12	0.42	38.76	4.24	79.92	0.00	1.36	124.08
N	9	9	9	9	9	9	9	9	9	9

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel- lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
				(16 JULY 1972 cont.)						
1 Inner										
Mean	0.00	18.67	33.33	2.00	39.67	9.00	128.33	0.00	7.00	238.00
S.E.	0.00	4.49	26.84	1.15	12.24	1.53	28.76	0.00	6.03	68.42
N	3	3	3	3	3	3	3	3	3	3
Outer										
Mean	0.00	26.00	107.00	2.00	56.75	7.00	87.00	0.00	11.75	297.50
S.E.	0.00	7.56	105.34	1.08	23.16	4.06	45.46	0.00	6.25	186.92
N	4	4	4	4	4	4	4	4	4	4
2 Inner										
Mean	0.00	4.50	32.50	0.50	28.50	8.00	19.50	0.50	3.50	97.50
S.E.	0.00	1.50	26.50	0.50	15.50	1.00	11.50	0.50	2.50	33.50
N	2	2	2	2	2	2	2	2	2	2
Outer										
Mean	0.00	24.75	14.75	0.00	90.75	15.25	54.25	0.25	14.25	214.25
S.E.	0.00	20.90	8.25	0.00	30.00	6.89	41.33	0.25	11.92	72.44
N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
15 OCTOBER 1972										
0 Inner										
Mean	46.38	13.63	103.00	0.50	223.13	1561.50	505.13	2.50	43.00	2498.75
S.E.	10.31	4.23	11.52	0.50	69.32	326.45	81.88	0.60	7.69	374.37
N	8	8	8	8	8	8	8	8	8	8
0 Outer										
Mean	67.60	29.70	139.20	1.10	303.00	2026.90	561.90	2.10	59.70	3191.20
S.E.	12.12	12.64	29.29	0.72	49.93	529.71	184.77	0.64	12.68	750.80
N	10	10	10	10	10	10	10	10	10	10
1 Inner										
Mean	104.00	2.33	67.00	0.67	297.33	635.67	342.67	0.67	35.67	1486.00
S.E.	27.05	1.85	3.79	0.33	52.25	195.33	104.25	0.66	10.84	331.12
N	3	3	3	3	3	3	3	3	3	3
Outer										
Mean	104.00	4.25	55.25	0.75	312.75	578.75	318.00	0.00	33.00	1406.75
S.E.	21.96	1.38	10.16	0.48	67.87	129.41	78.35	0.00	10.75	134.49
N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
2 Inner										
Mean	143.50	2.50	59.00	0.00	226.00	436.50	290.50	0.00	8.00	1166.00
S.E.	23.50	0.50	31.00	0.00	15.00	32.50	126.50	0.00	6.00	130.00
N	2	2	2	2	2	2	2	2	2	2
Outer										
Mean	234.00	1.25	37.00	0.50	236.00	69.00	117.75	0.00	17.50	713.00
S.E.	110.65	0.63	6.50	0.50	53.09	17.46	34.20	0.00	2.85	164.01
N 4	4	4	4	4	4	4	4	4	4	4
25 APRIL 1973										
0 Inner										
Mean	4.25	4.00	93.88	1.75	257.38	633.25	347.88	0.25	26.38	1369.00
S.E.	2.71	1.75	32.76	1.11	43.71	76.93	154.13	0.25	7.16	254.24
N	8	8	8	8	8	8	8	8	8	8
Outer										
Mean	0.00	4.38	48.63	1.13	241.75	1003.38	273.38	0.75	7.88	1581.25
S.E.	0.00	2.03	14.47	0.58	50.72	227.64	39.92	0.53	2.59	268.50
N	8	8	8	8	8	8	8	8	8	8

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
						(25 APRIL 1973 cont.)					
1	Inner										
	Mean	0.00	8.67	46.00	2.00	332.67	717.00	152.00	0.00	22.00	1280.33
	S.E.	0.00	4.14	22.52	2.00	109.29	137.62	45.28	0.00	7.77	307.16
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	3.50	4.00	38.50	1.25	328.50	1140.75	308.25	1.00	13.75	1839.50
	S.E.	2.87	2.16	25.01	0.48	87.29	353.54	26.96	0.58	4.01	431.62
	N	4	4	4	4	4	4	4	4	4	4
2	Inner										
	Mean	8.50	8.00	70.50	1.00	287.50	809.00	288.50	0.00	11.50	1484.50
	S.E.	8.50	1.00	18.50	1.00	40.50	256.00	151.50	0.00	5.50	362.50
	N	2	2	2	2	2	2	2	2	2	2
	Outer										
	Mean	0.67	4.00	37.00	0.67	254.67	976.67	328.67	0.00	14.00	1616.33
	S.E.	0.66	2.64	5.86	0.66	37.03	530.48	167.37	0.00	6.03	732.65
	N	3	3	3	3	3	3	3	3	3	3

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel- lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
						19 JULY 1973					
0	Inner										
	Mean	29.43	27.14	158.00	1.43	182.43	2111.00	137.00	0.86	267.43	2914.29
	S.E.	12.92	16.27	48.81	0.75	47.99	619.59	28.09	0.59	95.01	75.40
	N	7	7	7	7	7	7	7	7	7	7
	Outer										
	Mean	27.44	11.11	290.56	3.22	145.11	1784.33	120.22	1.44	134.11	2517.56
	S.E.	9.71	1.96	137.46	1.81	33.67	378.17	30.83	0.84	43.64	542.65
	N	9	9	9	9	9	9	9	9	9	9
1	Inner										
	Mean	47.67	10.33	266.00	2.33	250.67	2720.00	179.00	2.00	231.33	3709.33
	S.E.	24.18	6.01	187.32	1.45	79.10	657.52	21.59	2.00	20.54	684.68
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	39.50	10.50	212.50	3.75	257.50	2458.25	104.75	0.00	51.00	3137.55
	S.E.	12.04	4.48	116.09	2.84	106.69	1261.10	53.96	0.00	24.77	1545.58
	N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoma	Desmids	Other algae	Total
2	Inner										
	Mean	11.50	3.00	39.00	0.00	94.50	307.50	65.50	0.50	28.00	549.50
	S.E.	4.50	1.00	26.00	0.00	70.50	33.50	59.50	0.50	20.00	84.50
	N	2	2	2	2	2	2	2	2	2	2
	Outer										
	Mean	140.50	6.50	92.00	0.00	76.75	305.25	56.25	0.00	6.75	684.00
	S.E.	95.29	1.94	34.77	0.00	12.84	194.73	24.29	0.00	0.48	260.09
	N	4	4	4	4	4	4	4	4	4	4
						23 OCTOBER 1973					
0	Inner										
	Mean	21.00	13.14	63.43	0.57	325.86	1573.14	472.00	1.14	57.29	2527.57
	S.E.	5.11	4.17	37.99	0.57	64.92	196.85	73.00	0.40	22.32	242.67
	N	7	7	7	7	7	7	7	7	7	7
	Outer										
	Mean	32.71	11.43	25.29	0.43	750.29	1272.57	493.14	0.29	76.43	2662.57
	S.E.	4.22	4.05	12.27	0.43	133.43	313.62	140.94	0.29	9.71	414.63
	N	7	7	7	7	7	7	7	7	7	7

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
(23 OCTOBER 1973 cont.)										
1 Inner										
Mean	40.33	11.67	28.00	0.00	528.33	1448.67	319.33	1.33	54.67	2432.33
S.E.	4.66	3.18	2.52	0.00	130.50	454.86	49.09	0.66	18.85	586.54
N	3	3	3	3	3	3	3	3	3	3
Outer										
Mean	27.75	6.50	24.00	0.25	865.75	1103.75	244.00	0.25	40.00	2312.25
S.E.	3.28	1.56	7.29	0.25	254.10	291.02	39.12	0.25	6.21	512.20
N	4	4	4	4	4	4	4	4	4	4
2 Inner										
Mean	30.00	11.50	26.00	0.50	348.00	841.00	207.00	0.00	47.50	1511.50
S.E.	7.00	8.50	0.00	0.50	117.00	718.00	96.00	0.00	7.50	924.50
N	2	2	2	2	2	2	2	2	2	2
Outer										
Mean	30.25	5.00	7.50	0.75	477.75	288.00	148.75	0.75	15.25	974.00
S.E.	3.62	1.23	2.26	0.75	90.90	82.28	36.90	0.75	5.65	50.24
N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
					20 APRIL 1974						
0	Inner										
	Mean	0.67	30.11	28.44	3.67	278.22	740.33	888.00	1.00	5.44	1975.78
	S.E.	0.47	7.89	13.28	1.64	95.61	125.17	113.97	0.58	1.71	236.00
	N	9	9	9	9	9	9	9	9	9	9
	Outer										
	Mean	49.10	29.70	76.50	6.70	294.10	730.60	928.90	0.60	23.50	2141.40
	S.E.	30.15	6.99	26.33	4.67	89.54	138.70	181.89	0.31	8.95	351.03
	N	10	10	10	10	10	10	10	10	10	10
1	Inner										
	Mean	0.00	19.33	74.33	4.33	284.00	836.67	986.33	0.00	10.00	2215.00
	S.E.	0.00	2.60	12.99	3.38	79.19	304.40	252.48	0.00	4.51	567.55
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	0.25	23.50	73.00	0.25	422.25	706.75	810.00	1.00	20.00	2056.75
	S.E.	0.25	4.67	61.70	0.25	181.24	103.89	114.94	1.00	9.96	311.50
	N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
2	Inner										
	Mean	0.00	21.50	208.00	3.00	495.50	528.50	763.50	2.00	44.00	2064.50
	S.E.	0.00	4.50	152.00	1.00	174.50	144.50	197.50	2.00	12.00	654.50
	N	2	2	2	2	2	2	2	2	2	2
	Outer										
	Mean	0.00	11.50	25.00	1.00	219.75	547.75	694.00	0.00	9.75	1508.75
	S.E.	0.00	5.38	16.75	1.00	87.35	122.93	204.39	0.00	4.59	397.50
	N	4	4	4	4	4	4	4	4	4	4
	11 JULY 1974										
0	Inner										
	Mean	23.64	14.36	14.00	14.91	282.55	422.36	946.27	2.36	34.45	1755.27
	S.E.	12.19	6.50	5.23	5.09	61.19	62.63	108.88	0.84	5.86	206.81
	N	11	11	11	11	11	11	11	11	11	11
	Outer										
	Mean	59.33	13.00	47.11	22.11	487.56	381.56	701.67	2.00	76.89	1791.33
	S.E.	39.65	5.31	17.91	6.38	124.52	88.97	168.34	0.76	25.94	334.89
	N	9	9	9	9	9	9	9	9	9	9

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
1 Inner				(11 JULY 1974 cont.)						
Mean	52.33	26.33	66.67	76.33	369.67	265.00	927.00	2.33	41.00	1827.00
S.E.	52.33	12.44	34.46	8.17	167.07	163.61	432.30	0.33	8.72	835.29
N	3	3	3	3	3	3	3	3	3	3
Outer										
Mean	109.00	106.25	48.74	16.50	301.50	159.75	424.25	2.25	56.00	1224.25
S.E.	35.54	84.69	21.43	8.21	62.08	39.74	75.45	0.95	22.53	246.74
N	4	4	4	4	4	4	4	4	4	4
2 Inner										
Mean	0.00	4.00	81.00	6.50	190.00	110.50	319.50	5.50	65.50	781.50
S.E.	0.00	2.00	66.00	4.50	57.00	43.50	29.50	1.50	7.50	192.50
N	2	2	2	2	2	2	2	2	2	2
Outer										
Mean	49.50	30.25	49.00	33.75	290.75	205.75	299.00	2.25	40.25	1001.00
S.E.	11.53	7.86	23.53	14.81	56.84	56.18	84.49	0.95	15.70	200.33
N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel- lates	Centric diatoms	Pennate diatoms	Desmids diatoms	Other algae	Total
					9 OCTOBER 1974						
0	Inner										
	Mean	692.67	6.42	74.33	3.75	316.75	308.08	379.00	0.75	97.83	1879.75
	S.E.	154.15	3.57	15.13	1.92	46.11	33.62	46.94	0.37	28.50	263.36
	N	12	12	12	12	12	12	12	12	12	12
	Outer										
	Mean	385.90	6.20	71.10	5.30	621.50	404.70	380.90	0.90	75.50	1952.10
	S.E.	125.13	4.79	32.18	4.55	309.04	91.64	88.17	0.69	23.61	354.54
	N	10	10	10	10	10	10	10	10	10	10
1	Inner										
	Mean	790.33	0.67	30.67	0.00	369.67	234.00	297.33	0.33	55.67	1778.33
	S.E.	414.78	0.66	4.24	0.00	187.30	57.04	92.14	0.33	18.47	763.63
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	544.50	1.50	121.00	0.00	356.75	204.75	216.50	0.00	28.75	1474.00
	S.E.	174.35	1.50	51.10	0.00	84.36	13.64	77.56	0.00	10.03	333.37
	N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone	Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
2 Inner										
Mean	538.50	1.00	0.00	0.00	174.50	128.50	145.50	0.00	25.50	1014.50
S.E.	70.50	1.00	0.00	0.00	13.50	3.50	49.50	0.00	8.50	117.50
N	2	2	2	2	2	2	2	2	2	2
Outer										
Mean	523.00	14.50	42.50	0.00	257.75	131.75	134.75	0.50	27.50	1132.50
S.E.	205.89	14.50	9.12	0.00	16.62	39.97	43.93	0.50	8.59	220.66
N	4	4	4	4	4	4	4	4	4	4
17 APRIL 1975										
0 Inner										
Mean	19.50	2.25	29.50	0.33	206.08	734.67	534.92	0.00	4.00	1531.25
S.E.	10.79	1.30	10.98	0.19	79.99	210.79	176.53	0.00	1.29	477.48
N	12	12	12	12	12	12	12	12	12	12
Outer										
Mean	12.00	0.90	4.50	0.10	38.40	296.30	232.50	0.00	0.90	585.60
S.E.	10.73	0.28	1.40	0.10	7.10	48.51	64.91	0.00	0.28	108.38
N	10	10	10	10	10	10	10	10	10	10

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
					(17 APRIL 1975 cont.)						
1	Inner										
	Mean	4.67	1.67	25.00	5.00	92.00	354.67	248.67	0.00	0.67	732.33
	S.E.	4.66	0.66	20.50	4.51	35.59	202.57	167.60	0.00	0.33	416.33
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	0.75	0.50	4.00	0.00	33.25	90.25	91.50	0.00	0.75	221.00
	S.E.	0.75	0.29	1.78	0.00	7.87	27.72	34.57	0.00	0.48	64.52
	N	4	4	4	4	4	4	4	4	4	4
2	Inner										
	Mean	202.50	11.00	26.50	2.00	398.00	2308.00	939.50	0.00	139.00	4026.50
	S.E.	202.50	4.00	26.50	2.00	33.00	725.00	261.50	0.00	137.00	1334.50
	N	2	2	2	2	2	2	2	2	2	2
	Outer										
	Mean	0.75	0.50	1.25	0.00	41.50	104.00	75.00	0.00	1.50	224.50
	S.E.	0.75	0.29	0.48	0.00	9.42	14.69	31.53	0.00	0.65	42.90
	N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
						17 JULY 1975					
0	Inner										
	Mean	15.25	147.17	301.83	0.25	379.75	34.00	69.08	0.17	13.25	960.75
	S.E.	6.30	40.16	39.76	0.25	118.15	5.10	16.18	0.11	4.21	145.61
	N	12	12	12	12	12	12	12	12	12	12
	Outer										
	Mean	22.78	173.89	366.00	0.11	302.89	47.78	82.33	0.11	26.11	1022.00
	S.E.	9.59	33.52	48.11	0.11	68.68	13.03	25.86	0.11	8.29	141.90
	N	9	9	9	9	9	9	9	9	9	9
1	Inner										
	Mean	38.33	46.33	215.33	0.00	129.00	25.33	79.33	0.00	3.67	537.33
	S.E.	31.42	16.33	43.03	0.00	29.81	7.06	49.36	0.00	2.19	93.03
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	13.25	245.00	317.50	0.00	224.75	70.75	54.75	0.75	14.50	941.25
	S.E.	7.23	41.67	72.51	0.00	49.61	33.75	25.66	0.48	7.08	116.53
	N	4	4	4	4	4	4	4	4	4	4

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel- lates	Centric diatoms	Pannate diatoms	Desmids	Other algae	Total
2	Inner										
	Mean	13.50	70.50	218.50	0.00	151.50	26.50	48.50	0.00	12.50	541.50
	S.E.	4.50	20.50	16.50	0.00	26.50	12.50	13.50	0.00	1.50	35.50
	N	2	2	2	2	2	2	2	2	2	2
	Outer										
	Mean	24.00	120.50	231.25	0.00	192.25	64.00	15.50	0.25	5.50	653.25
	S.E.	8.30	70.44	80.70	0.00	104.62	18.39	7.72	0.25	2.02	206.91
	N	4	4	4	4	4	4	4	4	4	4
17 OCTOBER 1975											
0	Inner										
	Mean	730.58	73.67	67.08	1.00	472.67	137.42	612.83	0.58	28.83	2124.67
	S.E.	173.83	27.64	7.22	0.54	34.18	10.14	70.50	0.19	4.27	305.17
	N	12	12	12	12	12	12	12	12	12	12
	Outer										
	Mean	728.50	28.30	120.50	6.70	457.20	197.50	666.00	0.40	50.60	2255.70
	S.E.	153.26	5.69	21.40	4.65	42.71	26.28	119.17	0.22	13.92	214.19
	N	10	10	10	10	10	10	10	10	10	10

TABLE 9. continued

Zone		Coccoid B-G	Filam. B-G	Coccoid greens	Filam. greens	Flagel-lates	Centric diatoms	Pennate diatoms	Desmids	Other algae	Total
1	Inner					(17 OCTOBER 1975 cont.)					
	Mean	536.33	46.33	52.33	0.00	537.33	104.67	232.33	0.33	26.33	1536.00
	S.E.	41.68	20.28	18.27	0.00	114.40	24.28	59.01	0.33	7.42	273.94
	N	3	3	3	3	3	3	3	3	3	3
	Outer										
	Mean	908.50	156.25	83.00	2.50	823.50	156.50	381.50	1.25	57.00	2570.00
	S.E.	292.49	52.18	13.18	1.19	153.96	25.63	71.18	0.95	14.36	526.09
	N	4	4	4	4	4	4	4	4	4	4
2	Inner										
	Mean	1399.50	169.00	56.00	3.50	811.50	153.00	324.00	0.50	34.00	2951.00
	S.E.	194.50	21.00	11.00	0.50	65.50	1.00	41.00	0.50	15.00	144.00
	N	2	2	2	2	2	2	2	2	2	2
	Outer										
	Mean	766.50	36.00	78.75	0.00	564.75	82.00	159.50	0.00	21.50	1719.00
	S.E.	108.21	18.59	17.11	0.00	148.47	14.53	21.70	0.00	6.84	310.90
	N	4	4	4	4	4	4	4	4	4	4

Appendix B-3

Benthos

Environmental Operating Report - July-December 1976

BENTHOS Samuel C. Mozley

A. Lake Surveys

The Technical Specifications for environmental monitoring at the Cook Plant state that surveys are designed to determine whether the population of benthic animals is significantly different after the existence of a thermal plume and chemical discharges than it was before. This is to be accomplished by three seasonal surveys each year, with four replicates at each of 10 stations shallower than 8 m, and two replicates at each of 20 stations at greater depths, in April, July and October. The stations are divided into three depth ranges, 0-8, 8.1-16, and 16.1-24 m with five stations (inner area) near the plant and five reference stations 3.2-11 km away from the plant (outer area), in each depth range.

Two of the seasonal surveys required by the Technical Specifications occurred in the July-December 1976 reporting period. All replicate samples have been collected at all stations except SDC-7-4 in July 1976. Sediment conditions prevented the collection of adequate grab samples there despite repeated attempts and small shifts in the position of the research ship near the station. All replicate samples have been collected at all stations except SDC-7-5 in October 1976. Deteriorating weather conditions late in the day of the benthic animal survey drove the research ship into port, and attempts to arrange collection of the two missing replicate samples from this station later in the month and early in November were thwarted by bad weather or prior commitments of the research ship. Therefore no data were obtained for the two stations on these surveys. The next available substitutes are data collected in August 1976 at SDC-7-4 and in September 1976 at SDC-7-5, but these data will be used only when essential to the final analysis of plant effects, and are not reported here. The points on the figures representing the outer area of zone 2 in July and October 1976 are each based on only four stations rather than the required five. All samples collected on the two surveys have been sorted and benthos identified to major taxa.

Numerical data for benthic animal surveys of July and October 1976 are given in Tables 1 and 2. The group means from these tables have been used to update the inner-outer comparison graphs for five major taxa and total animals by depth zones (Figures 1-17).

With the October survey, a full two years of postoperational benthic monitoring have been completed at the Cook Plant and data are therefore sufficient for a preliminary statistical test for plant effects using zone mean densities of the major taxa of benthic animals. The design for this test is a simple, two-sample *t*-test based on the six means from zones and areas for each survey and the faunal parameters illustrated in Figures 1-17. The means were transformed by the equation

$$y = \log_{10} x,$$

or if one or more of the means in a set was 0, then for all means in that set

$$y = \log_{10}(x + 1).$$

Transformed values for outer areas of each zone were subtracted from corresponding values for the inner areas, providing the equivalent of the logarithm of the ratio of inner to outer means. This logarithmic ratio was determined for each taxon in each depth zone (0, 1 and 2) on each seasonal survey from April 1971 to October 1976 (Tables 3-8). The four preoperational ratios for a given season (1971, 1972, 1973 and 1974) were compared with the two postoperational ratios (1975, 1976) by the *t*-test. There were four degrees of freedom for the tests on spring and summer surveys, but missing data in November 1971 reduced the degrees of freedom for autumn tests to three. Significance of the differences between the two sets of ratios were tested at the .05 level. Of 54 tests (3 depth zones x 3 seasonal surveys x 6 animal taxa), 2 yielded *t*-values with a probability of less than .05: Chironomidae in autumn surveys in zone 2 (Table 7), and *Pontoporeia* in spring surveys in zone 2 (Table 3).

Pontoporeia populations as estimated by spring surveys were consistently less dense in the inner area of zone 2 than in the outer area throughout the preoperational period (Figure 3). However, in spring of the two postoperational years, and especially in April 1975, the inner area had denser populations. A significant decrease in the inner-outer ratio of population densities of this important fish-food organism would be cause for concern; the significant increase evident in present data is not.

Chironomidae populations as estimated by autumn surveys tended to be slightly less dense in the inner area of zone 2 than in the outer area before the plant began operating. The logarithmic ratios were near or less than one (Figure 14). In both postoperational years, the mean density of Chironomidae was much greater in the inner than the outer area. Data on the species composition of Chironomidae in zone 2 are not yet available for postoperational surveys, so no interpretation of the change in inner-outer ratios can be constructed at this time. It can only be said that the change in no way indicates inhibitory effects on this taxon as a whole in the vicinity of the Cook Plant.

In the benthos section of the January-June 1976 Environmental Operating Report, attention was drawn to an apparently early reproduction by *Pontoporeia* in the inner area of zone 2. Subsequent surveys in July and October 1976 have evidenced no corresponding decreases or increases in the inner-outer population ratios (Table 3), and therefore no adverse effects of the early reproduction, if indeed it was not an artifact of the sampling procedure, could be detected.

Low densities of *Pisidium* in the inner area of zone 0 was another apparent change noted in the January-June 1976 Environmental Operating Report. The more thorough, but still preliminary tests of inner-outer ratios reported here suggest that no changes have occurred in *Pisidium* species taken as a group which can be attributed to plant effects (Table 5).

B. Entrainment Studies

The Technical Specifications require simply that samples which are taken to estimate the entrainment of fish larvae and fish eggs be "inspected" for benthos. Samples are to be taken in the intake and in the discharge forebays twice monthly during each of three consecutive, 8-hour periods except in June, July and August, when such sample sets are to be collected four times monthly. We have been collecting four, instead of three samples at each location in the periods sunset-midnight, midnight-sunrise, sunrise-noon, and noon-sunset on each sampling date. Also, two replicate samples are taken in the intake forebay each time instead of one.

The main interest in these samples is whether they show entrainment of large quantities of important fish-food organisms, which are presumably killed in the plant's cooling system. In particular, we have been monitoring entrained densities of the larger benthic crustaceans because of their known value to many species of fish. Densities of the four different genera are tabulated for each quarter-day period on each sampling date for the discharge and the mean of the two intake samples. No suitable definition of a significant impact has been developed in terms of entrained densities, but the reported data permit calculation of estimates of the number of animals entrained for comparison with other sources of data.

All required samples of entrained benthos have been collected in the present reporting period. Samples from two of the four dates in both July and August have not yet been sorted for benthos due to an oversight. These samples will be processed and reported in the next Environmental Operating Report. Data from two sampling dates in each month are given for the four taxa of macrocrustaceans in Tables 9-12.

Densities of *Pontoporeia* were generally low during the latter half of 1976, exceeding .1/m^3 four times in single, quarter-day samples (Table 9). Densities were usually lower than those recorded in the corresponding months of 1975. Similarly, densities of *Mysis relicta* were lower than in last year's samples, and never exceeded .03/m^3 (Table 10). *Gammarus* densities were similar to or slightly lower than those of *Pontoporeia* (Table 11). A few specimens were collected in each month but densities never went above .1/m^3. *Asellus* was rare in entrainment samples, occurring in five of six months but at densities always below .03/m^3 (Table 12). Since entrained densities remained at or below 1975 levels, there was no indication of any increase in the rate of removal of these organisms from the lake. No changes were observed in lake populations of *Pontoporeia* which might suggest loss by entrainment. The other genera have not been collected effectively by our lake survey techniques, so no assessment of the effects of entrainment on lake populations is possible.

Sampling of crayfish is not required by the Technical Specifications, but we have been maintaining records of the kinds, numbers and weight of crayfish impinged on the travelling screens at the Cook Plant as an adjunct to the collection of data on impinged fish. As stated in earlier reports, all evidence indicates that impinged crayfish originate from dense populations on the apron of crushed rock which was installed around discharge and intake structures in the lake to protect the bottom from erosion. Natural populations in this area of smooth, sandy bottom appear to be very small from fish trawling records. Consequently, impingement of sometimes seemingly large quantities of crayfish is not considered to be a negative impact on the ecology of the lake.

Data on impinged crayfish in January-June 1976 were not reported in the corresponding Environmental Operating Report, but appear here for the first time. Crayfish from May, and probably some of the samples from the second half of April, could not be located, and it is assumed they were discarded by technical personnel due to a misunderstanding. Samples from November and December have not been processed yet. Note that the sampling schedule changed from continuous to one 24-hour period approximately every four days in March 1976.

Data on impinged crayfish are given in Table 13. All specimens collected in 1976 have been *Orconectes propinquus*. In order to estimate total impingement, the numbers and weights from samples (column A, Table 13) were multiplied by the number of days in each semi-monthly period, then divided by the number of 24-hour samples for which impinged crayfish were processed in the corresponding period (column B). Approximately 75% of the year 1976 is represented by these data, and the totals for the year can be approximated by multiplying the totals in Table 13 by 1.33: 20,540 and 119.53 kg. Considering the roughness of the approximation, the estimated weight agrees well with the estimate for 1975, 90 kg. No major change in the amount of impinged crayfish occurred between 1975 and 1976.

TABLE 1. Mean density (number per square meter) of major benthic taxa in each zone in July, 1976. The standard error (S.E.) is given in each case. The number (N) of inner stations and outer stations in each zone for which data were available is given in parentheses following the Total Animals entry.

Taxon	Region	Zone 0 (0-8 m) Mean	S.E.		Zone 1 (8-16 m) Mean	S.E.		Zone 2 (16-24 m) Mean	S.E.	
Pontoporeia	Inner	36.4	14.0		3103.	660.		3121.	659.	
affinis	Outer	24.3	17.0		2115.	605.		4303.	1962.	
Tubificidae	Inner	30.3	14.4		600.	274.		4812.	2688.	
	Outer	51.5	24.2		1970.	1014.		1167.	587.	
Naididae	Inner	191.	114.		1170.	244.		176.	42.1	
	Outer	324.	149.		1030.	322.		68.3	39.9	
Stylodrilus	Inner	9.10	6.05		6.06	6.06		830.	560.	
heringianus	Outer	0.	0.		115.	36.2		1674.	935.	
Sphaerium	Inner	0.	0.		0.	0.		84.7	44.2	
nitidum	Outer	0.	0.		6.06	6.06		917.	876.	
Sphaerium	Inner	0.	0.		12.7	7.18		6.06	6.06	
striatinum	Outer	3.04	3.04		18.2	12.1		7.58	7.58	
Pisidium spp.	Inner	6.06	6.06		230.	158.		564.	226.	
	Outer	12.1	8.83		327.	113.		1023.	623.	
Chironomidae	Inner	1682.	279.		376.	44.6		291.	43.4	
	Outer	1185.	101.		460.	99.2		174.	70.5	
Hirudinea	Inner	0.	0.		0.	0.		36.5	20.4	
	Outer	3.04	3.04		6.06	6.06		0.	0.	
Operculata	Inner	0.	0.		30.3	16.6		6.06	6.06	
	Outer	12.1	5.66		54.5	41.0		0.	0.	
Pulmonata	Inner	0.	0.		0.	0.		0.	0.	
	Outer	0.	0.		0.	0.		0.	0.	
Other	Inner	3.04	3.04		48.5	12.1		72.7	34.0	
	Outer	3.04	3.04		36.4	17.6		37.9	14.5	
Total Animals	Inner	1957.	263.	(5)	5575.	846.	(5)	9999.	4051.	(5)
	Outer	1618.	203.	(5)	6139.	1919.	(5)	9371.	4633.	(4)

TABLE 2. Mean density (number per square meter) of major benthic taxa in each zone in October, 1976. The standard error (S.E.) is given in each case. The number (N) of inner stations and outer stations in each zone for which data were available is given in parentheses following the Total Animals entry.

Taxon	Region	Zone 0 (0-8 m) Mean	S.E.	Zone 1 (8-16 m) Mean	S.E.	Zone 2 (16-24 m) Mean	S.E.
Pontoporeia affinis	Inner	12.1	5.66	236.	45.3	1151.	399.
	Outer	6.06	6.06	558.	142.	1659.	633.
Tubificidae	Inner	327.	132.	3551.	1650.	11241.	3596.
	Outer	69.7	36.0	3472.	1661.	1310.	536.
Naididae	Inner	279.	82.7	582.	159.	24.2	17.6
	Outer	270.	121.	164.	112.	22.7	14.5
Stylodrilus heringianus	Inner	0.	0.	18.2	12.1	1333.	536.
	Outer	6.08	3.72	273.	87.7	1417.	701.
Sphaerium nitidum	Inner	0.	0.	0.	0.	327.	182.
	Outer	3.04	3.04	12.1	12.1	258.	193.
Sphaerium striatinum	Inner	0.	0.	12.1	12.1	12.1	12.1
	Outer	0.	0.	12.1	12.1	15.2	15.2
Pisidium spp.	Inner	27.3	16.8	848.	360.	1776.	711.
	Outer	15.2	8.29	776.	404.	1742.	922.
Chironomidae	Inner	1024.	209.	394.	130.	855.	258.
	Outer	906.	160.	661.	329.	182.	32.8
Hirudinea	Inner	0.	0.	0.	0.	72.6	45.4
	Outer	0.	0.	6.06	6.06	15.2	15.2
Operculata	Inner	3.04	3.04	188.	95.9	158.	85.2
	Outer	12.1	8.83	158.	50.1	257.	146.
Pulmonata	Inner	0.	0.	6.06	6.06	85.0	62.0
	Outer	0.	0.	18.2	18.2	144.	73.5
Other	Inner	27.3	12.1	145.	61.6	249.	111.
	Outer	12.1	5.66	103.	46.4	37.9	14.5
Total Animals	Inner	1700.	402. (5)	9981.	2218. (5)	17283.	4005. (5)
	Outer	1300.	298. (5)	6212.	2293. (5)	7060.	2992. (4)

TABLE 3. Logarithms of ratios of inner to outer mean population densities for *Pontoporeia affinis* by year, season and depth zone. The value of Student's t is shown for each season and depth zone. The † sign indicates that the transformation $y = \log(x+1)$ was used. The vertical dotted line indicates the start of plant operation. A star (*) indicates that the ratio was significantly different after the start of plant operation ($p < .05$).

Season	Depth Zone	Year 1971	1972	1973	1974	1975	1976	Student's t
Spring	0	.41	-.28	.49	-.23	-.04	0	.38
	1	-.67	-.06	-.27	-.15	-.20	.11	1.09
	2	-.73	-.77	-.39	-.17	.33	0	2.87*
Summer	0	-.86	-.86	-1.56	-.68	-.39	.17	2.60
	1	.09	.04	.03	-.08	-.20	.16	.33
	2	-.68	-.26	-.10	-.13	-.17	-.14	.68
Fall	0	--	.72†	-.12†	1.12†	.39†	.27†	.51†
	1	--	-.29	-.18	-.28	-.31	-.38	1.82
	2	--	.04	-.07	-.21	-.17	-.16	.91

TABLE 4. Logarithms of ratios of inner to outer mean population densities for *Stylodrilus* (Lumbriculidae) by year, season and depth zone. The value of Student's *t* is shown for each season and depth zone. The † sign indicates that the transformation y = log(x+1) was used. The vertical dotted line indicates the start of plant operation. A star (*) indicates that the ratio was significantly different after the start of plant operation ($p < .05$).

Season	Depth Zone	Year 1971	1972	1973	1974	1975	1976	Student's *t*
Spring	0	.66†	-.28†	.26†	0†	0†	-.89†	1.49†
	1	-1.23	-.38	.70	.16	-1.50	-1.24	1.65
	2	-.87	-.64	-.51	-.56	-.39	-.24	2.58
Summer	0	1.00†	-.93†	-.70†	-.61†	-.68†	1.00†	.56†
	1	.10	-1.41	-.16	-.07	-.99	-1.14	1.42
	2	-.74	-.18	-.02	-.49	-.61	-.30	0.38
Fall	0	--	-.22†	.29†	-.27†	0†	-.85†	.91†
	1	--	-.79	.11	-.56	-.71	-1.18	1.36
	2	--	1.07	.17	-.58	-.51	-.03	.76

TABLE 5. Logarithms of ratios of inner to outer mean population densities for *Pisidium* spp. by year, season and depth zone. The value of Student's t is shown for each season and depth zone. The † sign indicates that the transformation $y = \mathrm{Log}(x+1)$ was used. The vertical dotted line indicates the start of plant operation. A star (*) indicates that the ratio was significantly different after the start of plant operation ($p < .05$).

Season	Depth Zone	Year 1971	1972	1973	1974	1975	1976	Student's t
Spring	0	.36	.36	.84	-.64	-.38	-.74	1.65
	1	.09	.17	-.18	-.02	-.83	-.32	1.01
	2	-.35	-.58	-.44	-.09	-.07	-.61	.11
Summer	0	-1.53†	-.90†	-1.82†	.21†	-.86†	-.27†	.64†
	1	.72	-.64	0	.34	-.21	-.15	.61
	2	-.71	-.43	-.02	.17	-.42	-.26	.31
Fall	0	--	.77†	-.09†	.11†	-.12†	.26†	.53†
	1	--	-.16	.31	.15	-.08	.04	.65
	2	--	.41	-.14	-.71	-.09	.01	-.25

TABLE 6. Logarithms of ratios of inner to outer mean population densities for Tubificidae by year, season and depth zone. The value of Student's t is shown for each season and depth zone. The † sign indicates that the transformation $y = \log(x+1)$ was used. The vertical dotted line indicates the start of plant operation. A star (*) indicates that the ratio was significantly different after the start of plant operation ($p < .05$).

Season	Depth Zone	Year						Student's t
		1971	1972	1973	1974	1975	1976	
Spring	0	.59	.08	.34	-.91	.24	.12	.19
	1	-.04	.45	-.80	.35	-1.02	.24	.66
	2	.12	-.16	-.13	.37	.66	-.06	.87
Summer	0	-.13	-1.22	-.89	.97	-.88	-.23	.31
	1	.12	.18	-.09	-.33	-.30	-.51	2.03
	2	-.06	.05	.30	.26	-.17	.62	.32
Fall	0	—	.52	.12	.56	-.08	.67	.32
	1	—	-.32	.48	.36	-.32	.01	.95
	2	—	.37	.35	-.31	.48	.93	1.70

TABLE 7. Logarithms of ratios of inner to outer mean population densities for Chironomidae by year, season and depth zone. The value of Student's t is shown for each season and depth zone. The † sign indicates that the transformation $y = \log(x+1)$ was used. The vertical dotted line indicates the start of plant operation. A star (*) indicates that the ratio was significantly different after the start of plant operation ($p < .05$).

Season	Depth Zone	Year						Student's
		1971	1972	1973	1974	1975	1976	t
Spring	0	.64	-.04	-.02	-1.07	1.30	.11	1.29
	1	.04	-.29	-.40	-.25	-.62	-.17	.86
	2	.17	-.19	-.17	-.09	.46	.18	2.58
Summer	0	.24	.93	.03	.26	-.06	.16	1.05
	1	.81	.88	-.05	.54	-.04	-.08	1.91
	2	-.08	-.90	.27	.45	-.21	.22	.22
Fall	0	—	-.29	-.24	.34	.09	.05	.51
	1	—	-.75	.23	.22	.14	-.22	.19
	2	—	-.06	-.23	.02	.31	.67	3.53*

TABLE 8. Logarithms of ratios of inner to outer mean population densities for total animals by year, season and depth zone. The value of Student's t is shown for each season and depth zone. The † sign indicates that the transformation $y = \log(x+1)$ was used. The vertical dotted line indicates the start of plant operation. A star (*) indicates that the ratio was significantly different after the start of plant operation ($p < .05$).

Season	Depth Zone	Year 1971	1972	1973	1974	1975	1976	Student's t
Spring	0	.61	0	.39	-1.05	.16	0	.17
	1	-.12	.49	-.64	.11	-.48	.15	.31
	2	-.42	-.47	-.27	.04	.25	-.20	1.38
Summer	0	.15	-.10	-.16	.27	-.65	.08	1.20
	1	.21	.13	-.05	-.02	-.23	-.04	1.85
	2	-.44	-.14	.07	.12	-.11	.03	.29
Fall	0	—	.29	-.06	.37	-.09	.12	.99
	1	—	-.30	.40	.25	-.28	.21	.46
	2	—	.21	.11	-.38	.09	.39	-1.00

TABLE 9. Benthos entrainment data, July-December 1976: *Pontoporeia affinis*, number per m^3. I = intake, D = discharge. Dates in parentheses.

Month	Bay	Period I Midn → Sunr	Period I Sunr → Noon	Period I Noon → Suns	Period I Suns → Midn	Period II Midn → Sunr	Period II Sunr → Noon	Period II Noon → Suns	Period II Suns → Midn
July	(6-7)					(20-21)			
	I	0	.010	.005	.030	.027	.008	0	.069
	D	.026	0	0	.092	0	0	0	0
August	(4-5)					(23-24)			
	I	.009	.008	0	.073	.051	.008	0	.014
	D	.017	0	0	.082	.033	0	0	.021
September	(14-15)					(22-23)			
	I	.038	0	0	.061	.078	0	.014	.101
	D	.028	0	0	.076	.027	.059	0	.053
October	(11-12)					(20-21)			
	I	0	.015	0	.041	.040	.009	.017	.007
	D	0	0	0	.122	.016	.016	0	0
November	(8-9)					(29-30)			
	I	.006	0	0	0	.007	0	.010	0
	D	0	0	0	0	.033	0	0	0
December	(1-2)					(15-16)			
	I	.019	.013	0	.008	.028	0	0	.293
	D	0	0	0	0	.023	.031	0	.127

TABLE 10. Benthos entrainment data, July-December 1976: *Mysis relicta*, number per m^3. I = intake, D = discharge.

		Period I				Period II			
Month	Bay	Midn → Sunr	Sunr → Noon	Noon → Suns	Suns → Midn	Midn → Sunr	Sunr → Noon	Noon → Suns	Suns → Midn
July									
	I	0	0	0	0	0	0	0	0
	D	0	0	0	0	0	0	0	0
August									
	I	0	0	0	0	0	0	0	0
	D	0	0	0	0	0	0	0	0
September									
	I	0	0	0	0	0	0	0	0
	D	0	0	0	0	.014	0	0	0
October									
	I	0	0	0	0	.030	0	.008	0
	D	0	0	0	0	.016	0	0	.014
November									
	I	.018	0	0	0	.007	0	0	.016
	D	.010	0	0	0	0	0	0	0
December									
	I	.007	0	0	0	.007	.014	0	.028
	D	0	0	0	0	0	0	0	0

TABLE 11. Benthos entrainment data, July-December, 1976: *Gammarus* sp., number per m^3. I = intake, D = discharge.

		Period I				Period II			
Month	Bay	Midn → Sunr	Sunr → Noon	Noon → Suns	Suns → Midn	Midn → Sunr	Sunr → Noon	Noon → Suns	Suns → Midn
July									
	I	0	0	0	0	.014	.016	0	.031
	D	0	0	0	0	0	.041	0	.022
August									
	I	0	.016	.008	0	0	0	.008	0
	D	0	.013	.016	0	0	0	0	0
September									
	I	.007	.010	.037	.081	.069	0	.027	.025
	D	.014	.019	.056	0	.027	.059	.042	.079
October									
	I	0	0	.008	0	.016	.028	.008	.076
	D	0	.081	.015	0	.016	0	0	0
November									
	I	.006	.014	0	.007	.022	0	.010	.008
	D	0	0	0	0	0	0	0	.012
December									
	I	0	0	.031	.066	.014	0	.044	.009
	D	.029	0	.016	0	.011	0	.018	0

TABLE 12. Benthos entrainment data, July-December, 1976: Asellus sp., number per m^3. I = intake, D = discharge.

Month	Bay	Period I Midn → Sunr	Period I Sunr → Noon	Period I Noon → Suns	Period I Suns → Midn	Period II Midn → Sunr	Period II Sunr → Noon	Period II Noon → Suns	Period II Suns → Midn
July									
	I	0	0	0	0	0	0	0	0
	D	0	0	0	0	0	0	0	0
August									
	I	0	0	0	0	0	0	.008	.012
	D	.013	0	0	.027	.017	0	0	0
September									
	I	0	0	0	0	0	0	.013	0
	D	0	0	0	0	0	0	0	0
October									
	I	0	0	0	0	.008	0	0	0
	D	.013	0	0	0	.016	0	0	0
November									
	I	0	0	0	0	0	.014	0	0
	D	0	0	0	0	0	.022	0	0
December									
	I	0	0	0	0	0	0	0	.009
	D	0	0	0	0	0	0	0	0

TABLE 13. Numbers and weights of crayfish (Orconectes propinquus) impinged on the travelling screens of the Donald C. Cook nuclear plant in 1976. The number of 24-hour samples processed for crayfish from each period is given in parentheses. A = sampled quantities. B = estimated totals.

Inclusive Dates			A Number	A Weight (kg)	B Number	B Weight (kg)
January	1-16	(16)	37	.21	37	.21
	17-31	(15)	34	.22	34	.22
February	1-15	(15)	34	.20	34	.20
	16-29	(14)	21	.15	21	.15
March	1-16	(4)	28	.22	112	.88
	17-31	(4)	38	.27	143	1.01
April	1-15	(4)	107	.72	401	2.70
	16-30	(3)*	3	.01	15	.05
May	1-16		samples missing			
	17-31		samples missing			
June	1-15	(4)	97	.75	364	2.81
	16-30	(2)	186	1.35	1395	10.13
July	1-16	(4)	296	2.21	1184	8.84
	17-31	(4)	967	5.85	3626	21.94
August	1-16	(4)	893	4.25	3372	17.00
	17-31	(3)	500	2.55	2500	12.75
September	1-15	(4)	356	1.80	1335	6.73
	16-30	(3)	82	.41	410	1.95
October	1-16	(4)	51	.22	204	.88
	17-31	(2)	29	.16	218	1.20
Total, Jan.-Apr., June-Oct. (75 % of year)					15405	89.65

* Partial sample loss suspected.

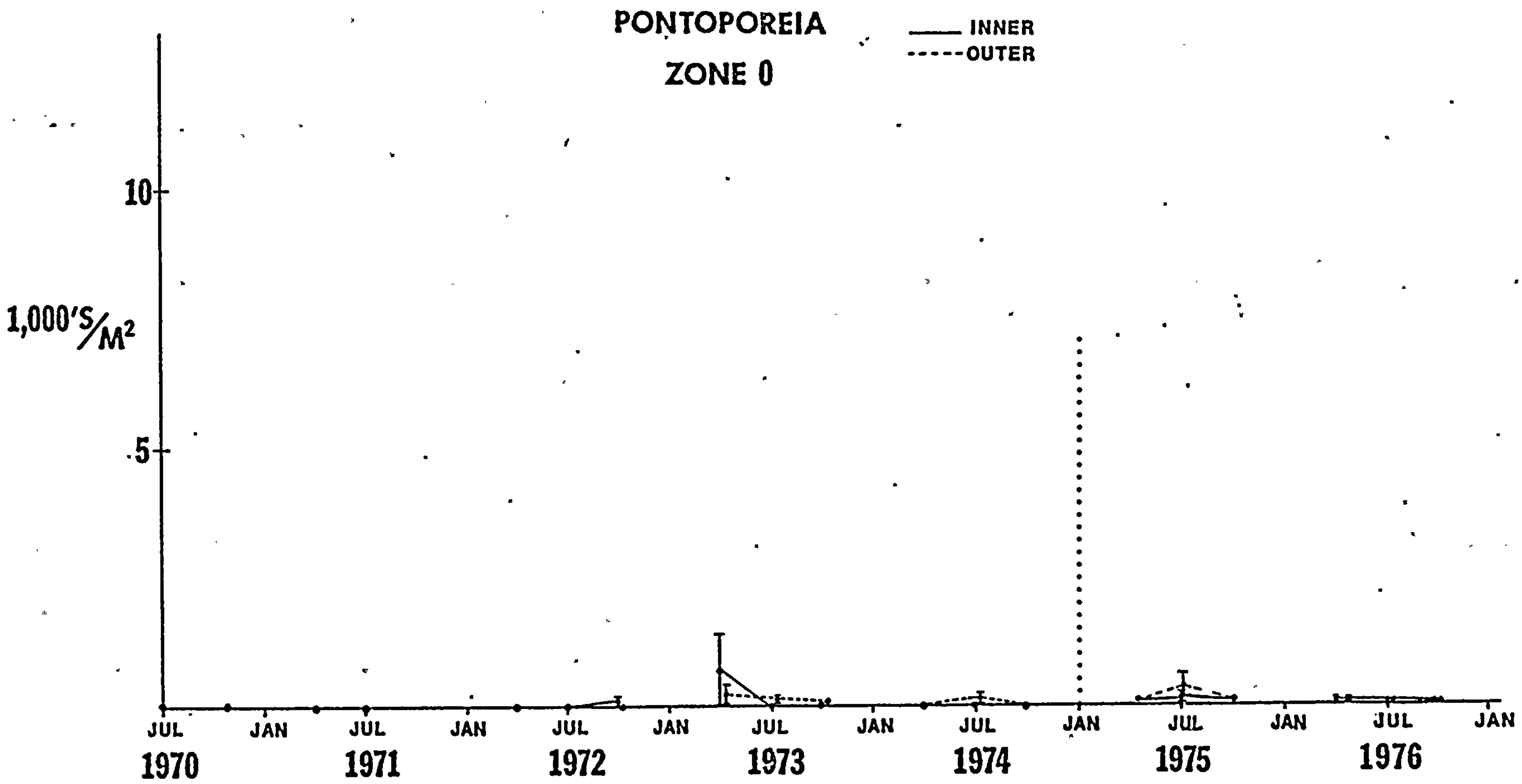

FIGURE 1. Density (animals/m^2) of *Pontoporeia affinis* in the inner and outer sections of depth zone 0 (0–8 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

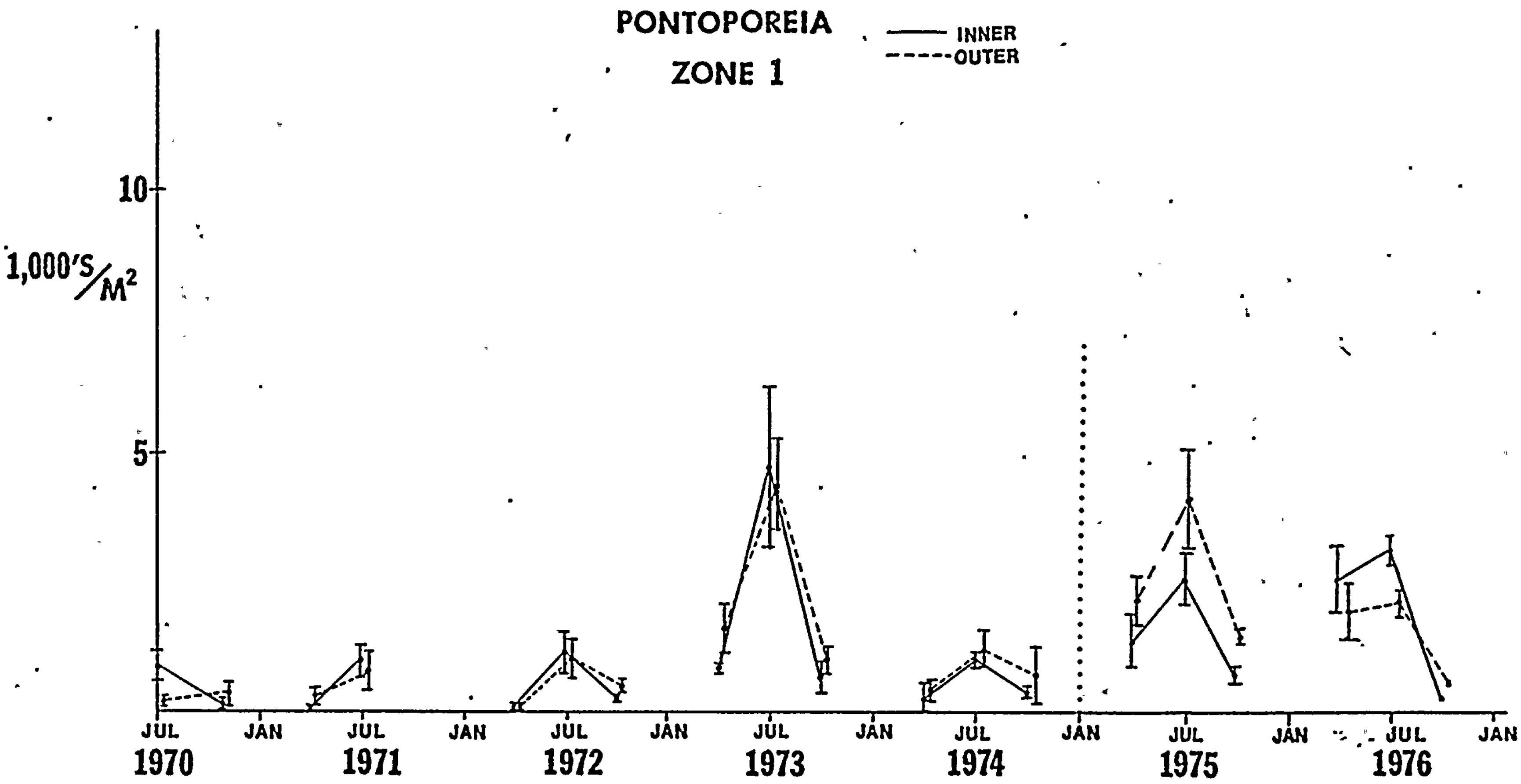

FIGURE 2. Density (animals/m^2) of *Pontoporeia affinis* in the inner and outer sections of depth zone 1 (8-16 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

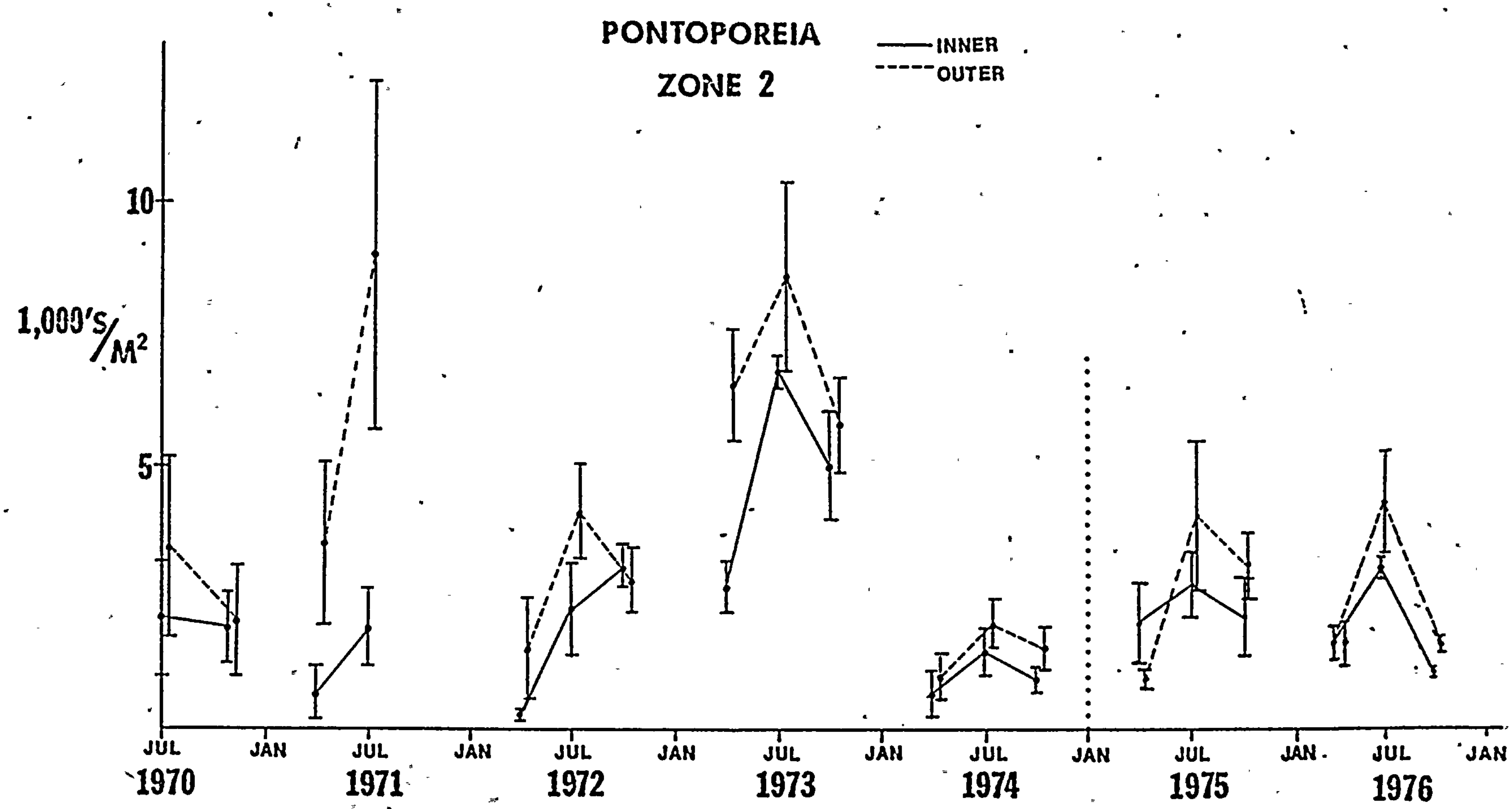

FIGURE 3. Density (animals/m^2) of *Pontoporeia affinis* in the inner and outer sections of depth zone 2 (16–24 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

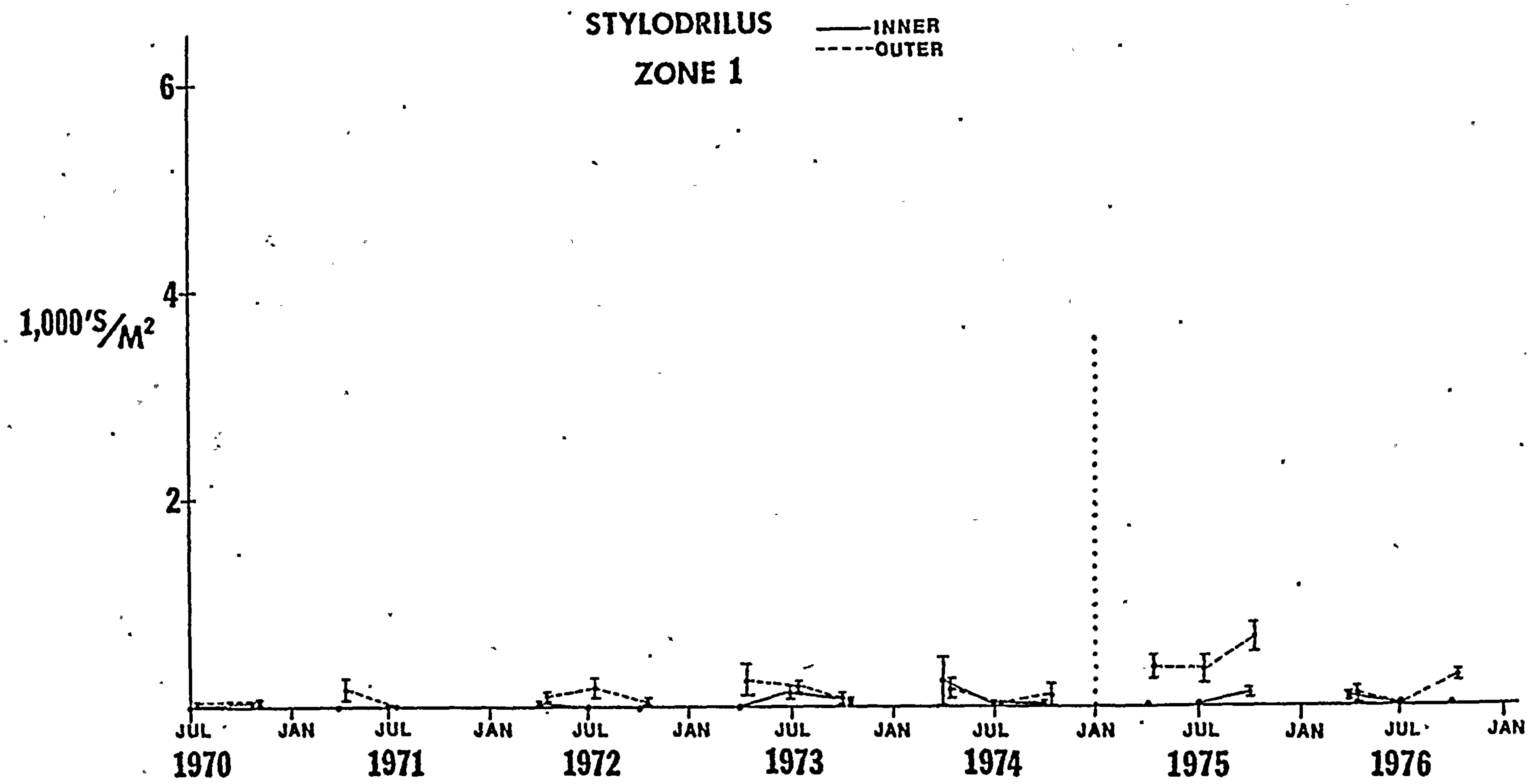

FIGURE 4. Density (animals/m^2) of *Stylodrilus heringianus* in the inner and outer sections of depth zone 1 (8-16 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

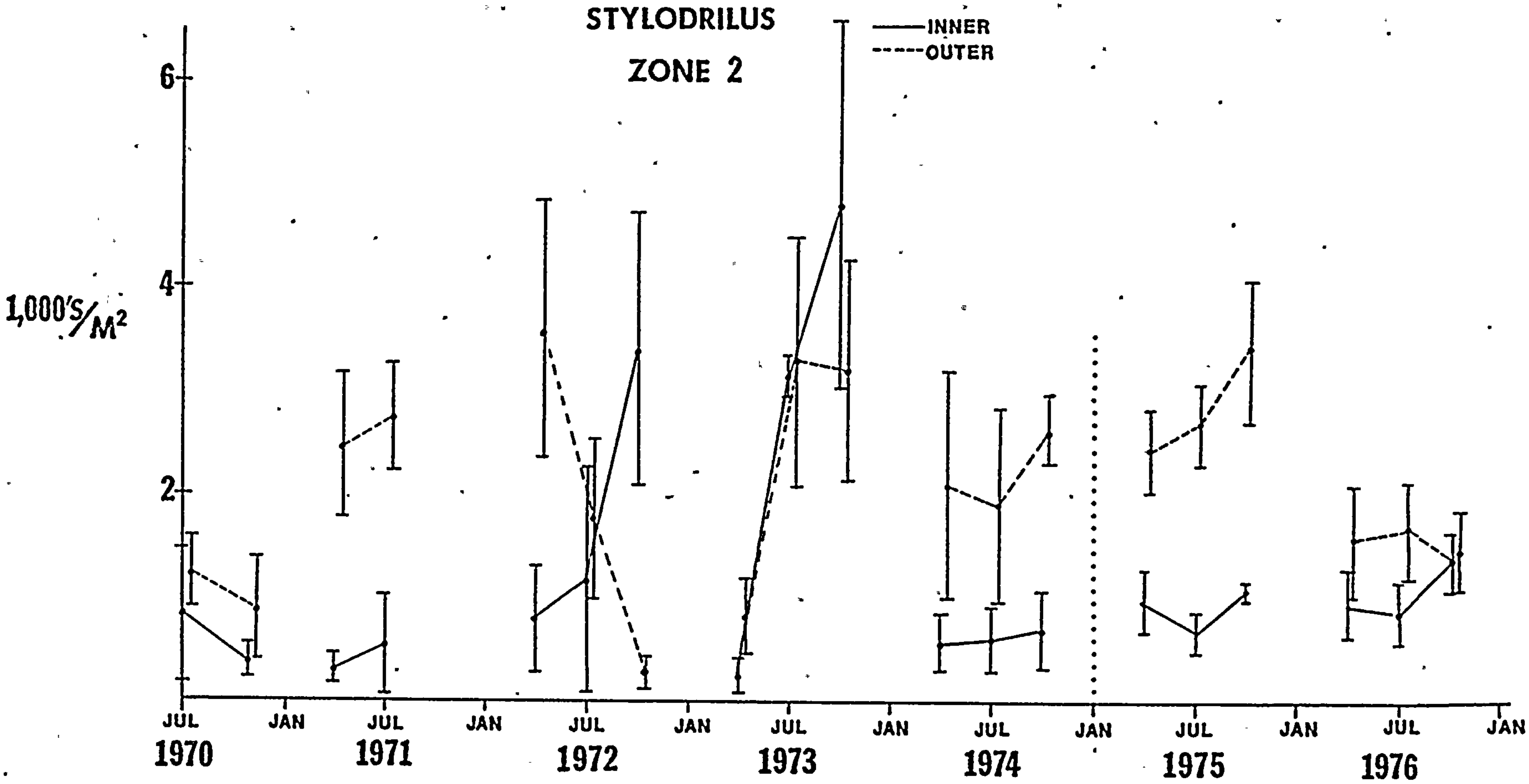

FIGURE 5. Density (animals/m^2) of *Stylodrilus heringianus* in the inner and outer sections of depth zone 2 (16-24 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

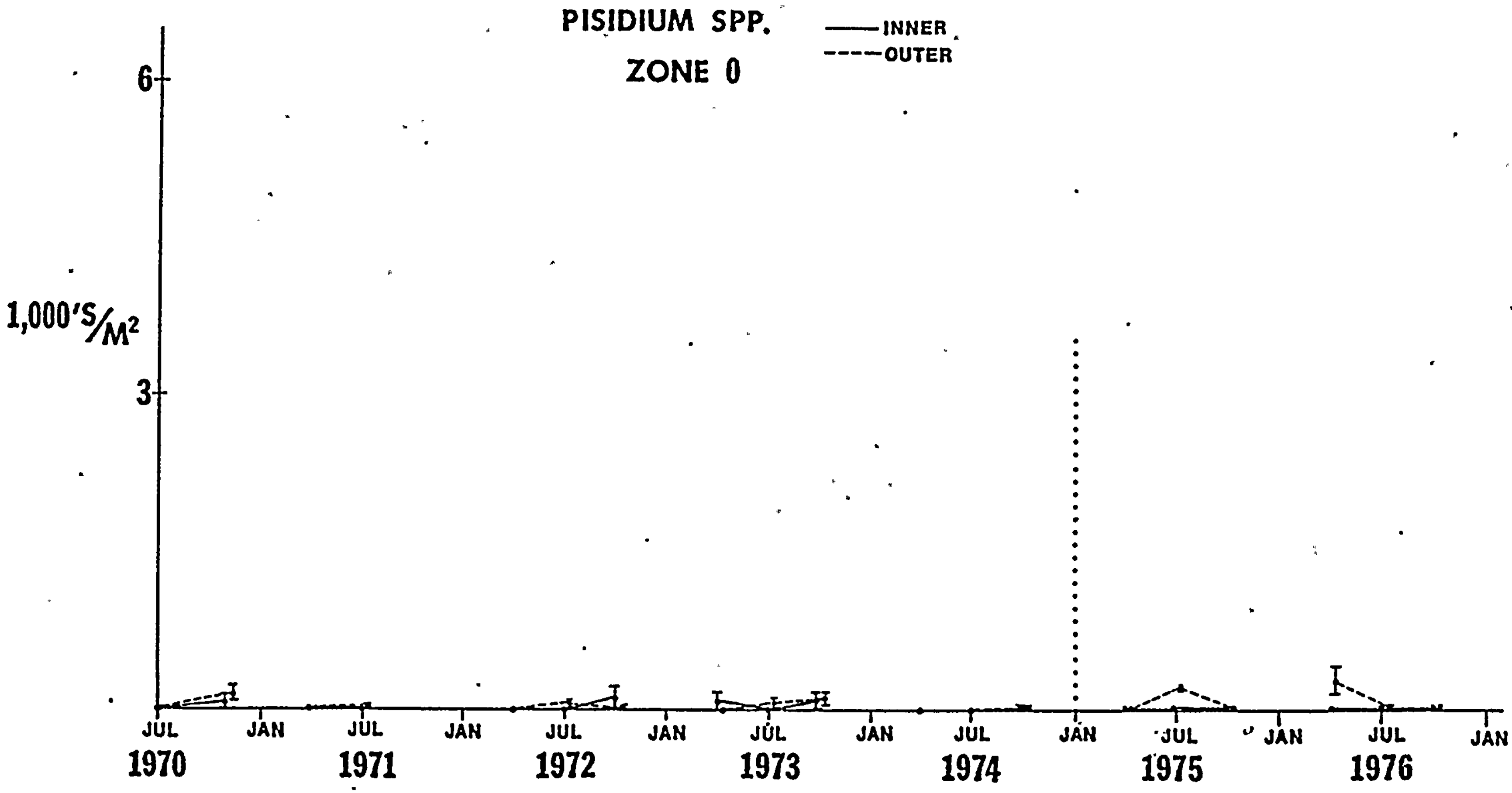

FIGURE 6. Density (animals/m^2) of *Pisidium* spp. in the inner and outer sections of depth zone 0 (0-8 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

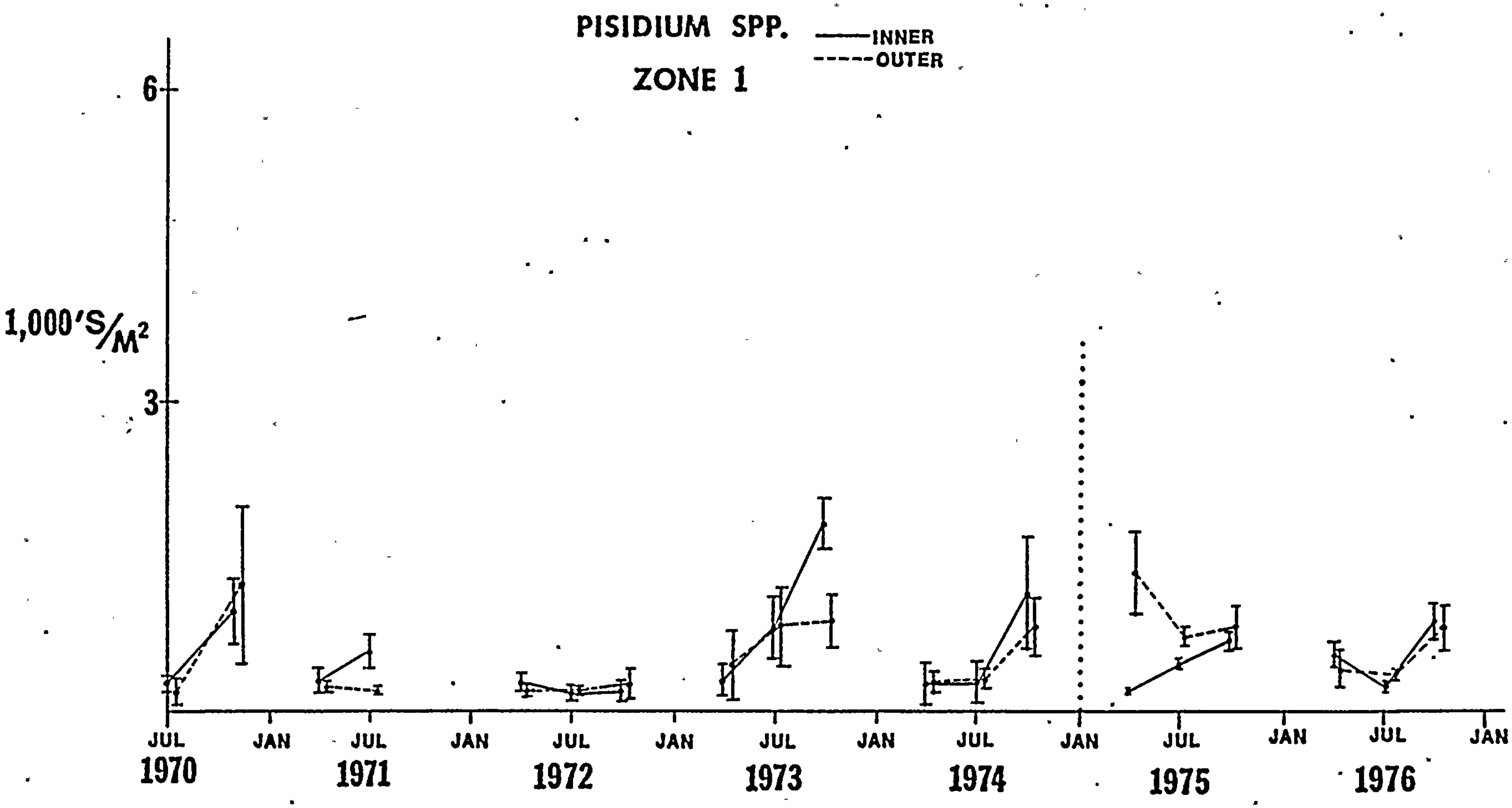

FIGURE 7. Density (animals/m^2) of *Pisidium* spp. in the inner and outer sections of depth zone 1 (8-16 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

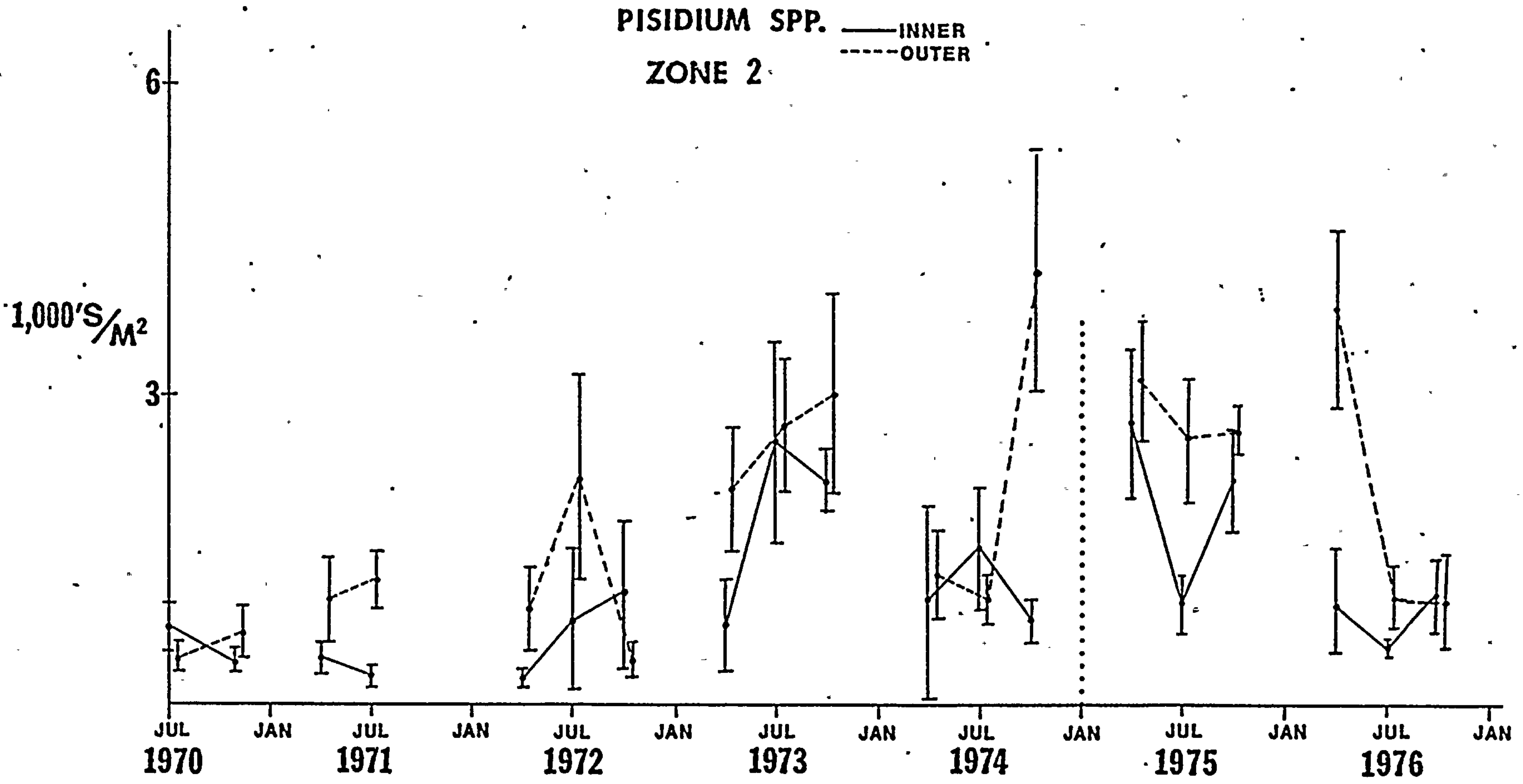

FIGURE 8. Density (animals/m^2) of *Pisidium* spp. in the inner and outer sections of depth zone 2 (16-24 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

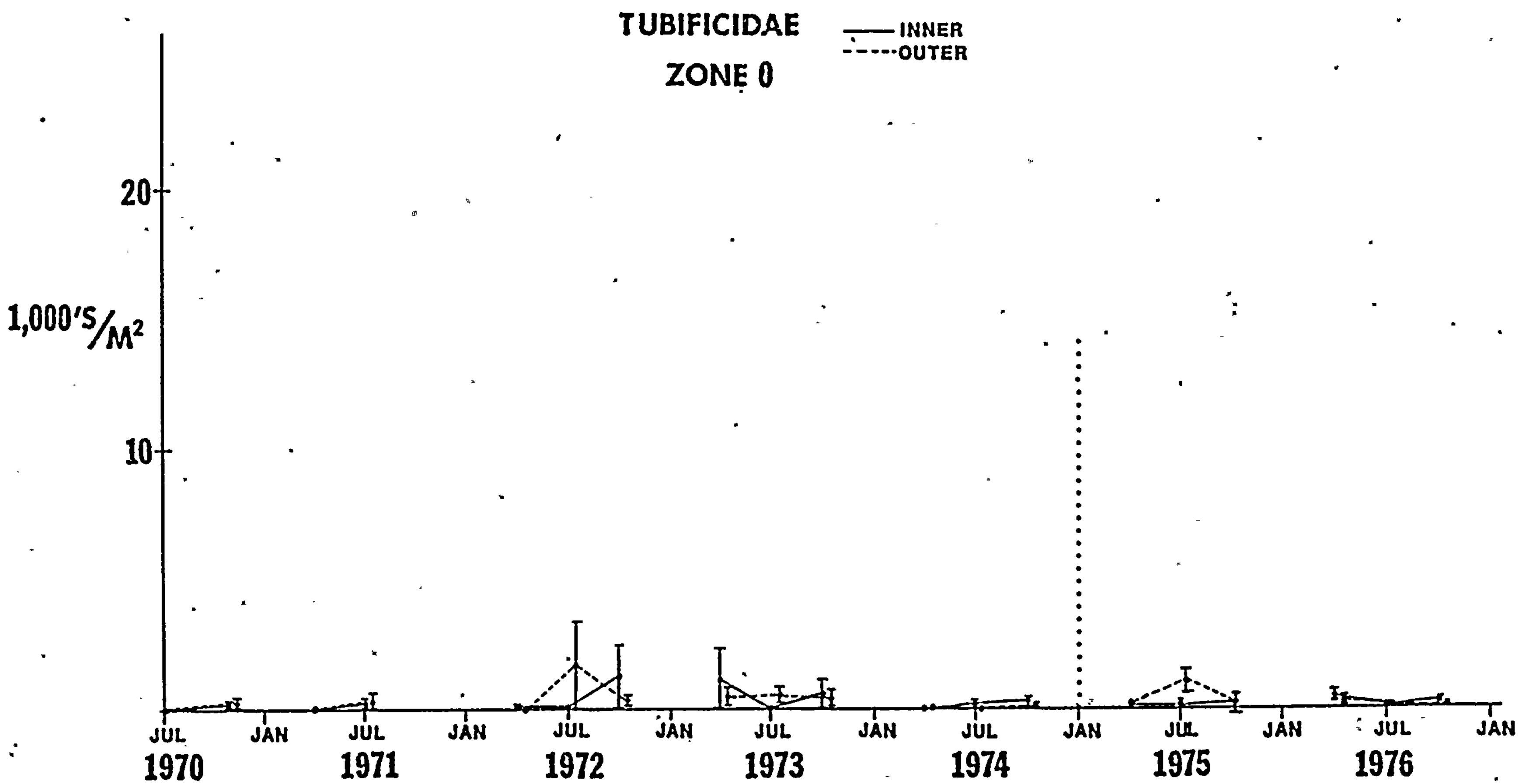

FIGURE 9. Density (animals/m^2) of Tubificidae in the inner and outer sections of depth zone 0 (0-8 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

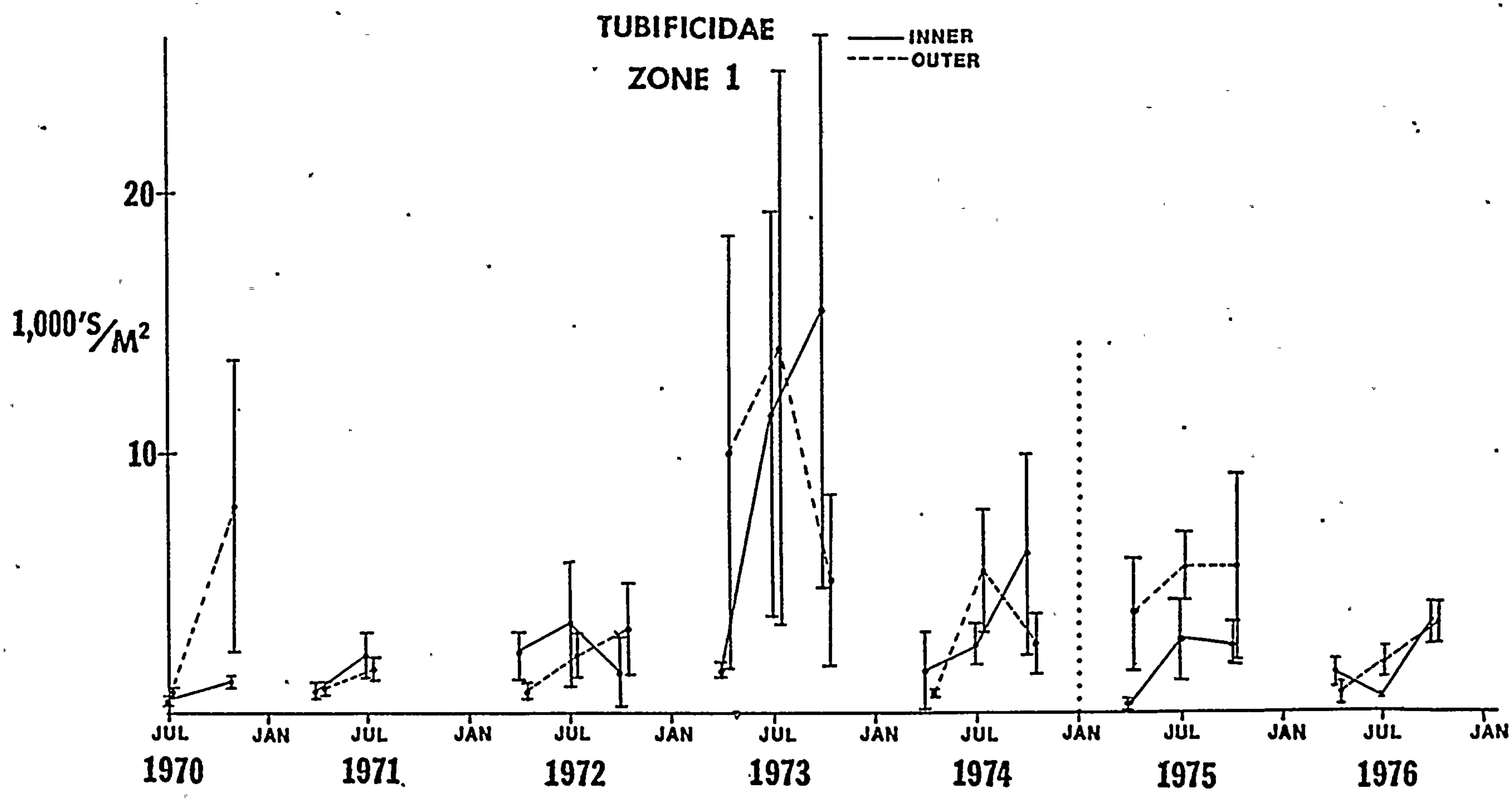

FIGURE 10. Density (animals/m^2) of Tubificidae in the inner and outer sections of depth zone 1 (8-16 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

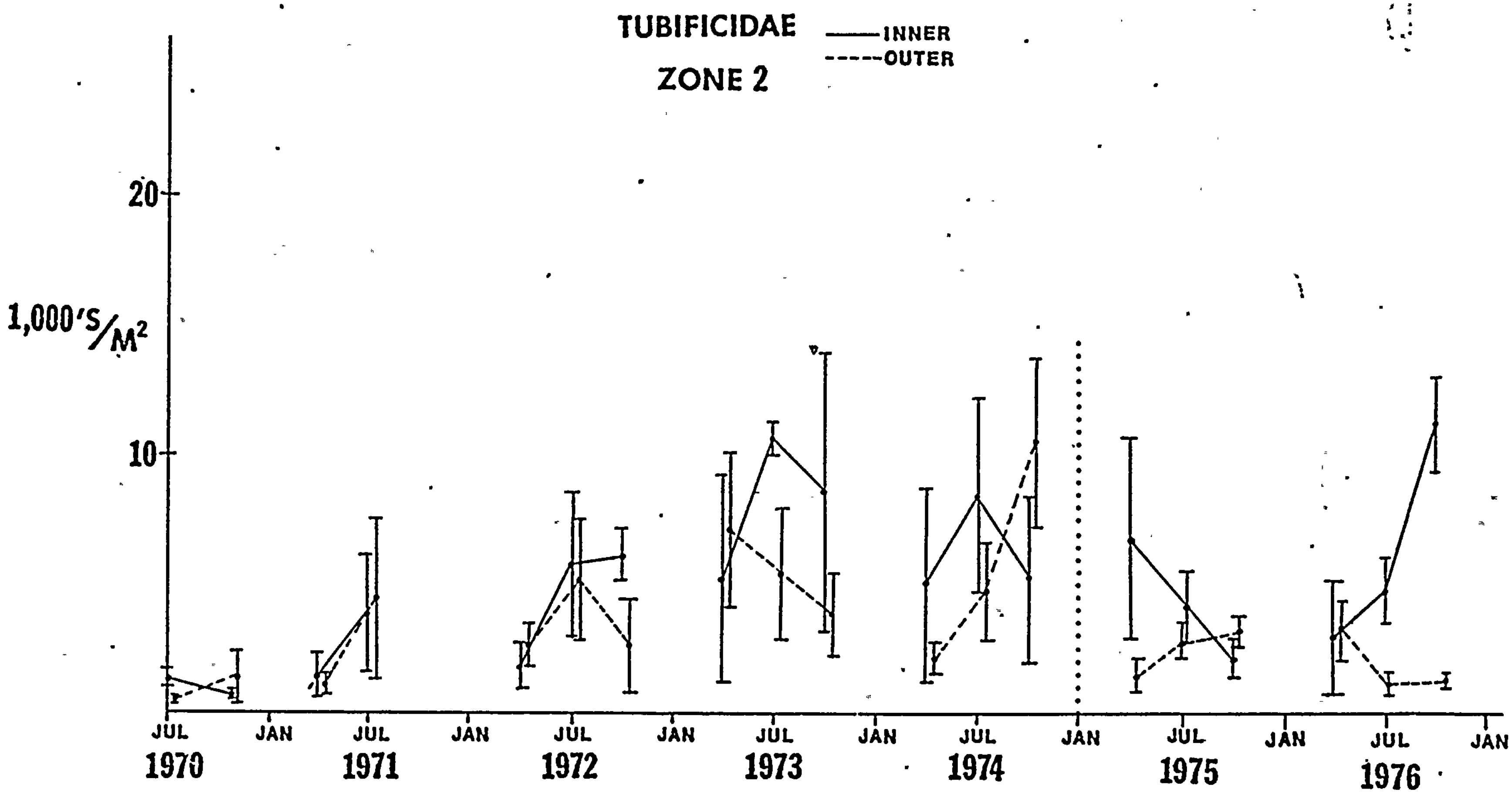

FIGURE 11. Density (animals/m^2) of Tubificidae in the inner and outer sections of depth zone 2 (16-24 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

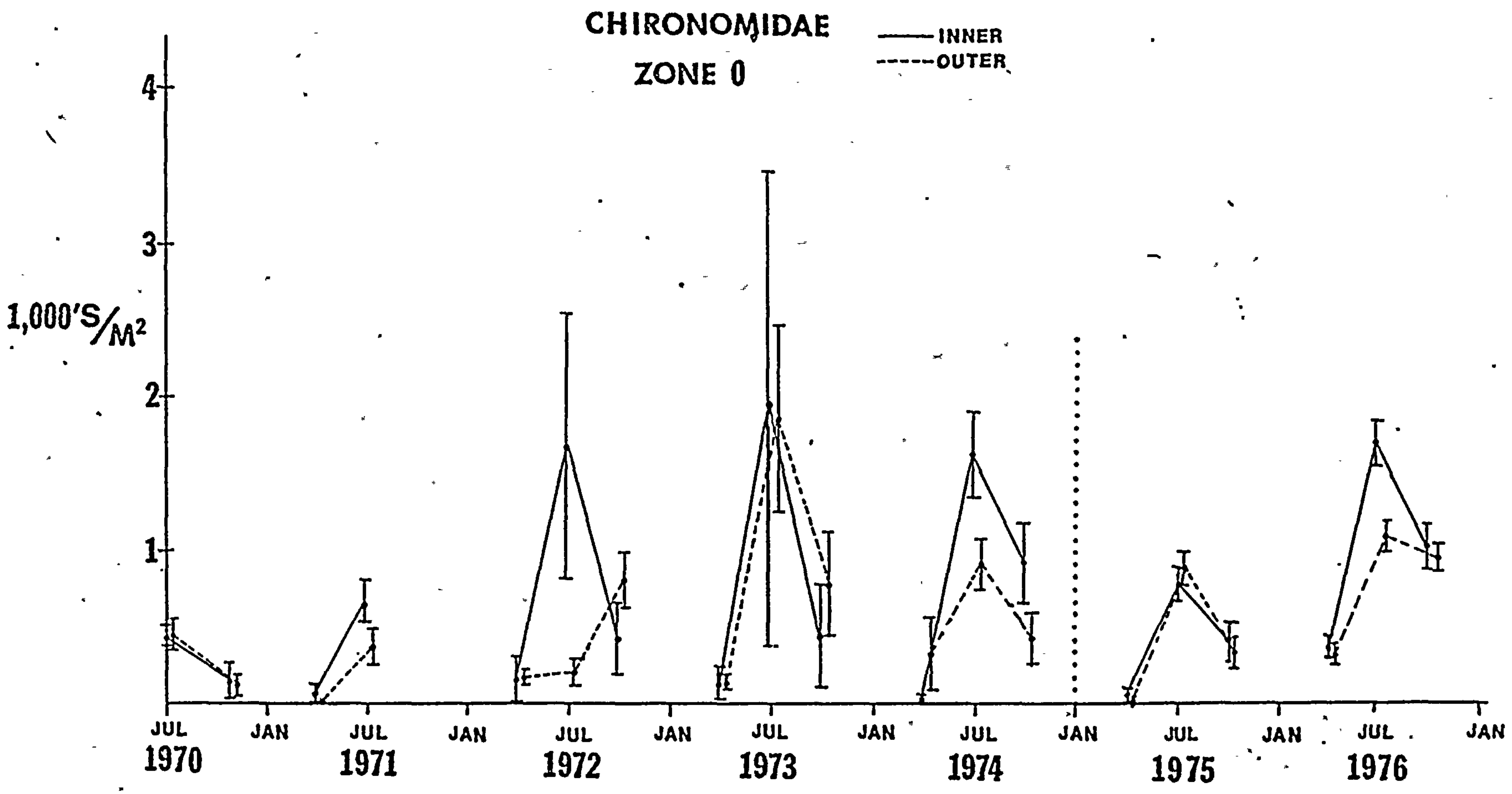

FIGURE 12. Density (animals/m^2) of Chironomidae in the inner and outer sections of depth zone 0 (0-8 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

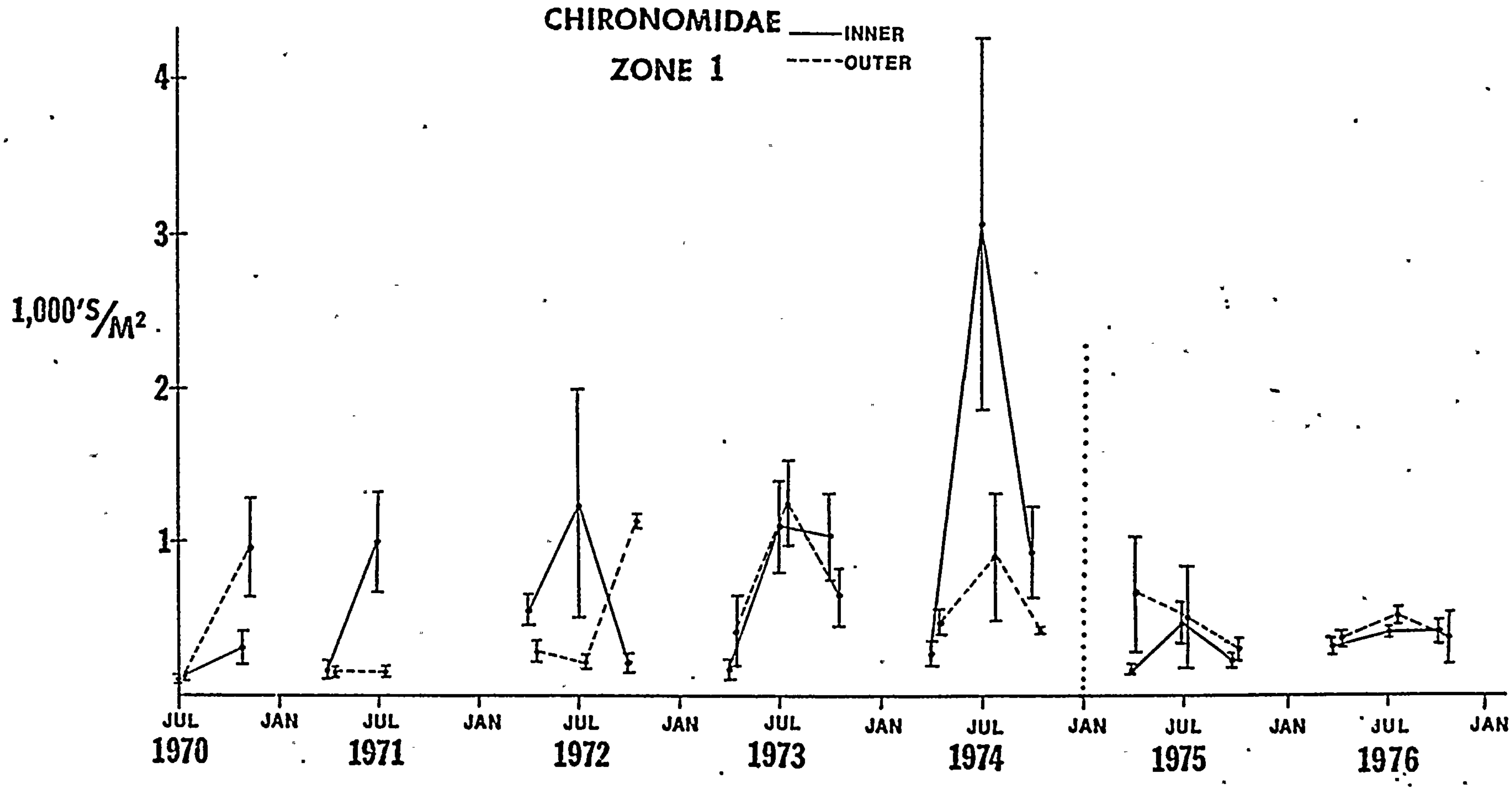

FIGURE 13. Density (animals/m^2) of Chironomidae in the inner and outer sections of depth zone 1 (8-16 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

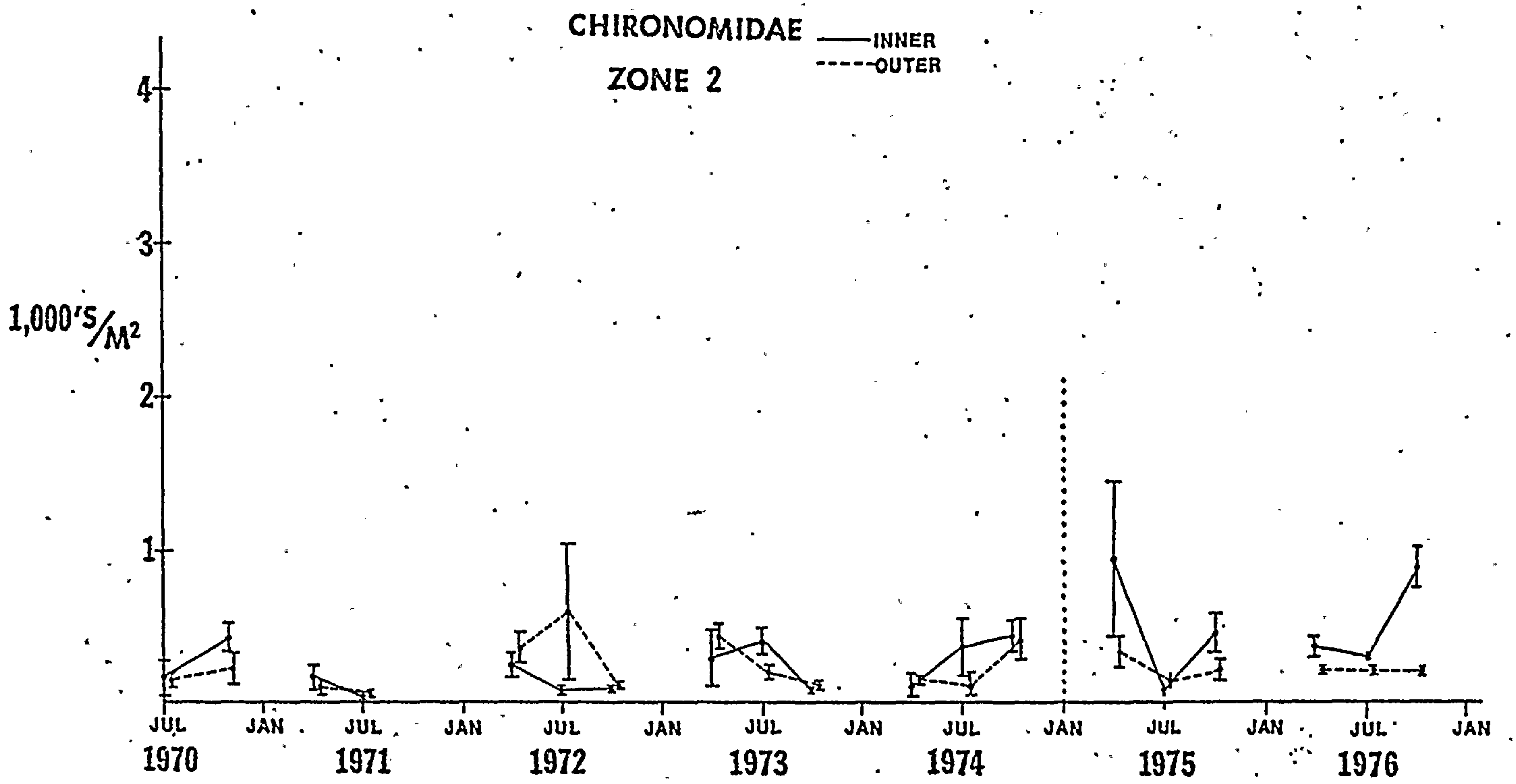

FIGURE 14. Density (animals/m^2) of Chironomidae in the inner and outer sections of depth zone 2 (16-24 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

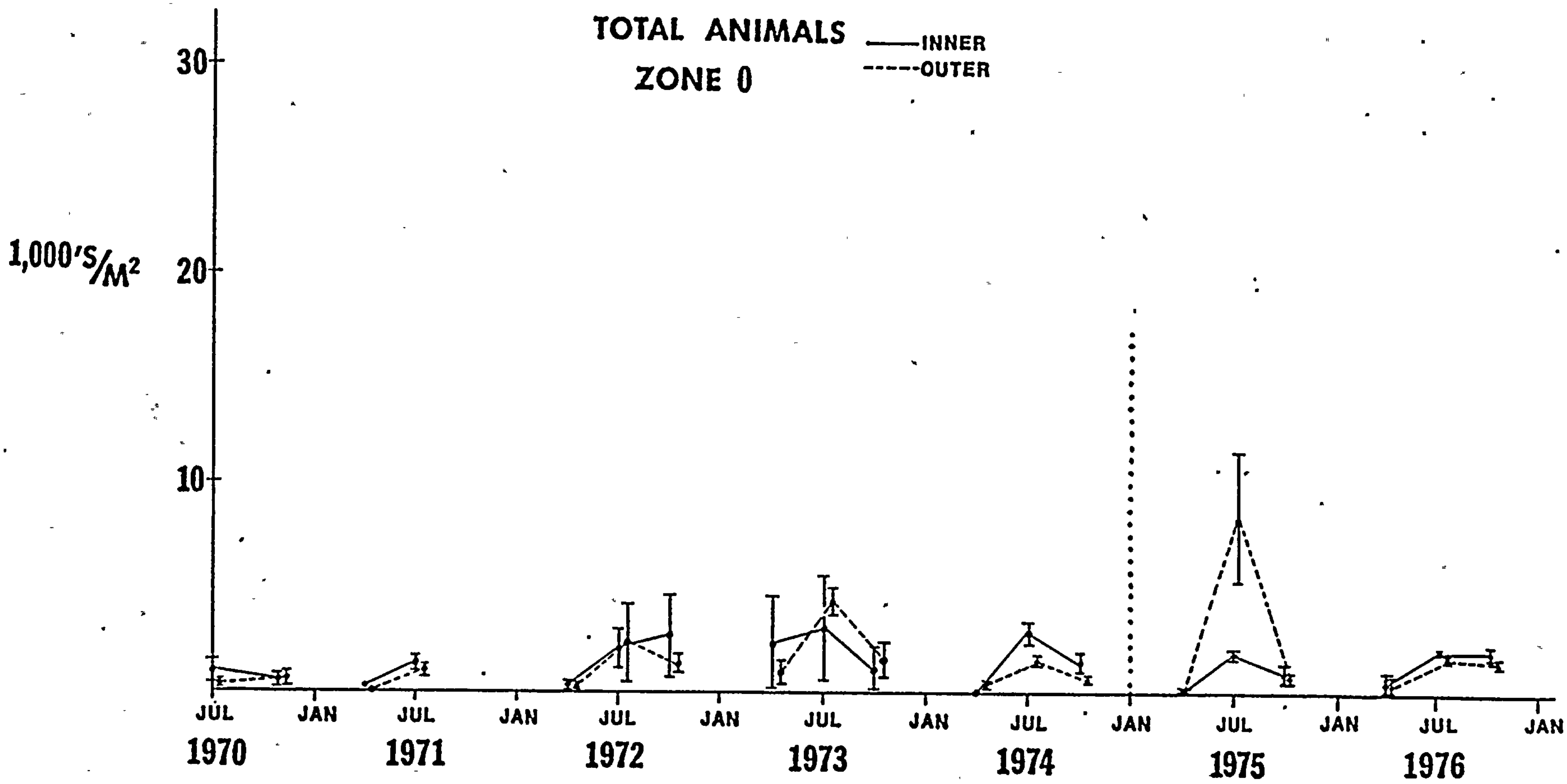

FIGURE 15. Density (animals/m^2) of total animals in the inner and outer sections of depth zone 0 (0-8 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

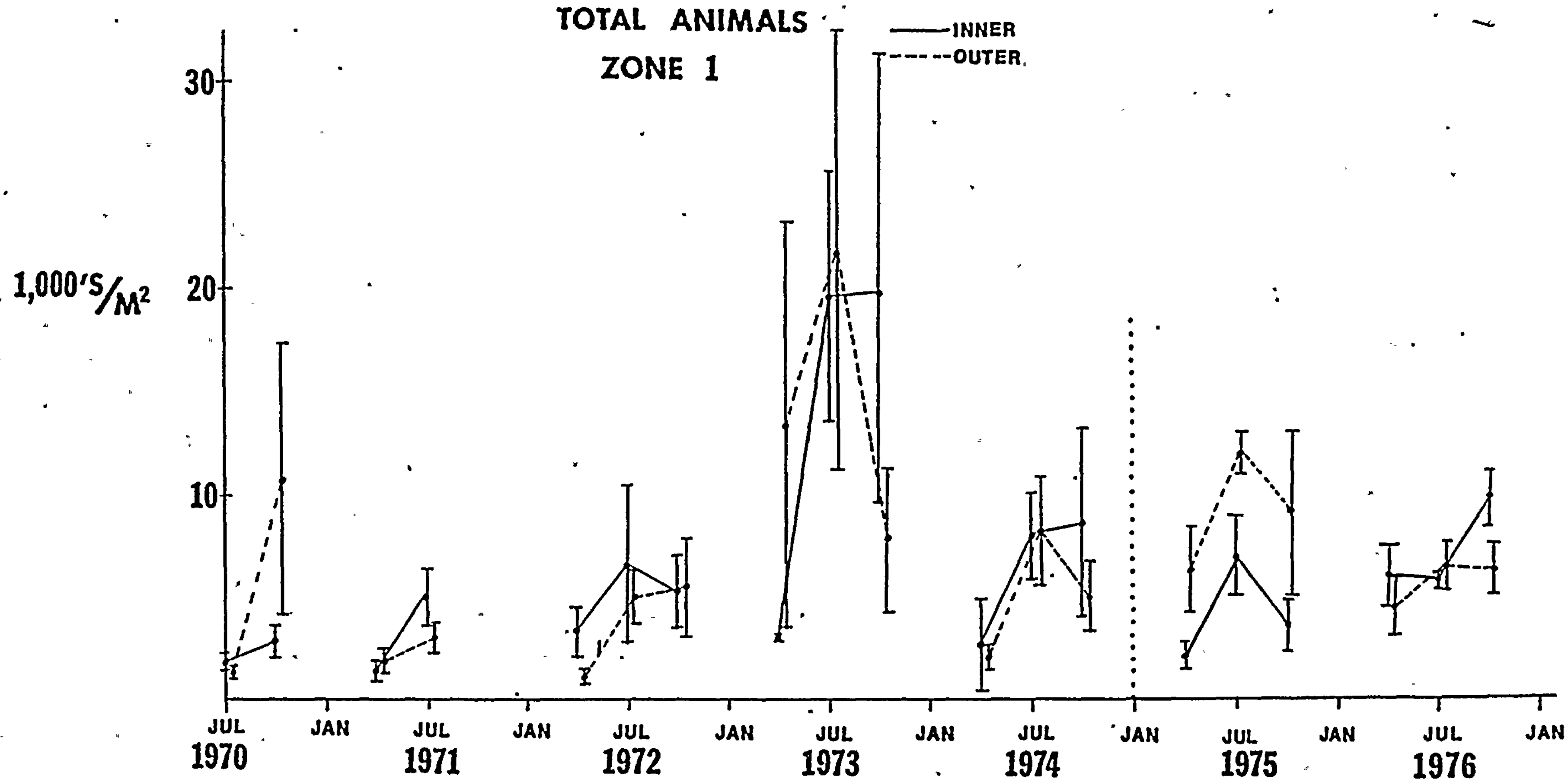

FIGURE 16. Density (animals/m^2) of total animals in the inner and outer sections of depth zone 1 (8-16 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

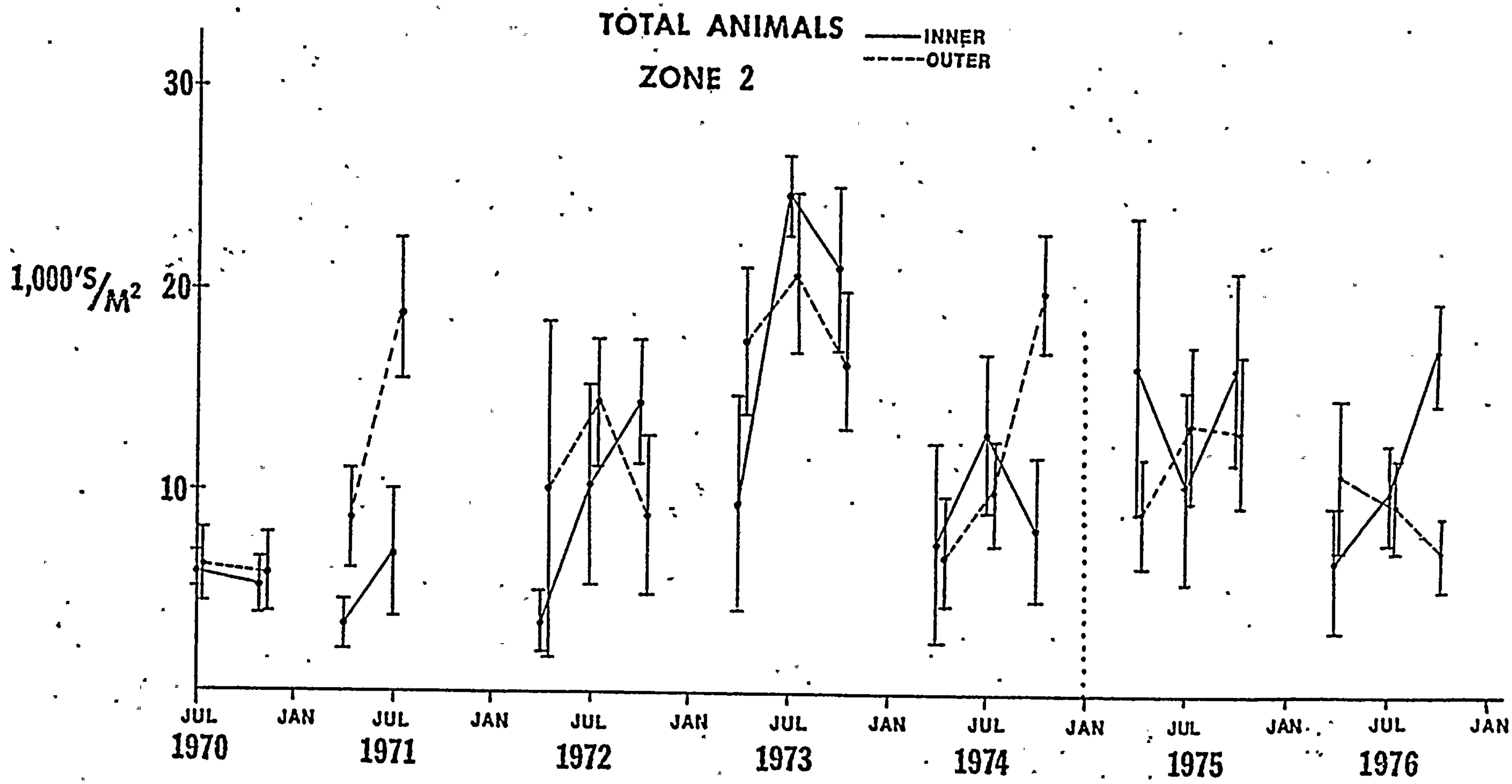

FIGURE 17. Density (animals/m^2) of total animals in the inner and outer sections of depth zone 2 (16-24 m depth). The error bars are standard errors. The vertical dotted line indicates the start of plant operation.

Appendix B-4

Fish

Environmental Operating Report - July-December 1976

FISH David J. Jude

Field Sampling for Adult Fish

Introduction

Fish netted during the July-December 1976 period have not been completely processed; therefore only tentative conclusions can be presented. June 1976 data will be presented since these data were not available for inclusion in the January-June 1976 semi-annual report.

Standard series netting was completed for all months from July-December except for October and November. Foul weather prevented night gillnetting in October and precluded day and night gillnetting and night trawling in November.

Gill Nets

Technical Specifications state that gillnetting is to occur at three 6 m stations (C and R at Cook; G at Warren Dunes) and three 9 m stations (D and Q at Cook; H at Warren Dunes) once per month during April through November. A day sample (approximately 12 hours of netting) and a night sample (approximately 12 hours of netting) is to occur at each station every month.

See Tables 1-6 for a preliminary report of gill net catches in June through November 1976. The spring influx of most species was complete by June, the beginning of this semi-annual report period, so that June gill net catches were dominated by the usual warm-water species found during summer: alewives, spottail shiners and yellow perch. Some trout-perch were also taken. Rainbow smelt, lake trout and unidentified coregonids were also observed due to an upwelling during the sampling period.

July gill nets had the same dominant assemblage present as was found in June, with the exception of rainbow smelt. Again an upwelling is probably responsible for this as the adult smelt is a cold-water species present only during the colder months and upwellings. Some unidentified coregonids, which also behave this way, were taken in July at the 9 m stations.

August gill nets were dominated by alewives, spottail shiners and yellow perch with substantial numbers of carp, trout-perch and gizzard shad also present. Gizzard shad have appeared more regularly and in increasing numbers with each successive year. September had the same species assemblage as July with the addition of white suckers, chinook salmon and a channel catfish. Every fall we have seen an influx of salmon, undoubtedly migrating to the St. Joe river for spawning. Other fall species are channel catfish, gizzard shad and sometimes carpsucker, which are probably migrating from the St. Joe river, as we seldom capture these three species at other times. One lake sturgeon was also netted but was released alive when the net was retrieved.

Numbers of fish netted in October declined noticeably over previous months, most likely because only day nets were set and the weather was rough. Alewives, spottail shiners and gizzard shad were most abundant with lake trout, chinook salmon and white suckers also taken.

Trawls

Requirements for trawling in the Technical Specifications state that the same stations as sampled for gillnetting with the exception of station Q shall be sampled from April through November with duplicate tows once during the day and once during the night each month.

See Tables 7-12 for a preliminary report of trawl catches for the months of June through November 1976. Catches in trawls reflected the same trends found with gill nets. June trawls contained mainly alewives, spottail shiners and yellow perch, with some trout-perch and johnny darters also taken. July trawl catches increased in species diversity, and numbers of fish captured increased over those caught in June. The July assemblage was primarily comprised of alewives, spottails, rainbow smelt, yellow perch, johnny darters and trout-perch. Unusual numbers of unidentified coregonids, one lake whitefish and several lake trout were also trawled. These fish reflect the influence of the upwelling on trawl catches.

The August species assemblage was the same as that found in July except for the absence of cold-water species; only one unidentified coregonid was taken in August. Numbers of fish trawled in August declined from numbers caught in July. In September alewives, spottails, yellow perch and trout-perch were taken in modest numbers. Spottails were most numerous, displacing the alewife as the most abundant species. Total numbers of fish trawled in September declined from numbers caught in preceding months.

Numbers of fish trawled in October increased over the preceding month with alewives and spottails shiners most numerous. Trout-perch and johnny darters were also taken in increased numbers. The numbers of yellow perch declined with their normal offshore movement at this time of year.

Numbers of fish trawled declined sharply in November. Alewives, spottails and smelt were the most numerous species with a few trout-perch and an occasional yellow perch taken. One lake trout was also captured.

Seines

Seining, according to the Technical Specifications, will be performed at three stations (A and B at the Cook Plant and F at Warren Dunes) once per month from April through November during times of reduced wave height. Duplicate 61 m hauls were to be done once during the day and once during the night each month.

See Tables 13-18 for a preliminary report of seine catches in June through November 1976. In June, alewives and spottails were the most abundant inshore species. A number of salmonids were also taken. The July species assemblage varied little from that of June. Alewives and spottails were still dominant, and yellow perch (few were taken in June) occurred in modest numbers. Two unidentified coregonids, nine salmonids and three river redhorse (rare in the Cook Plant vicinity) were also seined in July.

Species diversity in August declined from that of July. Alewives were abundant and taken in all but one seine haul. Spottail shiners were next in abundance, occurring in modest numbers. Yellow perch were also taken, but in low numbers.

Young of the year alewives dominated seine catches in September but their occurrence at each station was quite variable. Adult alewives have moved or are moving to deeper water by this time. Spottail shiners, smelt, yellow perch and trout-perch were also collected, but in low numbers. A large number of rainbow and brown trout as well as one coho salmon were also captured. Again gizzard shad, usually rare in the area during other months, were taken in notable numbers as was found in the gill net results.

In October, alewife and spottail numbers declined, while cold water species such as lake trout, rainbows and brown trout increased in the catches. We have never captured a large adult lake trout in any of our previous seining operations during the lake trout spawning season October and November, so that our 1976 catches of over 10 large lakers in seine hauls was quite unexpected. Apparently the conditions were right (mildly turbid water, moonlit night and modest waves) and the fish were inshore allowing these high catches. In addition to the lakers, an unusually high number of emerald and sand shiners, rare in our collections, were taken in October seine hauls.

Only nine fish, all collected at night, were seined in November. Water temperatures were very low and wave heights were high making conditions unfavorable for fish and man. Species taken were: four longnose dace, and one each of spottail shiner, smelt, trout-perch and bluegill. For a complete monthly (June-December) species list compiled by station refer to Tables 1-18.

Fish Larvae Samples

Field fish larvae samples

Open water larvae samples were collected from July through December in accordance with the Environmental Technical Specifications which call for sampling at 10 permanent stations once during the day and once during the night.

For the inshore stations (A, B, F) duplicate samples were collected by towing two nets simultaneously by hand against the current a distance of 61 m once during the day and once during the night once per month during April through December. At stations C, G, and R (6 m stations) 5 minute horizontal tows were made at 0.5, 2, 4 and 5.5 meters. At the 9 m stations (D, H) horizontal tows were made at 0.5, 2.5, 4.5, 6.5 and 8.5 meters. At station E and W (21 meters) tows were made at 0, 7.5, 13.5 and 20 meters only during the months of April through August.

Examination of 1976 samples have begun, however only a few samples have been processed. Data from 1975 have not been completely processed on the computer and so are not available either. However field larvae samples for the July-December period of 1973-74 show fish larvae most abundant in July with their numbers tapering off from August through October. June is the second most important month. No larvae were taken in November and December 1973.

Alewife are the most abundant fish larvae encountered, being collected from June to October. Spottail shiners are second in abundance when sled tow samples from 1974 are considered in this discussion. Spottails are common from July-September. Yellow perch are taken in very low numbers in June-July, with June the peak month. Smelt larvae are present in low numbers in early spring (April or May). Other larval species collected in the past with regular and supplementary tows include: johnny darters, trout-perch, slimy sculpins and ninespine stickleback. Some carp larvae appear to have been identified in 1975. We are presently working on confirming these identifications. Burbot larvae have also been found.

Entrainment samples

Technical Specifications call for entrainment samples to be collected at two locations, the intake forebay and discharge forebay. A study using several different sampling hose positions within the intake forebay did not reveal any obvious stratification of the larvae, so a single depth in the intake forebay (5 m) was chosen for all subsequent sampling. Forebay samples are taken by pumping measured volumes of water with a 80 gpm diaphram pump into a 1/2 meter diameter plankton net. During all months of the year, except June, July and August, samples were collected twice a month for each 8 hour segment during a twenty-four hour period. A slight modification of the times of sampling to better reflect biological changes that might occur has been promulgated so that sampling is now conducted during four periods of six hours each: sunset to midnight, midnight to sunrise, sunrise to noon and noon to sunset. Fish eggs and larvae are removed from all samples, larvae are identified, but eggs are assigned probable species designations from knowledge of spawning times and sometimes by physical shape and size. During June, July and August samples similar to those described above are collected every week.

All samples as required were taken from June-December. Volumes of condenser water sampled were: June - 919,486 + gallons (meter malfunction occurred and an average volume has not been calculated yet), July - 860,418 + gallons, August - 1,195,294 gallons, September - 390,381 gallons, October -457,249 gallons, November - 477,075 gallons and December 250,792 gallons (only one of the two sampling visits have been completed as of this writing). None of the 1976 entrainment samples have been processed. Data for 1974 define entrainment of larvae and eggs as being a seasonal problem. During months of high larvae and egg abundance (June-August) entrained larvae may range from 135,000 to 2.5 million per day for full Unit 1 operation (Jude 1977, in press). Fall and winter entrainment is much less, since few or no fish spawn in this area at this time. Species expected to be entrained are alewife and a few spottails and trout-perch.

Forebay Visual Inspection

A request to note the number of dead fish in the vicinity of the trash racks once each month using visual estimation techniques was carried out. From June through November 1976 notable numbers of fish were observed swimming in the Cook Plant forebay. Alewife and yellow perch accounted for the majority of fish observed. Alewives were seen from June through November and yellow perch from July through October. Lake trout were observed in June, August, October and November. Other species seen were spottail shiners, trout-perch and northern pike. All fish appeared to be in good condition and except for one lake trout, showed no sign of mechanical damage. No dead fish were observed.

Impingement

Impingement samples are collected every fourth day from samples bagged by plant personnel every day. Since samples are collected irregularly by plant personnel we chose the bags of fish which give us the best approximation to 24 hours of sampling on or around the specified day for sampling. This can and has led to variations in the amount of time sampled from 20 to 28 hours, but we feel this system is the best compromise among a number of important considerations. Statistics, as required by the Technical Specifications, have verified the validity of every fourth day sampling and since March 1976, sampling has proceeded in this manner. Fish as required, are examined for species, life stages and quantity (number and weight) and valid subsamples of fish are counted, measured, weighed, sexed and breeding and general condition is determined. The specific data on length, sex, etc. is not available, but numbers caught are. (See the tables of impingement data at the end of this report.)

Impingement samples were collected as described from July-December 1976. Data are presented in this report for the period November 1975 through October 1976 to give a year's data for consideration. Daily impingement collections were made until March 1976 when an every fourth day sampling plan was implemented. Discussion will be limited to the months of May-October 1976, months for which data have not been previously presented.

May 1976 impingement (11,656 fish, 297.92 kg) was about one half that of May 1975 (26,368 fish, 848.06 kg). Alewives were the most commonly impinged fish in May 1976 (7125 fish, 215.9 kg), and May 1975 (22,681 fish, 794.24 kg). The total number of species impinged were less in May 1976 (16 species impinged) than in May 1975 (21 species impinged). Other species impinged in large numbers in May 1976 were: slimy sculpins (1793 fish), trout-perch (853 fish), rainbow smelt (610 fish), yellow perch (289 fish), johnny darters (140 fish) and lake trout (26 fish).

June 1976 impingement (32,671 fish, 833.11 kg) was considerably less than June 1975 (81,836 fish, 2036.55 kg). The number of fish species impinged were virtually the same for June 1975 (16 species) and June 1976 (15 species). Alewives again dominated the impingement catch both years, particularly in 1976 (29,092 fish, 719.9 kg). Large numbers of spottail shiners were also impinged in June 1976 (2587 fish, 44.0 kg). Other notable species impinged were: trout-perch (853 fish), yellow perch (289 fish), slimy sculpins (285 fish) and lake trout (11 fish). The June species assemblage was very similar both years.

July was the month of maximum fish impingement for 1976. In 1975, the heaviest impingement occurred in June. Twelve species were impinged in July 1976 compared to 16 for 1975. July 1976 impingement was 33,045 fish (981.12 kg) while 12,794 fish (355 kg) were impinged in July 1975. Alewives were the dominant fish impinged in July 1976 (28,012 fish, 713.1 kg). However, the record impingement in 1976 was due to a catch of more trout-perch (2057 fish, 17.2 kg) and yellow perch (2030 fish, 234.4 kg), both of which were impinged in far greater numbers than in July 1975. Other species impinged in lesser numbers were: spottail shiners, slimy sculpins, rainbow smelt and 19 unidentified coregonids, most of which are believed to be bloaters (*Coregonus hoyi*).

August 1976 had the lowest number of impinged fish of any month in the May-October period (6404 fish, 257.99 kg). Alewives were the dominant fish impinged (3790 fish, 89.5 kg), exceeding the number impinged in August 1975 (1906 fish, 46.69 kg). Impingement of yellow perch in August 1976 (1523 fish) increased threefold over August 1975 catches (492 fish). The same minor species were impinged both years (trout-perch, spottail shiners and slimy sculpins).

September 1976 impingement (16,346 fish, 202.51 kg) was seven times as great as the September 1975 catch (2310 fish, 39.3 kg). Alewives (3300 fish, 20.6 kg) were displaced for the first time this period (May-December 1976) as the dominant fish impinged. Yellow perch was the most abundant fish (6068 fish, 129.1 kg) being impinged in greater numbers this month than in any other month for the 12 month period. Trout-perch (4195 fish, 15.5 kg) were also impinged in large numbers as were spottail shiners (2247 fish, 22.9 kg).

Impingement catches declined slightly in October 1976 (10,463 fish, 137.63 kg) compared to October 1975 (16,087 fish, 157 kg). Yellow perch (4123 fish, 81.6 kg) and spottail shiners (2952 fish, 30.5 kg) dominated the October 1976 catch. Alewives were still abundant (2356 fish, 12.3 kg) however, despite the fact they were in the process of moving off-shore to deeper water at this time of year. A smaller proportion of trout-perch and larger proportion of spottails were impinged in October 1976 than October 1975. Other species taken in lesser numbers in October 1976 were: trout-perch, slimy sculpins, rainbow smelt and seven unidentified coregonids.

In summary then, the total number of fish impinged for the May-October period was less in 1976 (110,585) than it was for 1975 (145,353). The variance in numbers impinged between months was also less in 1976. The species assemblage on a monthly basis remained relatively constant between the two years. Considerably more fish were impinged in the spring (May and June) of 1975 than spring, 1976. This was the result of greater numbers of alewives being impinged in the spring of 1975. More fish were impinged in the summer (July-September) of 1976 than 1975. Three species, yellow perch, trout-perch and alewife were responsible for the larger summer 1976 impingement catches. Impingement was relatively constant for October of both years.

Severe weather this year was the worst of any previous field season and was responsible for fish larvae samples not being collected in October at stations G and H during the day. In November, none of the required fish larvae samples were collected and for December none are required.

Reference

Jude, D. J., 1977, in press. Entrainment of fish larvae and eggs on the Great Lakes, with special reference to the D. C. Cook Nuclear Plant, southeastern Lake Michigan. Proceedings of the Third National Workshop on Entrainment and Impingement. (New York, Feb. 4, 1976) Contribution No. 202 of the Great Lakes Research Division.

TABLE 1. Preliminary report of gill net catches for the month of June 1976.

Date:	6/21		6/21		6/21		6/21		6/21		6/21	
Station:	C		D		R		Q		G		H	
Time:	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Species												
Alewife	A	A	F	F	N	A	F	F	A	A	F	M
Black bullhead												
Bluegill												
Brown trout												1
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon		1	1	2				2				2
Emerald shiner												
Fathead minnow												
Gizzard shad												
Golden shiner												
Johnny darter												
Lake trout	2	1		2	1	9		4				2
Lake whitefish				F								
Largemouth bass												
Longnose dace												
Longnose sucker		1	1			1	1			1		
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt		M	N	F	3	M	F	F			F	1
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner	F	M				F			F	F	1	
Trout-perch	F	4	F	1	2	F		1	F	F	F	F
Unident. coreg.		2	4	M				F	3		F	F
White sucker	1	1								1		
Yellow perch	M	F	N	M	1	1	N	F	4	F	N	F
Misc.												
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 2. Preliminary report of gill net catches for the month of July 1976.

Date:	7/14	7/13	7/14	7/13	7/14	7/13	7/14	7/13	7/14	7/13	7/14	7/13
Station:	C		D		R		Q		G		H	
Time:	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Species												
Alewife	A	M	A	A	N	A	A	M	M	A	A	A
Black bullhead												
Bluegill												
Brown trout				1								1
Burbot				1								
Carp					1						1	
Channel catfish												
Chinook salmon						1						
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad	1											
Golden shiner												
Johnny darter												
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace												
Longnose sucker		1					1			1		
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt								1				
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner	N	M	F	A	N	F	M		M	A	N	F
Trout-perch								1				F
Unident. coreg.			F	2				F				F
White sucker		1			1	1		1	2	1	F	F
Yellow perch	N	A	N	A	N	A	A	M	A	M	M	A
Misc.												
River Redhorse										1		
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 3. Preliminary report of gill net catches for the month of August 1976.

Date:	8/9		8/9		8/9		8/9		8/9		8/9	
Station:	C		D		R		Q		G		H	
Time:	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Species												
Alewife	F	F	F	F	F	M	F	F	F	F	1	F
Black bullhead												
Bluegill												
Brown trout		1						1				
Burbot												
Carp		6	F	F	2	F	F	1	1			
Channel catfish						2				1		
Chinook salmon												
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad	2	F	F	F	2	N	F	10	F	F	1	F
Golden shiner												
Johnny darter												
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace												
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt												
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner	M	F	M	F	M	F	F	F	F	F	F	F
Trout-perch		F		F		F	F					F
Unident. coreg.												
White sucker		F								F		
Yellow perch	F	F	3	M	A	A	M	A	N	F	N	M
Misc.												
Silver Redhorse						1						
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 4. Preliminary report of gill net catches for the month of September 1976.

Date:	9/30	9/16	9/30	9/16	9/30	9/16	9/30	9/16	9/30	9/16	9/30	9/16
Station:	C		D		R		Q		G		H	
Time:	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Species												
Alewife	F	M	F	M	A	A	F	M		F		A
Black bullhead												
Bluegill												
Brown trout		F										
Burbot												
Carp		1		1		F	1					
Channel catfish		2		5	1	F		F		F		F
Chinook salmon		F		1						F		1
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad	F	F	F	3	2	F	3	F		F		N
Golden shiner												
Johnny darter												
Lake trout								F				
Lake whitefish												
Largemouth bass												
Longnose dace												
Longnose sucker										M		
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt							1			F		
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner		M		M	N	M	F	M	1	M	F	A
Trout-perch		F		F		F		F		F		A
Unident. coreg.												
White sucker	1	F		3	3			M	1	F		M
Yellow perch	F	A		M	A	M	M	M		A	F	A
Misc.												
River Redhorse						1						
Lake Sturgeon						1						
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 5. Preliminary report of gill net catches for the month of October 1976.

Date:	10/11		10/11		10/11		10/11		10/11		10/11	
Station:	C		D		R		Q		G		H	
Time:	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Species												
Alewife			F		F		F		F		F	
Black bullhead												
Bluegill												
Brown trout												
Burbot												
Carp							1					
Channel catfish												
Chinook salmon	1				1							
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad	F		M		M		M					
Golden shiner												
Johnny darter												
Lake trout			1		1		1				1	
Lake whitefish												
Largemouth bass												
Longnose dace												
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt					F						F	
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner	M				F		F		F		F	
Trout-perch							F					
Unident. coreg.												
White sucker	1										F	
Yellow perch												
Misc.												
Zero Catch												
No Fishing		X		X		X		X		X		X

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 6. Preliminary report of gill net catches for the month of November 1976.

Date:												
Station:	C		D		R		Q		G		H	
Time:	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Species												
Alewife												
Black bullhead												
Bluegill												
Brown trout												
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad												
Golden shiner												
Johnny darter												
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace												
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt												
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner												
Trout-perch												
Unident. coreg.												
White sucker												
Yellow perch												
Misc.												
Zero Catch												
No Fishing	X	X	X	X	X	X	X	X	X	X	X	X

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 7. Preliminary report of trawl catches for the month of June 1976.

Date:	6/14				6/14				6/14				6/14				6/14			
Station:	C				D				R				G				H			
Time:	Day		Night		Day		Night		Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species																				
Alewife		1	M	N		1	M	N	1	1	M	M			F	F	2		F	M
Black bullhead																				
Bluegill																				
Brown trout																				
Burbot																				
Carp																				
Channel catfish																				
Chinook salmon											F									
Coho salmon											1	2								
Emerald shiner																				
Fathead minnow																				
Gizzard shad																				
Golden shiner																				
Johnny darter		1		2			1		4	2	F	F			1	F			F	F
Lake trout																				
Lake whitefish																				
Largemouth bass																				
Longnose dace																				
Longnose sucker																				
Mottled sculpin																				
Ninespine stklbk.																				
Northern pike																				
Rainbow smelt																				
Rainbow trout																				
Rock bass																				
Slimy sculpin					1						1									
Spottail shiner	2	2	N	N	1	1	A	N	2	1	M	M	1	4	M	M			M	M
Trout-perch							F	F				1			F	1			F	F
Unident. coreg.																				
White sucker																				
Yellow perch			M	F			M	F		1	M	F			F	F	10		M	M
Misc.																				
Zero Catch																		X		
No Fishing																				

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 8. Preliminary report of trawl catches for the month of July 1976.

Date:	7/13				7/13				7/13				7/13				7/13			
Station:	C				D				R				G				H			
Time:	Day		Night		Day		Night		Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species																				
Alewife	M	M	M	M	F	M	F	M	N	M	N	N	M	M			N	F	N	F
Black bullhead																				
Bluegill																				
Brown trout																				
Burbot																				
Carp																				
Channel catfish																				
Chinook salmon																				
Coho salmon																				
Emerald shiner																				
Fathead minnow																				
Gizzard shad																				
Golden shiner																				
Johnny darter	F		F	F	F	F			F	F	F	F		F	F		F		F	F
Lake trout						1			F											
Lake whitefish					F															
Largemouth bass																				
Longnose dace																				
Longnose sucker																				
Mottled sculpin																				
Ninespine stklbk.																				
Northern pike																				
Rainbow smelt	M	M		1	M	M		F	F	F				N			N	A	N	
Rainbow trout																				
Rock bass																				
Slimy sculpin																				
Spottail shiner	F	F	F	F	1		F	M	F	F	F			F			F	F		F
Trout-perch	M	M	M	N	F	M	M	M	M	M	N	M	M	M	M	M	F	F	M	F
Unident. coreg.	F	F	F		F	F		F	F	F			F	F			F	F		
White sucker													F							
Yellow perch	M	M	F	F	F	F	F		1	F		F	F	F	F	2	F	F	F	F
Misc.																				
Zero Catch																				
No Fishing																				

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 9. Preliminary report of trawl catches for the month of August 1976.

Date:	8/9				8/9				8/9				8/9				8/9			
Station:	C				D				R				G				H			
Time:	Day		Night		Day		Night		Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species																				
Alewife	M	A	F	F	1		M	F	3	8	F	F		F	F	F	F		F	F
Black bullhead																				
Bluegill																				
Brown trout																				
Burbot																				
Carp																				
Channel catfish																				
Chinook salmon																				
Coho salmon																				
Emerald shiner																				
Fathead minnow																				
Gizzard shad																				
Golden shiner																				
Johnny darter	3	4	F	1	1	1	1	F			F	F		1					F	F
Lake trout																				
Lake whitefish																				
Largemouth bass																				
Longnose dace																				F
Longnose sucker																				
Mottled sculpin																				
Ninespine stklbk.																				
Northern pike																				
Rainbow smelt	F	F	F	F			F	1			F			1				1	F	1
Rainbow trout																				
Rock bass																				
Slimy sculpin								3											1	
Spottail shiner	2		F	F			M	F			F	F			M	M			F	F
Trout-perch			F	F			F	F			F	F			F	M			F	1
Unident. coreg.																				
White sucker																				
Yellow perch		1	F	F	M		F	F			F	F	2	1	F	F	F	4	F	F
Misc.																				
Zero Catch																				
No Fishing																				

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 10. Preliminary report of trawl catches for the month of September 1976.

Date:	9/13				9/13				9/13				9/13				9/13			
Station:	C				D				R				G				H			
Time:	Day		Night		Day		Night		Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species																				
Alewife			F	F				F	1	1	F	F			F	M			F	F
Black bullhead																				
Bluegill																				
Brown trout																				
Burbot																				
Carp		1								1										
Channel catfish											1									
Chinook salmon																				
Coho salmon																				
Emerald shiner																				
Fathead minnow																				
Gizzard shad																				
Golden shiner																				
Johnny darter				F	1		F	F				F						1	F	F
Lake trout																				
Lake whitefish																				
Largemouth bass																				
Longnose dace																				
Longnose sucker																				
Mottled sculpin																				
Ninespine stklbk.						1														
Northern pike																				
Rainbow smelt	2																			
Rainbow trout																				
Rock bass																				
Slimy sculpin																				
Spottail shiner			M	F			M	M			M	M			M	M			M	F
Trout-perch			M	N	1		F	F			F	F			F	M			F	F
Unident. coreg.																				
White sucker				1																
Yellow perch	4	M	F	F		1	F	F	F	1	F	F	1	F	F	M	2	M	F	F
Misc.																				
Zero Catch																				
No Fishing																				

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 11. Preliminary report of trawl catches for the month of October 1976.

Date:	10/11				10/11				10/11				10/11				10/11			
Station:	C				D				R				G				H			
Time:	Day		Night		Day		Night		Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species																				
Alewife		A		F	3	N	M	F	N	F	F		N	N	A	N	M	A	F	F
Black bullhead																				
Bluegill																				
Brown trout																				
Burbot																		1		
Carp																1				
Channel catfish																				
Chinook salmon																				
Coho salmon																				
Emerald shiner																				
Fathead minnow																				
Gizzard shad																				
Golden shiner																				
Johnny darter		F	F	F	2	F	F	F	1		F	F	F				F		F	F
Lake trout																				
Lake whitefish																				
Largemouth bass																				
Longnose dace																				
Longnose sucker																				
Mottled sculpin																				
Ninespine stklbk.																				
Northern pike																				
Rainbow smelt						1		F												1
Rainbow trout																				
Rock bass																				
Slimy sculpin				F															1	
Spottail shiner		F	A	A		F	M	M	2		A	A	N	N	A	N	M	A	M	F
Trout-perch			N	N	3	F		M			M	N	F	F	F	F	F	F	M	F
Unident. coreg.																				
White sucker																				
Yellow perch			F								F	F		F	F	F	F			F
Misc.																				
Zero Catch	X																			
No Fishing																				

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 12. Preliminary report of trawl catches for the month of November 1976.

Date:	11/8				11/8				11/8				11/8				11/8			
Station:	C				D				R				G				H			
Time:	Day		Night		Day		Night		Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Species																				
Alewife			1	F							F	F			F	F			F	
Black bullhead																				
Bluegill																				
Brown trout																				
Burbot																				
Carp																				
Channel catfish																				
Chinook salmon																				
Coho salmon																				
Emerald shiner																				
Fathead minnow																				
Gizzard shad			1																	
Golden shiner																				
Johnny darter															1					F
Lake trout												1								
Lake whitefish																				
Largemouth bass																				
Longnose dace																				
Longnose sucker																				
Mottled sculpin																				
Ninespine stklbk.																				
Northern pike																				
Rainbow smelt			F	F			F	F			F	F			F	F			F	1
Rainbow trout																				
Rock bass																				
Slimy sculpin											1									F
Spottail shiner			F	F			M	F			F	F							F	F
Trout-perch							F				1	F							F	
Unident. coreg.																				
White sucker																				
Yellow perch								F												1
Misc.																				
Zero Catch																				
No Fishing	X	X			X	X			X	X			X	X			X	X		

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 13. Preliminary report of seine catches for the month of June 1976.

Date:	6/14		6/14		6/14		6/14		6/14		6/14	
Station:	A				B				F			
Time:	Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2
Species												
Alewife		2	A	A	F	F	M	A	F	F	M	M
Black bullhead												
Bluegill												
Brown trout	F		3				F	2	2	2	2	
Burbot												
Carp	1						1					
Channel catfish												
Chinook salmon					1						2	3
Coho salmon				1	2	2		2			2	
Emerald shiner												
Fathead minnow												
Gizzard shad				1								
Golden shiner												
Johnny darter			1			1	1					
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace				1					1			
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												1
Northern pike												
Rainbow smelt												
Rainbow trout							1					
Rock bass												
Slimy sculpin												
Spottail shiner	M	M	M	M	M	M	M	F	A	A	A	M
Trout-perch											1	
Unident. coregonids												
White sucker				1							1	
Yellow perch			1	1			F	F			1	
Misc.												
Quillback											1	
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 14. Preliminary report of seine catches for the month of July 1976.

Date:	7/13		7/13		7/13		7/13		7/13		7/13	
Station:	A				B				F			
Time:	Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2
Species												
Alewife	A	F	M	F	M	F	M	M	A	N	M	A
Black bullhead												
Bluegill												1
Brown trout	1	2			1		1					
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad												
Golden shiner												
Johnny darter												
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace												
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt								1				
Rainbow trout		1				1	2					
Rock bass												
Slimy sculpin												
Spottail shiner	A	A	A	A	M	M	A		A	A	M	A
Trout-perch				F	F		F	1				
Unident. coregonids	2											
White sucker				1							1	
Yellow perch	M	M	F	M	F	F	M	M	M	M	M	M
Misc.												
River Redhorse						1		2				
Quillback										1		
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE.15. Preliminary report of seine catches for the month of August 1976.

Date:	8/9		8/10		8/9		8/10		8/9		8/10	
Station:	A				B				F			
Time:	Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2
Species												
Alewife	A	A	A	A	A	A	A	A		A	A	M
Black bullhead												
Bluegill												
Brown trout												
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad												
Golden shiner												
Johnny darter	1	1										F
Lake trout												
Lake whitefish												
Largemouth bass						1						
Longnose dace						1						
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt												1
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner			M	M	F	F	F	F	M	F	M	M
Trout-perch							1					F
Unident. coregonids												
White sucker												
Yellow perch			F	F	1			1	1			1
Misc.												
Smallmouth Bass					1							
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 16. Preliminary report of seine catches for the month of September 1976.

Date:	9/13		9/14		9/13		9/14		9/13		9/14	
Station:	A				B				F			
Time:	Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2
Species												
Alewife	A	A	A	F	4	A	F	F	A	A	F	M
Black bullhead												
Bluegill												
Brown trout		2	F	F	1		2		1	1		F
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon					1							
Emerald shiner												
Fathead minnow												
Gizzard shad				F								F
Golden shiner												
Johnny darter												
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace							1	1				
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt				2				F				
Rainbow trout								F		1		F
Rock bass												
Slimy sculpin					1							
Spottail shiner	F	F							F		F	
Trout-perch				2			F	F				F
Unident. coregonids												
White sucker												
Yellow perch		2			1							
Misc.												
Zero Catch												
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 17. Preliminary report of seine catches for the month of October 1976.

Date:	10/11		10/12		10/11		10/12		10/11		10/11	
Station:	A				B				F			
Time:	Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2
Species												
Alewife	1		F	F			F	1	F	F	F	F
Black bullhead												
Bluegill												
Brown trout									F	1	1	
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon				1			F					
Emerald shiner					M	M						
Fathead minnow												
Gizzard shad										1		
Golden shiner												
Johnny darter												
Lake trout			2	1			3	1				2
Lake whitefish												
Largemouth bass												
Longnose dace				1							1	
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt					F							
Rainbow trout				1		1						
Rock bass												
Slimy sculpin												
Spottail shiner	1			F			F		F		F	
Trout-perch												
Unident. coregonids												
White sucker											1	
Yellow perch												
Misc.												
Sand Shiner				1	F	F						
Zero Catch		X										
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 18. Preliminary report of seine catches for the month of November 1976.

Date:	11/8		11/8		11/8		11/8		11/8		11/8	
Station:	A				B				F			
Time:	Day		Night		Day		Night		Day		Night	
Replicate:	1	2	1	2	1	2	1	2	1	2	1	2
Species												
Alewife												
Black bullhead												
Bluegill				1								
Brown trout												
Burbot												
Carp												
Channel catfish												
Chinook salmon												
Coho salmon												
Emerald shiner												
Fathead minnow												
Gizzard shad												
Golden shiner												
Johnny darter												
Lake trout												
Lake whitefish												
Largemouth bass												
Longnose dace			1	1				2				
Longnose sucker												
Mottled sculpin												
Ninespine stklbk.												
Northern pike												
Rainbow smelt				1								
Rainbow trout												
Rock bass												
Slimy sculpin												
Spottail shiner			1									
Trout-perch			1									
Unident. coregonids												
White sucker				1								
Yellow perch												
Misc.												
Zero Catch	X	X			X	X	X		X	X	X	X
No Fishing												

Code: F = few (1-10 fish), M = many (11-50 fish), N = numerous (51-100 fish), A = abundant (more than 100 fish)

TABLE 19. NUMBER AND WEIGHT OF IMPINGED FISH COLLECTED BY THE SAMPLING PROGRAM EACH MONTH, JANUARY THROUGH JUNE 1976.

NO. OF COLLECTING DAYS	JANUARY 31 DAYS		FEBRUARY 29 DAYS		MARCH 8 DAYS		APRIL 8 DAYS		MAY 6 DAYS		JUNE 8 DAYS	
	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)
ALEWIFE	184	9.56	3	0.11	4168	180.91	518	21.15	1379	41.79	8398	203.16
BLACK BULLHEAD	2	0.02	1	0.08	4	0.24	1	0.02	1	0.01	0	0.0
BLACK CRAPPIE	2	0.49	0	0.0	1	0.00	0	0.0	0	0.0	0	0.0
BLUEGILL	2	0.01	0	0.0	0	0.0	0	0.0	0	0.0	1	0.02
BROWN TROUT	0	0.0	0	0.0	0	0.0	1	0.61	1	0.03	0	0.0
BURBOT	5	2.15	7	3.76	4	3.65	1	0.96	1	0.50	1	0.05
CARP	4	0.10	0	0.0	1	0.00	0	0.0	0	0.0	0	0.0
CHANNEL CATFISH	22	0.45	12	1.02	6	0.03	0	0.0	0	0.0	1	0.00
CHINOOK SALMON	0	0.0	0	0.0	1	0.15	0	0.0	1	0.06	0	0.0
COHO SALMON	1	0.65	2	0.98	2	0.68	0	0.0	1	0.00	1	0.00
FOURHORNED SCULPIN	0	0.0	0	0.0	0	0.0	0	0.0	1	0.00	0	0.0
GIZZARD SHAD	1150	31.53	72	23.87	34	0.95	0	0.0	0	0.0	0	0.0
GRASS PICKEREL	0	0.0	1	0.06	0	0.0	0	0.0	0	0.0	0	0.0
GREEN SUNFISH	2	0.02	0	0.0	0	0.0	0	0.0	0	0.0	1	0.01
HYBRID SUNFISH	0	0.0	0	0.0	2	0.05	0	0.0	0	0.0	0	0.0
JOHNNY DARTER	0	0.0	1	0.00	0	0.0	2	0.01	27	0.09	4	0.01
LAKE CHUB	0	0.0	1	0.00	0	0.0	0	0.0	0	0.0	0	0.0
LAKE TROUT	8	19.25	10	9.02	16	4.02	0	0.0	5	8.58	3	5.01
LARGEMOUTH BASS	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

TABLE 19 CONTINUED.

NO. OF COLLECTING DAYS	JANUARY 31 DAYS		FEBRUARY 29 DAYS		MARCH 8 DAYS		APRIL 8 DAYS		MAY 6 DAYS		JUNE 8 DAYS	
	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)
LONGNOSE DACE	3	0.04	1	0.01	0	0.0	0	0.0	0	0.0	0	0.0
LONGNOSE SUCKER	2	2.43	4	6.19	2	1.54	1	1.65	0	0.0	0	0.0
MUD MINNOW	0	0.0	0	0.0	5	0.03	0	0.0	0	0.0	0	0.0
NINESPINE STICKLEBACK	5	0.01	3	0.01	3	0.01	0	0.0	15	0.04	0	0.0
NORTHERN PIKE	2	0.67	0	0.0	0	0.0	0	0.0	0	0.0	1	0.53
PUMPKINSEED	2	0.00	2	0.00	2	0.01	0	0.0	0	0.0	0	0.0
RAINBOW SMELT	240	2.57	75	1.27	106	1.38	72	2.08	118	1.03	12	0.14
RAINBOW TROUT	0	0.0	1	0.13	0	0.0	0	0.0	1	0.01	0	0.0
ROCK BASS	0	0.0	1	0.15	0	0.0	0	0.0	0	0.0	0	0.0
SLIMY SCULPIN	252	2.11	106	0.76	267	1.93	258	1.33	347	1.63	76	0.52
SPOTTAIL SHINER	2317	18.09	1863	17.04	3007	28.38	237	2.52	137	1.13	50	0.54
TADPOLE MADTOM	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
TROUT-PERCH	144	2.15	34	0.46	44	0.49	2	0.02	165	1.11	75	0.62
UNIDENTIFIED COREGONID	7	0.05	0	0.0	1	0.02	0	0.0	2	0.10	0	0.0
UNIDENTIFIED PISCES	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WHITE SUCKER	4	1.26	2	0.05	0	0.0	0	0.0	0	0.0	2	2.46
YELLOW BULLHEAD	0	0.0	1	0.01	0	0.0	0	0.0	0	0.0	0	0.0
YELLOW PERCH	1660	14.01	111	8.21	119	4.43	39	1.21	56	1.67	88	9.05
MONTHLY TOTALS	6020	107.59	2314	73.21	7795	228.89	1132	31.56	2258	57.79	8714	222.15

TABLE 20. NUMBER AND WEIGHT OF IMPINGED FISH COLLECTED BY THE SAMPLING PROGRAM EACH MONTH, JULY THROUGH OCTOBER 1976.

NO. OF COLLECTING DAYS	JULY 8 DAYS		AUGUST 7 DAYS		SEPTEMBER 8 DAYS		OCTOBER 8 DAYS		TOTALS, JAN.-OCT.	
	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)
ALEWIFE	7229	184.03	864	20.45	861	6.31	608	3.17	24212	670.64
BLACK BULLHEAD	0	0.0	0	0.0	0	0.0	1	0.04	10	0.41
BLACK CRAPPIE	0	0.0	0	0.0	0	0.0	0	0.0	3	0.50
BLUEGILL	0	0.0	0	0.0	0	0.0	2	0.02	5	0.05
BROWN TROUT	0	0.0	0	0.0	0	0.0	0	0.0	2	0.64
BURBOT	1	0.46	0	0.0	2	0.42	0	0.0	22	11.94
CARP	0	0.0	0	0.0	0	0.0	0	0.0	5	0.11
CHANNEL CATFISH	0	0.0	0	0.0	0	0.0	1	0.00	42	1.50
CHINOOK SALMON	0	0.0	0	0.0	0	0.0	0	0.0	2	0.21
COHO SALMON	0	0.0	0	0.0	0	0.0	0	0.0	7	2.32
FOURHORNED SCULPIN	0	0.0	0	0.0	0	0.0	0	0.0	1	0.00
GIZZARD SHAD	0	0.0	0	0.0	2	0.58	7	0.07	1265	57.01
GRASS PICKEREL	0	0.0	0	0.0	0	0.0	0	0.0	1	0.06
GREEN SUNFISH	0	0.0	0	0.0	0	0.0	0	0.0	3	0.03
HYBRID SUNFISH	0	0.0	0	0.0	0	0.0	0	0.0	2	0.05
JOHNNY DARTER	6	0.01	1	0.00	24	0.05	5	0.01	70	0.18
LAKE CHUB	0	0.0	0	0.0	1	0.00	0	0.0	2	0.01
LAKE TROUT	0	0.0	0	0.0	0	0.0	0	0.0	42	45.88
LARGEMOUTH BASS	0	0.0	0	0.0	1	0.01	0	0.0	1	0.01

TABLE 20 CONTINUED.

NO. OF COLLECTING DAYS	JULY 8 DAYS NO.	JULY 8 DAYS WT. (KG)	AUGUST 7 DAYS NO.	AUGUST 7 DAYS WT. (KG)	SEPTEMBER 8 DAYS NO.	SEPTEMBER 8 DAYS WT. (KG)	OCTOBER 8 DAYS NO.	OCTOBER 8 DAYS WT. (KG)	TOTALS, JAN.-OCT. NO.	TOTALS, JAN.-OCT. WT. (KG)
LONGNOSE DACE	0	0.0	0	0.0	0	0.0	1	0.02	5	0.06
LONGNOSE SUCKER	0	0.0	2	0.02	0	0.0	0	0.0	11	11.82
MUD MINNOW	0	0.0	0	0.0	0	0.0	0	0.0	5	0.03
NINESPINE STICKLEBACK	0	0.0	0	0.0	0	0.0	1	0.00	27	0.06
NORTHERN PIKE	0	0.0	1	1.95	0	0.0	0	0.0	4	3.15
PUMPKINSEED	0	0.0	0	0.0	0	0.0	4	0.01	10	0.02
RAINBOW SMELT	50	0.61	19	0.39	2	0.03	29	0.15	723	9.66
RAINBOW TROUT	1	0.03	0	0.0	0	0.0	0	0.0	3	0.17
ROCK BASS	0	0.0	0	0.0	0	0.0	0	0.0	1	0.15
SLIMY SCULPIN	70	0.45	41	0.24	92	0.45	39	0.28	1548	9.71
SPOTTAIL SHINER	110	0.99	62	0.56	433	3.82	762	7.88	8978	80.96
TADPOLE MADTOM	1	0.01	0	0.0	0	0.0	0	0.0	1	0.01
TROUT-PERCH	531	4.44	120	1.06	979	3.62	176	2.77	2270	16.75
UNIDENTIFIED COREGONID	5	0.20	0	0.0	0	0.0	2	0.01	17	0.37
UNIDENTIFIED PISCES	1	0.01	0	0.0	0	0.0	0	0.0	1	0.01
WHITE SUCKER	1	1.45	0	0.0	2	1.81	0	0.0	11	7.04
YELLOW BULLHEAD	0	0.0	0	0.0	0	0.0	0	0.0	1	0.01
YELLOW PERCH	524	60.49	344	33.82	1416	30.12	1064	21.07	5421	184.07
MONTHLY TOTALS	8530	253.19	1454	58.49	3815	47.24	2702	35.49	44734	1115.58

TABLE 21. ESTIMATES OF NUMBER AND WEIGHT OF EACH SPECIES OF FISH IMPINGED DURING EACH MONTH, JANUARY THROUGH JUNE 1976. THESE ESTIMATES WERE DERIVED BY MULTIPLYING EACH ENTRY IN THE PRECEDING CATCH TABLES BY M/N, WHERE M IS THE NO. OF DAYS IN EACH MONTH AND N IS THE NO. OF COLLECTING DAYS.

NO. OF COLLECTING DAYS	JANUARY 31 DAYS		FEBRUARY 29 DAYS		MARCH 8 DAYS		APRIL 8 DAYS		MAY 6 DAYS		JUNE 8 DAYS	
	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)
ALEWIFE	184	9.56	3	0.11	16151	701.02	1942	79.30	7124	215.89	31492	761.86
BLACK BULLHEAD	2	0.02	1	0.08	15	0.92	3	0.06	5	0.05	0	0.0
BLACK CRAPPIE	2	0.49	0	0.0	3	0.01	0	0.0	0	0.0	0	0.0
BLUEGILL	2	0.01	0	0.0	0	0.0	0	0.0	0	0.0	3	0.07
BROWN TROUT	0	0.0	0	0.0	0	0.0	3	2.29	5	0.14	0	0.0
BURBOT	5	2.15	7	3.76	15	14.12	3	3.60	5	2.58	3	0.19
CARP	4	0.10	0	0.0	3	0.02	0	0.0	0	0.0	0	0.0
CHANNEL CATFISH	22	0.45	12	1.02	23	0.10	0	0.0	0	0.0	3	0.02
CHINOOK SALMON	0	0.0	0	0.0	3	0.57	0	0.0	5	0.33	0	0.0
COHO SALMON	1	0.65	2	0.98	7	2.64	0	0.0	5	0.02	3	0.02
FOURHORNED SCULPIN	0	0.0	0	0.0	0	0.0	0	0.0	5	0.01	0	0.0
GIZZARD SHAD	1150	31.53	72	23.87	131	3.69	0	0.0	0	0.0	0	0.0
GRASS PICKEREL	0	0.0	1	0.06	0	0.0	0	0.0	0	0.0	0	0.0
GREEN SUNFISH	2	0.02	0	0.0	0	0.0	0	0.0	0	0.0	3	0.03
HYBRID SUNFISH	0	0.0	0	0.0	7	0.18	0	0.0	0	0.0	0	0.0
JOHNNY DARTER	0	0.0	1	0.00	0	0.0	7	0.03	139	0.45	15	0.04
LAKE CHUB	0	0.0	1	0.00	0	0.0	0	0.0	0	0.0	0	0.0
LAKE TROUT	8	19.25	10	9.02	62	15.57	0	0.0	25	44.35	11	18.80
LARGEMOUTH BASS	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

TABLE 21 CONTINUED.

NO. OF COLLECTING DAYS	JANUARY 31 DAYS NO.	WT. (KG)	FEBRUARY 29 DAYS NO.	WT. (KG)	MARCH 8 DAYS NO.	WT. (KG)	APRIL 8 DAYS NO.	WT. (KG)	MAY 6 DAYS NO.	WT. (KG)	JUNE 8 DAYS NO.	WT. (KG)
LONGNOSE DACE	3	0.04	1	0.01	0	0.0	0	0.0	0	0.0	0	0.0
LONGNOSE SUCKER	2	2.43	4	6.19	7	5.96	3	6.19	0	0.0	0	0.0
MUD MINNOW	0	0.0	0	0.0	19	0.11	0	0.0	0	0.0	0	0.0
NINESPINE STICKLEBACK	5	0.01	3	0.01	11	0.03	0	0.0	77	0.18	0	0.0
NORTHERN PIKE	2	0.67	0	0.0	0	0.0	0	0.0	0	0.0	3	1.99
PUMPKINSEED	2	0.00	2	0.00	7	0.03	0	0.0	0	0.0	0	0.0
RAINBOW SMELT	240	2.57	75	1.27	410	5.36	270	7.79	609	5.34	45	0.54
RAINBOW TROUT	0	0.0	1	0.13	0	0.0	0	0.0	5	0.06	0	0.0
ROCK BASS	0	0.0	1	0.15	0	0.0	0	0.0	0	0.0	0	0.0
SLIMY SCULPIN	252	2.11	106	0.76	1034	7.47	967	5.00	1792	8.44	285	1.95
SPOTTAIL SHINER	2317	18.09	1863	17.04	11652	109.99	888	9.45	707	5.85	187	2.04
TADPOLE MADTOM	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
TROUT-PERCH	144	2.15	34	0.46	170	1.91	7	0.09	852	5.75	281	2.32
UNIDENTIFIED COREGONID	7	0.05	0	0.0	3	0.06	0	0.0	10	0.49	0	0.0
UNIDENTIFIED PISCES	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
WHITE SUCKER	4	1.26	2	0.05	0	0.0	0	0.0	0	0.0	7	9.23
YELLOW BULLHEAD	0	0.0	1	0.01	0	0.0	0	0.0	0	0.0	0	0.0
YELLOW PERCH	1660	14.01	111	8.21	461	17.18	146	4.54	289	8.61	330	33.95
MONTHLY TOTALS	6020	107.58	2314	73.21	30194	886.95	4239	118.34	11659	298.55	32671	833.05

TABLE 22. ESTIMATES OF NUMBER AND WEIGHT OF EACH SPECIES OF FISH IMPINGED DURING EACH MONTH, JULY THROUGH OCTOBER 1976. THESE ESTIMATES WERE DERIVED BY MULTIPLYING EACH ENTRY IN THE PRECEDING CATCH TABLES BY M/N, WHERE M IS THE NO. OF DAYS IN EACH MONTH AND N IS THE NO. OF COLLECTING DAYS.

NO. OF COLLECTING DAYS	JULY 8 DAYS		AUGUST 7 DAYS		SEPTEMBER 8 DAYS		OCTOBER 8 DAYS		TOTALS, JAN.-OCT.	
	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)
ALEWIFE	28012	713.12	3826	90.56	3228	23.67	2356	12.28	94318	2607.39
BLACK BULLHEAD	0	0.0	0	0.0	0	0.0	3	0.15	29	1.29
BLACK CRAPPIE	0	0.0	0	0.0	0	0.0	0	0.0	5	0.51
BLUEGILL	0	0.0	0	0.0	0	0.0	7	0.09	12	0.17
BROWN TROUT	0	0.0	0	0.0	0	0.0	0	0.0	8	2.43
BURBOT	3	1.80	0	0.0	7	1.56	0	0.0	48	29.78
CARP	0	0.0	0	0.0	0	0.0	0	0.0	7	0.12
CHANNEL CATFISH	0	0.0	0	0.0	0	0.0	3	0.01	63	1.60
CHINOOK SALMON	0	0.0	0	0.0	0	0.0	0	0.0	8	0.90
COHO SALMON	0	0.0	0	0.0	0	0.0	0	0.0	18	4.31
FOURHORNED SCULPIN	0	0.0	0	0.0	0	0.0	0	0.0	5	0.01
GIZZARD SHAD	0	0.0	0	0.0	7	2.19	27	0.26	1387	61.54
GRASS PICKEREL	0	0.0	0	0.0	0	0.0	0	0.0	1	0.06
GREEN SUNFISH	0	0.0	0	0.0	0	0.0	0	0.0	5	0.05
HYBRID SUNFISH	0	0.0	0	0.0	0	0.0	0	0.0	7	0.18
JOHNNY DARTER	23	0.05	4	0.00	90	0.17	19	0.05	298	0.80
LAKE CHUB	0	0.0	0	0.0	3	0.01	0	0.0	4	0.02
LAKE TROUT	0	0.0	0	0.0	0	0.0	0	0.0	116	106.98
LARGEMOUTH BASS	0	0.0	0	0.0	3	0.05	0	0.0	3	0.05

TABLE 22 CONTINUED.

NO. OF COLLECTING DAYS	JULY 8 DAYS		AUGUST 7 DAYS		SEPTEMBER 8 DAYS		OCTOBER 8 DAYS		TOTALS, JAN.-OCT.	
	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)	NO.	WT. (KG)
LONGNOSE DACE	0	0.0	0	0.0	0	0.0	3	0.06	7	0.11
LONGNOSE SUCKER	0	0.0	8	0.08	0	0.0	0	0.0	24	20.85
MUD MINNOW	0	0.0	0	0.0	0	0.0	0	0.0	19	0.11
NINESPINE STICKLEBACK	0	0.0	0	0.0	0	0.0	3	0.01	99	0.24
NORTHERN PIKE	0	0.0	4	8.64	0	0.0	0	0.0	9	11.30
PUMPKINSEED	0	0.0	0	0.0	0	0.0	15	0.03	26	0.07
RAINBOW SMELT	193	2.36	84	1.73	7	0.12	112	0.59	2045	27.66
RAINBOW TROUT	3	0.12	0	0.0	0	0.0	0	0.0	9	0.31
ROCK BASS	0	0.0	0	0.0	0	0.0	0	0.0	1	0.15
SLIMY SCULPIN	271	1.76	181	1.05	345	1.70	151	1.09	5384	31.32
SPOTTAIL SHINER	426	3.82	274	2.49	1623	14.33	2952	30.53	22889	213.63
TADPOLE MADTOM	3	0.02	0	0.0	0	0.0	0	0.0	3	0.02
TROUT-PERCH	2057	17.21	531	4.69	3671	13.59	682	10.73	8429	58.89
UNIDENTIFIED COREGONID	19	0.79	0	0.0	0	0.0	7	0.03	46	1.41
UNIDENTIFIED PISCES	3	0.02	0	0.0	0	0.0	0	0.0	3	0.02
WHITE SUCKER	3	5.62	0	0.0	7	6.79	0	0.0	23	22.95
YELLOW BULLHEAD	0	0.0	0	0.0	0	0.0	0	0.0	1	0.01
YELLOW PERCH	2030	234.40	1523	149.76	5310	112.94	4123	81.63	15983	665.23
MONTHLY TOTALS	33046	981.09	6435	259.00	14301	177.14	10463	137.53	151342	3872.45

.ONALD C. COOK NUCLEAR PLANT

CIRCULATING WATER SYSTEM ENVIRONMENTAL DATA

MONTH JULY YEAR 1976

DAY	VOLUME PUMPED (gpm x 10^9)	MEAN FLOW RATE (gpmx10^6)	MEAN CURRENT VEL. (ft/sec)	MEAN ΔT (°F)	MEAN TEMPERATURE DISCHARGE (°F)	No. of Pumps Running ↓
1	1202	.835	.648	20.2	78.8	3
2	597	.415	.321	0.3	66.2	3
3	367	.255	.198	0.2	66.2	1
4	370	.257	.199	0.2	61.2	1
5	646	.449	.347	0.6	67.1	3
6	1126	.782	.606	5.7	74.2	3
7	1097	.762	.591	13.5	83.9	3
8	1089	.756	.588	14.5	84.7	3
9	1092	.758	.588	14.5	83.1	3
10	1105	.767	.594	14.2	85.6	3
11	1096	.761	.591	14.3	87.4	3
12	1097	.762	.591	14.5	85.0	3
13	1100	.764	.593	14.3	74.8	3
14	1100	.764	.593	18.1	87.9	3
15	1107	.769	.594	19.8	93.2	3
16	1105	.768	.591	19.9	93.9	3
17	1100	.764	.593	19.8	93.6	3
18	1097	.762	.591	19.9	94.4	3
19	1097	.762	.591	19.8	93.9	3
20	1111	.772	.597	19.8	94.3	3
21	1097	.762	.591	19.8	94.9	3
22	1102	.765	.593	19.7	92.9	3
23	1098	.763	.591	19.7	93.9	3
24	1099	.764	.593	19.6	93.8	3
25	1102	.765	.593	15.7	88.9	3
26	1102	.766	.593	19.8	94.0	3
27	1097	.762	.591	19.8	95.6	3
28	1102	.766	.593	19.7	95.3	3
29	1102	.765	.593	20.0	95.7	3
30	1109	.770	.597	19.9	95.6	3
31	1110	.771	.597	19.9	94.5	3

TOTAL FLOW 31,821 X10^9

NOTES:

RESPONSIBLE ENGINEER C. Antonowitsch

DONALD C. COOK NUCLEAR PL[illegible]T

CIRCULATING WATER SYSTEM ENVIRONMENTAL DATA

MONTH AUGUST YEAR 1976

DAY	VOLUME PUMPED (gpm x 10^9)	MEAN FLOW RATE(gpmx10^6)	MEAN CURRENT VEL (ft/sec)	MEAN ΔT (°F)	MEAN TEMPERATURE DISCHARGE (°F)	No. of Pumps Running
1	1109	.770	.597	19.3	73.7	3
2	1115	774	.600	19.3	87.3	3
3	1117	776	.602	19.9	90.0	3
4	1097	762	.591	19.7	92.8	3
5	1122	779	.605	20.0	93.8	3
6	1119	777	.604	20.0	93.7	3
7	1119	777	.603	20.0	91.5	3
8	1097	762	.591	19.8	90.5	3
9	1121	779	.605	19.9	91.9	3
10	1117	776	.602	19.9	92.1	3
11	1109	770	.597	20.0	92.8	3
12	1102	765	.593	19.9	93.2	3
13	1102	765	.593	20.1	93.9	3
14	1097	762	.591	19.6	93.9	3
15	1112	772	.598	20.2	91.9	3
16	1110	771	.597	19.9	91.9	3
17	1120	778	.604	20.0	92.4	3
18	1125	.781	.606	20.3	92.2	3
19	1122	.779	.606	20.0	92.9	3
20	1123	780	.606	19.6	93.3	3
21	1085	754	.585	19.2	92.7	3
22	1115	774	.601	19.6	93.2	3
23	1118	.777	.603	19.8	94.1	3
24	1123	.780	.606	19.4	90.7	3
25	1109	.770	.597	17.9	88.6	3
26	1106	.768	.595	19.9	93.3	3
27	1107	.769	.595	19.0	92.9	3
28	1122	.780	.605	20.0	94.3	3
29	1080	.750	.583	19.6	93.2	3
30	1132	.786	.610	20.1	92.2	3
31	1123	.780	.606	19.9	92.3	3

TOTAL FLOW 34,475 X 10^9

NOTES:

RESPONSIBLE ENGINEER C. Antonowitz

DONALD C. COOK NUCLEAR PLANT

CIRCULATING WATER SYSTEM ENVIRONMENTAL DATA

MONTH SEPTEMBER YEAR 1976

DAY	VOLUME PUMPED (gpm x 10^9)	MEAN FLOW RATE (gpm x 10^6)	MEAN CURRENT VEL (ft/sec)	MEAN ΔT (°F)	MEAN TEMPERATURE DISCHARGE (°F)	No. of Pumps Running
1	1.123	.780	.606	20.0	92.9	3
2	1.123	.780	.606	19.7	85.9	3
3	1.131	.786	.610	19.9	88.5	3
4	1.133	.787	.611	19.9	90.8	3
5	1.140	.792	.615	20.0	89.4	3
6	1.140	.792	.614	19.7	88.5	3
7	1.144	.795	.617	19.9	89.2	3
8	1.138	.790	.613	19.7	88.8	3
9	1.131	.785	.610	16.0	85.5	3
10	1.143	.794	.617	18.7	86.1	3
11	.459	.319	.248	9.0	69.6	1
12	.434	.302	.234	3.6	73.9	1
13	.422	.293	.227	6.6	76.7	1
14	.423	.294	.228	6.9	77.0	1
15	.422	.293	.227	4.1	74.3	1
16	.422	.293	.227	3.3	71.3	1
17	.413	.287	.222	2.6	71.2	1
18	.681	.473	.366	1.2	69.9	2
19	.883	.613	.475	3.0	72.0	2
20	1.175	.816	.634	19.1	88.7	3
21	1.178	.818	.634	19.7	88.2	3
22	1.179	.819	.636	19.8	87.2	3
23	1.167	.811	.630	19.7	87.0	3
24	1.175	.816	.634	19.8	86.7	3
25	1.175	.816	.634	19.7	86.0	3
26	1.175	.816	.634	19.7	86.1	3
27	1.158	.805	.625	19.7	86.4	3
28	1.165	.809	.629	19.6	84.9	3
29	1.176	.817	.634	19.7	85.3	3
30	1.171	.813	.631	19.7	85.4	3
31						

TOTAL FLOW 28.799 X 10^9

NOTES:

RESPONSIBLE ENGINEER [signature]

DONALD C. COOK NUCLEAR PL

CIRCULATING WATER SYSTEM ENVIRONMENTAL DATA

MONTH OCTOBER YEAR 1976

DAY	VOLUME PUMPED (gpm x 10⁹)	MEAN FLOW RATE (gpmx10⁶)	MEAN CURRENT VEL (ft/sec)	MEAN ΔT (°F)	MEAN TEMPERATURE DISCHARGE (°F)	No. of Pumps Running
1	1173	.815	.633	19.5	85.6	3
2	1169	.812	.631	19.5	85.7	3
3	1169	.812	.631	19.5	85.6	3
4	1172	.814	.632	19.7	85.6	3
5	1173	.815	.633	19.8	86.2	3
6	1165	.809	.629	19.8	84.9	3
7	1169	.812	.631	19.9	83.4	3
8	1179	.819	.636	19.5	83.5	3
9	1174	.814	.632	20.0	83.1	3
10	1168	.811	.630	19.8	82.3	3
11	1168	.811	.630	19.8	82.0	3
12	1174	.816	.634	19.8	82.0	3
13	1176	.817	.635	19.8	83.5	3
14	1178	.818	.635	19.8	82.0	3
15	1178	.818	.635	19.7	81.2	3
16	1174	.816	.634	19.5	80.4	3
17	1181	.820	.637	19.8	79.8	3
18	1179	.819	.635	19.7	80.1	3
19	1176	.817	.635	20.0	79.3	3
20	1173	.814	.632	19.6	78.6	3
21	1176	.817	.635	19.8	76.9	3
22	1182	.821	.637	19.8	74.3	3
23	1179	.819	.636	19.7	73.8	3
24	1179	.819	.636	19.9	74.3	3
25	1179	.819	.636	19.6	74.0	3
26	1179	.819	.636	19.4	74.8	3
27	1179	.819	.636	19.8	75.2	3
28	1171	.814	.632	20.2	74.5	3
29	1179	.819	.636	20.0	72.3	3
30	1179	.819	.636	19.9	73.3	3
31	1179	.819	.636	19.9	73.5	3

TOTAL FLOW 36.429 X10⁹

NOTES:

RESPONSIBLE ENGINEER C. Antonowitzk

DONALD C. COOK NUCLEAR PLANT

CIRCULATING WATER SYSTEM ENVIRONMENTAL DATA

MONTH NOVEMBER YEAR 1976

DAY	VOLUME PUMPED (gpm x 10⁹)	MEAN FLOW RATE (gpmx10⁶)	MEAN CURRENT VEL (ft/sec)	MEAN ΔT (°F)	MEAN TEMPERATURE DISCHARGE (°F)	No. of Pumps Running ↓
1	1179	.819	.636	19.8	72.5	3
2	1179	.819	.636	19.6	72.7	3
3	1182	.821	.637	19.6	72.0	3
4	1176	.817	.635	19.7	72.5	3
5	1177	.818	.634	19.7	70.0	3
6	1180	.820	.636	17.3	66.5	3
7	1179	.819	.636	14.8	64.6	3
8	1182	.821	.637	19.4	66.6	3
9	1179	.819	.636	17.9	65.3	3
10	1187	.824	.640	17.6	66.2	3
11	1179	.819	.636	19.3	68.0	3
12	1179	.819	.636	19.6	65.2	3
13	1185	.823	.639	19.8	65.2	3
14	1189	.826	.640	19.6	63.1	3
15	1189	.826	.640	19.6	63.2	3
16	1192	.828	.642	19.5	63.3	3
17	1195	.830	.644	19.4	62.9	3
18	1194	.829	.643	19.7	64.0	3
19	1194	.830	.644	17.0	61.7	3
20	.782	.543	.421	0.8	45.3	3
21	.384	.267	.207	0.3	44.8	1
22	.473	.328	.205	1.9	44.9	2
23	.836	.581	.451	5.4	46.6	3
24	1200	.833	.646	15.6	56.2	3
25	1192	.828	.643	15.6	57.6	3
26	1182	.821	.637	15.5	58.6	3
27	1188	.825	.639	15.5	60.8	3
28	1199	.833	.647	16.0	58.3	3
29	1200	.834	648	19.7	59.0	3
30	1205	.837	.649	19.5	57.6	3
31	—	—	—	—	—	

TOTAL FLOW 33,337 X 10⁹

NOTES:

RESPONSIBLE ENGINEER [signature]

DONALD C. COOK NUCLEAR PLANT

CIRCULATING WATER SYSTEM ENVIRONMENTAL DATA

MONTH DECEMBER YEAR 1976

DAY	VOLUME PUMPED (gpm x 10^9)	MEAN FLOW RATE (gpmx10^6)	MEAN CURRENT VEL (ft/sec)	MEAN ΔT (°F)	MEAN TEMPERATURE DISCHARGE (°F)	No. of Pumps Running
1	1199	833	647	20.1	58.9	3
2	1201	834	648	19.4	57.9	3
3	1175	816	634	19.5	58.4	3
4	1157	804	517	19.3	57.8	3
5	1136	789	613	19.7	55.5	3
6	1184	823	639	19.3	56.9	3
7	1182	821	636	19.8	57.4	3
8	1179	819	642	19.3	56.0	3
9	1203	836	649	18.9	54.2	3
10	1223	849	657	18.7	55.8	3
11	1215	844	655	19.7	57.0	3
12	1184	822	637	20.0	56.8	3
13	1201	834	646	19.8	56.5	3
14	1204	836	649	19.4	56.3	3
15	1236	859	666	18.6	58.3	3
16	1256	872	677	18.2	57.9	3
17	1238	860	668	17.9	56.5	3
18	1240	861	667	18.5	53.9	3
19	1179	819	636	17.8	55.0	3
20	1223	849	648	18.2	55.4	3
21	1253	870	675	19.2	55.9	3
22	1275	886	691	20.4	55.9	3
23	1209	839	651	18.4	55.1	3
24	—	—	—	1.0	35.7	1
25	—	—	—	0.7	35.3	1
26	—	—	—	0.2	34.6	1
27	—	—	—	—	—	1
28	—	—	—	—	34.0	1
29	—	—	—	—	—	1
30	—	—	—	—	—	1
31	—	—	—	—	—	1

TOTAL FLOW 26,595 X10^9

NOTES:

RESPONSIBLE ENGINEER C. Antonowitsch

Deicing Discharge Flow Through Middle Intake

Jan. 4, 1976	385 x 10^6 gal/day	Jan. 30, 1976	829 x 10^6 gal/day	Dec. 11, 1976	122 x 10^6 gal/day
5	661	31	832	12	118
6	813	Feb. 1, 1976	828	13	120
7	793	2	844	14	120
8	800	3	844	15	185
9	763	4	844	16	942
10	758	5	842	17	990
11	758	6	840	18	1116
12	758	7	470	19	1061
13	757	8	376	20	978
14	746	9	716	21	1002
15	771	10	753	22	1148
16	763	11	757	23	1088
17	754	12	776	24	None
18	753	13	775	25	None
19	785	14	768	26	None
20	766	15	776	27	105
21	771	16	746	28	105
22	748			29	105
23	826			30	105
24	787			31	105
25	828				
26	827				
27	829				
28	829				
29	824				

Circulating Water System Chlorination - 197

January 1976

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
	No		
	Chlorination		
2	0.05	0.07	0.03
	No		
	Chlorination		

February

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
	DEICING PRO		
	No		
	Chl[illegible]		
	N[illegible]		
1	0.06	0.06	0.06
	No Chlorination		

March

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.05	.07	.02
2	0	0	0
2	0	0	0
2	.06	.06	.05
2	.08	.09	.07
2	.04	.05	.03
2	.07	.07	.06
2	.06	.07	.05
2	.06	.07	.05
2	.05	.05	.05
2	.05	.08	.02
2	.06	.07	.05
2	.03	.03	.03
2	.05	.06	.04
2	.02	.02	.01
2	.02	.02	.02
2	.06	.07	.05
2	.07	.08	.05
2	.07	.08	.05
2	.07	.07	.05
2	.07	.08	.05
2	.06	.07	.04
2	.06	.09	.04
2	.07	.10	.03
2	.07	.07	.04
2	.05	.08	.02
2	.05	.06	.03
2	.05	.06	.03
2	.05	.08	.03
2	.05	.07	.03
2	.09	.10	.05

April

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.06	.08	.04
2	.05	.07	.03
2	.05	.06	.03
2	.04	.05	.02
2	.05	.07	.03
2	.03	.04	.02
2	.05	.06	.03
2	0	0	0
2	0	0	0
2	.05	.06	.03
2	.05	.07	.03
2	.06	.08	.04

May

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.05	.09	.02
2	.04	.07	.03
2	.05	.06	.03
2	.04	.08	.02
2	.04	.07	.02
2	.04	.05	.02
2	.04	.05	.02
2	.07	.09	.02
2	.07	.08	.05
2	.09	.09	.08
2	.04	.05	.04
2	.06	.08	.04
2	.05	.07	.02

June

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.07	.08	.07
2	.07	.07	.06
2	.04	.07	.02
2	.05	.05	.04
2	.07	.08	.06
2	.08	.09	.07
2	.05	.07	.02
2	.06	.07	.02
2	.06	.07	.06
2	.04	.04	.04
2	.07	.07	.06
2	.07	.08	.03
2	.06	.08	.03
2	.07	.07	.06
2	.08	.08	.08
2	.06	.08	.05
2	.08	.08	.07
2	.08	.08	.07
2	.07	.07	.06
2	.06	.07	.01
2	.06	.08	.04
2	.07	.07	.06
2	.06	.07	.06
2	.07	.08	.05
2	.17	.08	.06
2	.07	.08	.06
2	.07	.08	.06
2	.08	.08	.07
2	.07	.08	.06
2	.06	.07	.03

July

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
	OUT OF SERVICE		
2	.08	.08	.07
	OUT OF SERVICE		
2	.03	.04	.03
2	.02	.03	.02
2	.04	.04	.03
2	.05	.05	.04
2	.05	.06	.04
2	.05	.06	.04
2	.05	.06	.04
2	.05	.05	.04
2	.06	.07	.05
2	.05	.06	.05
2	.06	.08	.05
2	.06	.06	.05
2	.04	.04	.04
2	.04	.04	.04
2	.04	.05	.04
2	.04	.05	.04
2	.04	.04	.03
2	.04	.06	.03

August

CHLORINE-TOTAL MG/L — MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.05	.06	.04
2	.05	.05	.04
2	.05	.05	.04
2	.05	.05	.04
2	.05	.05	.04
2	.05	.06	.04
2	.05	.05	.05
2	.05	.05	.05
2	.05	.05	.05
2	.05	.05	.05
2	.04	.05	.04
2	.04	.06	.04
2	.04	.05	.04
2	.04	.04	.03
2	.04	.05	.03
2	.04	.04	.04
2	.04	.04	.04
2	.04	.05	.03
2	.04	.04	.03
2	.03	.04	.03
2	.05	.07	.04
2	.05	.06	.04
2	.05	.07	.04
2	.05	.06	.04
2	.05	.06	.04
2	.04	.05	.03
2	.04	.05	.03
2	.04	.04	.03
2	.04	.04	.03
2	.04	.04	.03
2	.04	.04	.03

September

CHLORINE-TOTAL: MG/L: MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
.2	.04	.04	.03
.2	.04	.05	.02
.2	.04	.05	.03
.2	.04	.05	.03
.2	.04	.05	.03
.2	.04	.05	.03
.2	.04	.05	.03
.2	.05	.05	.03
.2	.04	.04	.03
.2	.04	.04	.03
2	0	0	0
2	0	0	0
2	0	0	0
2	0	0	0
2	0	0	0
2	.04	.05	.04
2	.04	.05	.03
2	.04	.05	.03
2	.04	.06	.04

October

CHLORINE-TOTAL MG/L: MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.04	.05	04
2	.05	.06	03
2	.05	.07	05
2	.05	.06	04
2	.04	.05	04
2	.04	.05	03
2	0	0	0
2	0	0	0
2	.05	.05	03
2	.04	.05	04
2	.05	.06	04
2	.04	.04	04
2	.05	.06	04
2	.05	.05	04
2	.05	.05	04
2	.05	.07	04
2	.05	.07	05
2	.06	.07	05
2	.06	.07	05
2	.05	.06	05
2	.04	.05	04
2	.05	.06	04
2	.05	.06	06
2	.04	.06	04
2	.05	.05	04
2	.05	.05	04
2	.05	.06	04
2	.04	.04	03
1	.05	.06	03
2	.05	.05	04
2	.05	.05	04

November

CHLORINE-TOTAL: MG/L: MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.05	.06	.04
2	.04	.04	.03
2	.03	.04	.03
2	.03	.04	.02
2	.04	.05	.03
2	.03	.04	.03
2	.03	.03	.03
2	.03	.04	.03
2	.04	.06	.02
2	.04	.05	.03
2	.03	.03	.03
.2	.03	.03	.03
.2	.15	.15	.15
2	.04	.06	.01
2	.05	.08	.02
2	.06	.06	.05
2	.05	.07	.03
2	.06	.06	.06
2	.06	.07	.06
2	.06	.07	.05
2	.06	.06	.05

December

CHLORINE-TOTAL MG/L MAXIMUM 0.5

1	DAILY AVG.	HIGH	LOW
2	.06	.06	.05
2	.06	.06	.05
2	.05	.06	.03
2	.05	.06	.05
2	.05	.07	.04
2	.05	.06	.03
2	.05	.07	.05
2	.06	.08	.05
2	.05	.06	.04
2	.04	.05	.04
2	.04	09	.03
2	.02	03	.01
2	.02	03	.01

Circulating Water System Chlorination - 1976 (Cont')

Appendix C
Groundwater Monitoring

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 1A

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	10.6	8-30-76
Sulfate (SO_4), mg/l	0.82	8-30-76
Phosphate (PO_4), mg/l	9.0	8-30-76
pH, standard units	6.4	8-30-76
Conductivity, µmho	265	8-30-76
Nitrate (NO_3), mg/l	5.0	8-30-76
Iron (Fe), mg/l	0.25	8-30-76
Copper (Cu), mg/l	0	8-30-76
Static Water Level Elevation	605.54	8-30-76

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 2

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	2.2	8-30-76
Sulfate (SO_4), mg/l	2.4	8-30-76
Phosphate (PO_4), mg/l	6.5	8-30-76
pH, standard units	7.1	8-30-76
Conductivity, μmho	410	8-30-76
Nitrate (NO_3), mg/l	4.0	8-30-76
Iron (Fe), mg/l	0.1	8-30-76
Copper (Cu), mg/l	0	8-30-76
Static Water Level Elevation	Not Determined*	8-30-76

* Well not designed to determine static water level.

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 3

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	8.9	8-31-76
Sulfate (SO_4), mg/l	4.1	8-31-76
Phosphate (PO_4), mg/l	5.5	8-31-76
pH, standard units	7.2	8-31-76
Conductivity, µmho	505	8-31-76
Nitrate (NO_3), mg/l	0	8-31-76
Iron (Fe), mg/l	0.1	8-31-76
Copper (Cu), mg/l	0	8-31-76
Static Water Level Elevation	Not Determined *	

* Well not designed to determine static water level.

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 6

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	7.3	8-31-76
Sulfate (SO_4), mg/l	3.5	8-31-76
Phosphate (PO_4), mg/l	10.5	8-31-76
pH, standard units	7.0	8-31-76
Conductivity, µmho	655	8-31-76
Nitrate (NO_3), mg/l	0	8-31-76
Iron (Fe), mg/l	0.3	8-31-76
Copper (Cu), mg/l	0	8-31-76
Static Water Level Elevation	Not Determined	

* Well not designed to determine static water level.

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 7

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	10.2	8-30-76
Sulfate (SO_4), mg/l	48.6	8-30-76
Phosphate (PO_4), mg/l	13.5	8-30-76
pH, standard units	7.1	8-30-76
Conductivity, µmho	600	8-30-76
Nitrate (NO_3), mg/l	0	8-30-76
Iron (Fe), mg/l	0.4	8-30-76
Copper (Cu), mg/l	0	8-30-76
Static Water Level Elevation	Not Determined*	

* Well not designed to determine static water level.

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 8

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	20.6	8-30-76
Sulfate (SO_4), mg/l	29.6	8-30-76
Phosphate (PO_4), mg/l	7.5	8-30-76
pH, standard units	7.0	8-30-76
Conductivity, μmho	610	8-30-76
Nitrate (NO_3), mg/l	6.6	8-30-76
Iron (Fe), mg/l	0	8-30-76
Copper (Cu), mg/l	0	8-30-76
Static Water Level Elevation	604.66	8-30-76

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 11

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	177.2	8-30-76
Sulfate (SO_4), mg/l	146.5	8-30-76
Phosphate (PO_4), mg/l	4.5	8-30-76
pH, standard units	7.6	8-30-76
Conductivity, μmho	895	8-30-76
Nitrate (NO_3), mg/l	6.0	8-30-76
Iron (Fe), mg/l	0.4	8-30-76
Copper (Cu), mg/l	0	8-30-76
Static Water Level Elevation	591.37	8-30-76

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL 12

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	132.3	8-30-76
Sulfate (SO_4), mg/l	181.9	8-30-76
Phosphate (PO_4), mg/l	6	8-30-76
pH, standard units	7.6	8-30-76
Conductivity, μmho	760	8-30-76
Nitrate (NO_3), mg/l	4.0	8-30-76
Iron (Fe), mg/l	0.1	8-30-76
Copper (Cu), mg/l	0	8-30-76
Static Water Level Elevation	593.97	8-30-76

DONALD C. COOK NUCLEAR PLANT

BRIDGMAN, MICHIGAN

GROUND WATER MONITORING WELL Lake

CHEMICAL ANALYSIS PARAMETERS		DATE
Sodium (Na), mg/l	2.8	8-31-76
Sulfate (SO_4), mg/l	20.6	8-31-76
Phosphate (PO_4), mg/l	0	8-31-76
pH, standard units	8.0	8-31-76
Conductivity, µmho	265	8-31-76
Nitrate (NO_3), mg/l	0	8-31-76
Iron (Fe), mg/l	0	8-31-76
Copper (Cu), mg/l	0	8-31-76
Static Water Level Elevation	Not Required	8-31-76

Appendix D

Radioactive Release Data

<u>GASES</u>

Third Quarter	Fourth Quarter

A. Fission and Activation Gases

1. Total Released, curies

① 77.922 ± 2.030	253.475 ± 13.273

2. Average release rate, μCi/sec.

9.803	31.888

3. Percent of Technical Specification Limit

② .0464	.1776

4. Totals for each isotope released, curies elevated, batch releases

(Third Quarter)

Xe-133	77.820 ± 2.023
Xe-135	$2.492 \times 10^{-2} \pm 9.97 \times 10^{-4}$
Xe-133m	$7.051 \times 10^{-2} \pm 5.57 \times 10^{-3}$
Kr-85m	$2.521 \times 10^{-3} \pm 1.49 \times 10^{-4}$
Ar-41	$3.436 \times 10^{-4} \pm 6.63 \times 10^{-5}$
Kr-85	$3.330 \times 10^{-3} \pm 5.23 \times 10^{-4}$
③Kr-88	$< 2.206 \times 10^{-3}$

(Fourth Quarter)

Xe-133	201.046 ± 5.227
Xe-135	$.2710 \pm 1.09 \times 10^{-2}$
Xe-133m	$2.125 \pm 1.68 \times 10^{-1}$
Kr-85m	$1.321 \times 10^{-3} \pm 7.79 \times 10^{-5}$
Ar-41	$5.807 \times 10^{-4} \pm 1.12 \times 10^{-4}$
Kr-85	50.029 ± 7.866
Kr-88	$4.129 \times 10^{-3} \pm 7.10 \times 10^{-4}$

	Third Quarter	Fourth Quarter

B. Iodines

1. Total I-131 released, curies

   $1.720 \times 10^{-4} \pm 1.33 \times 10^{-5}$ | $1.727 \times 10^{-4} \pm 1.44 \times 10^{-5}$

2. Average release rate, μCi/sec.

   2.164×10^{-5} | 2.173×10^{-5}

3. Percent of Technical Specification Limit

   .00390 | .00391

4. Total Curies of each iodine isotope released.

   I-131 $1.714 \times 10^{-4} \pm 1.32 \times 10^{-5}$ | $1.653 \times 10^{-4} \pm 1.27 \times 10^{-5}$

   I-133 $6.030 \times 10^{-7} \pm 1.39 \times 10^{-7}$ | $7.417 \times 10^{-6} \pm 1.71 \times 10^{-6}$

C. Particulates

1. Total (half-life greater than 8 days), curies

   $< 2.4112 \times 10^{-6}$ | $< 2.4112 \times 10^{-6}$

2. Average release rate, μCi/sec.

   $< 3.033 \times 10^{-7}$ | $< 3.033 \times 10^{-7}$

3. Percent of Technical Specification Limit

   $< 5.459 \times 10^{-5}$ | $< 5.459 \times 10^{-5}$

4. Total release of each radionuclide, curies

   BA-140 $< 2.4112 \times 10^{-6}$ | $< 2.4112 \times 10^{-6}$

5. Gross Alpha released, curies

   $<3.609 \times 10^{-7}$ | $<3.609 \times 10^{-7}$

D. Tritum

1. Total released, curies

   $2.574 \times 10^{-3} \pm 8.37 \times 10^{-5}$ | $1.411 \times 10^{-3} \pm 4.59 \times 10^{-5}$

Third Quarter	Fourth Quarter
2. Average release rate, μCi/sec.	
3.238×10^{-4}	1.775×10^{-4}
3. Percent of MPC Limit	
4 .00381	.00209

LIQUIDS

Third Quarter		Fourth Quarter

E. Mixed Fission and Activation Products

1. Total release, curies

   $4.218 \times 10^{-2} \pm 2.21 \times 10^{-3}$ — [5] $1.755 \times 10^{-1} \pm 9.59 \times 10^{-3}$

2. Average concentration, μCi/ml

   1.539×10^{-9} — [5] 1.222×10^{-8}

3. Percent of Technical Specification Limit

   0.0980 — [5] .470

4. Total for each radionuclide released, curies

	Third Quarter	Fourth Quarter
Gross Beta	$3.536 \times 10^{-2} \pm 1.98 \times 10^{-3}$	$1.255 \times 10^{-1} \pm 7.03 \times 10^{-3}$
Co-58	$1.179 \times 10^{-2} \pm 3.54 \times 10^{-4}$	$4.127 \times 10^{-2} \pm 1.24 \times 10^{-3}$
Co-60	$4.418 \times 10^{-3} \pm 2.47 \times 10^{-4}$	$2.208 \times 10^{-2} \pm 1.24 \times 10^{-3}$
I-131	$7.529 \times 10^{-3} \pm 4.74 \times 10^{-4}$	$1.795 \times 10^{-2} \pm 1.13 \times 10^{-3}$
I-133	$2.447 \times 10^{-4} \pm 5.14 \times 10^{-5}$	$1.843 \times 10^{-4} \pm 3.87 \times 10^{-5}$
Cs-137	$1.006 \times 10^{-2} \pm 4.02 \times 10^{-4}$	$4.790 \times 10^{-2} \pm 1.92 \times 10^{-3}$
Cs-134	$6.469 \times 10^{-3} \pm 3.36 \times 10^{-4}$	$3.238 \times 10^{-2} \pm 1.68 \times 10^{-3}$
Mn-54	$8.331 \times 10^{-4} \pm 1.29 \times 10^{-4}$	$3.613 \times 10^{-3} \pm 5.60 \times 10^{-4}$
Cs-136	$3.058 \times 10^{-4} \pm 9.02 \times 10^{-5}$	$1.040 \times 10^{-3} \pm 3.07 \times 10^{-4}$
Cr-51	$2.118 \times 10^{-4} \pm 4.53 \times 10^{-5}$	$3.113 \times 10^{-3} \pm 6.66 \times 10^{-4}$
Nb-95	$1.055 \times 10^{-4} \pm 2.41 \times 10^{-5}$	$1.171 \times 10^{-3} \pm 2.67 \times 10^{-4}$
Zr-95	$2.139 \times 10^{-5} \pm 6.91 \times 10^{-6}$	$3.326 \times 10^{-4} \pm 1.07 \times 10^{-4}$
Sb-124	$< 1.77 \times 10^{-3}$	$2.849 \times 10^{-3} \pm 1.14 \times 10^{-5}$
Fe-59	$1.379 \times 10^{-4} \pm 3.83 \times 10^{-5}$	$1.277 \times 10^{-3} \pm 3.55 \times 10^{-4}$
Na-24	$1.899 \times 10^{-5} \pm 5.89 \times 10^{-6}$	[5] $1.098 \times 10^{-4} \pm 3.40 \times 10^{-5}$
I-135	$6.56 \times 10^{-6} \pm 2.04 \times 10^{-6}$	$<8.86 \times 10^{-5}$
Co-57	$8.059 \times 10^{-6} \pm 3.50 \times 10^{-6}$	$7.010 \times 10^{-5} \pm 3.04 \times 10^{-5}$

F. Tritum

1. Total released, curies

   83.503 ± 2.714 — 44.574 ± 1.449

2. Average concentration, μCi/ml

   3.047×10^{-6} — 3.104×10^{-6}

	Third Quarter	Fourth Quarter
3. Percent of MPC limit	⑥ .1016	⑥ .1035

G. Dissolved and Entrained Gases

	Third Quarter	Fourth Quarter
1. Total released, curies	.7254 ± .193	.2983 ± .081
2. Average concentration, μCi/mh	2.647×10^{-8}	2.077×10^{-8}
3. Percent of Technical Specification Limit	⑦	

4. Total for each radionuclide, curies

	Third Quarter	Fourth Quarter
Ar-41	$5.544 \times 10^{-5} \pm 1.48 \times 10^{-5}$	$5.161 \times 10^{-4} \pm 1.38 \times 10^{-4}$
Xe-133	$.7159 \pm 1.93 \times 10^{-1}$	$.2978 \pm 8.04 \times 10^{-2}$
Xe-135	$3.5990 \times 10^{-4} \pm 7.02 \times 10^{-5}$	$5.544 \times 10^{-6} \pm 1.08 \times 10^{-6}$
Xe-133m	$8.52 \times 10^{-3} \pm 1.70 \times 10^{-4}$	$<1.18 \times 10^{-3}$
Kr-85	$6.000 \times 10^{-4} \pm 1.32 \times 10^{-4}$	$<1.18 \times 10^{-3}$

H. Alpha Radioactivity, curies

	Third Quarter	Fourth Quarter
	$< 4.668 \times 10^{-3}$	$< 3.100 \times 10^{-3}$

I. Volumes

	Third Quarter	Fourth Quarter
1. Total volume, prior to dilution, liters	8.858×10^{5}	5.882×10^{5}
2. Total Dilution Water, liters	2.7403×10^{10}	1.436×10^{10}

J. Solid Waste, Semi-Annual

1. Evaporator Bottoms

65.09 cubic meters

3.655 curies

Third Quarter | Fourth Quarter

1. Continued

Co-58, Co-60 - Three shipments by truck to Sheffield, Illinois
Two to Barnnell, South Carolina by truck

Dry Compressible

47.465 cubic meters

19.44 curies

Co-58, Co-60 - Two shipments by truck to Sheffield, Illinois
Two shipments to Barnnell, South Carolina by truck

NOTES

1. Numbers following ± are estimates of sampling and analytical error.

2. Based on Technical Specifications Appendix B, 2.4.3.b quarterly beta dose limit. The gamma dose limit would yield .00535 for the third quarter and .0134 for the fourth quarter. The percent for the past twelve consecutive months using the beta dose limit is .337 and using the gamma dose limit is .0530.

3. All figures that are preceded by < are calculated from the minimum detectable concentration which can be seen by the instruments used for analysis.

4. Using 2×10^{-7} μCi/cc as the applicable limit.

5. Not including .437 curies of Na-24 released during secondary testing.

6. Using 3×10^{-3} as the applicable limit.

7. No limit established.

Batch Releases of Gaseous Waste

Release No.	Start	Time	Stop	Time
G-76-4	8/26	2215	8/26	2304
G-76-5	9/10	1309	9/10	1344
G-76-6	9/15	1118	9/15	1209
G-76-7	9/16	0728	9/16	1358
G-76-8	9/17	2109	9/17	2210
G-76-9	9/19	0315	9/19	1158
G-76-10	9/19	1640	9/19	2150
G-76-11	11/7	1305	11/7	1640
G-76-12	11/8	0959	11/8	1550
G-76-13	11/8	2120	11/8	2200
G-76-14	11/9	1400	11/9	1923
G-76-15	11/9	2205	11/10	0138
G-76-16	11/10	0350	11/10	0503
G-76-17	11/10	1820	11/10	2105
G-76-18	12/24	1600	12/31	2400*
G-76-19	12/24	1600	12/31	2400*
G-76-20	12/24	1600	12/31	2400*
G-76-21	12/27	1740	12/27	2319
G-76-22	12/28	0542	12/28	0815
G-76-23	12/28	1428	12/28	1559

*Simultaneous purge of the containment upper volume, lower volume and instrument room

First Quarter	Second Quarter

GASES

A. Fission and activation gases

1. Total released, curies

285.6498 ± 7.45	357.7766 ± 11.48

2. Average release rate, $\mu Ci/sec$

$36.73 \pm .95$	45.01 ± 1.46

3. Percent of Technical Specification Limit

.172 ①	.340 ①

4. Totals for each isotope released, curies, elevated, batch releases

(First Quarter)

Xe-133	285.268 ± 7.42
Xe-135	$1.811 \times 10^{-1} \pm 7.24 \times 10^{-3}$
Xe-133m	$5.613 \times 10^{-2} \pm 4.43 \times 10^{-3}$
Kr-85m	$2.325 \times 10^{-2} \pm 1.37 \times 10^{-3}$
Kr-87	$1.763 \times 10^{-3} \pm 3.53 \times 10^{-4}$
Ar-41	$3.005 \times 10^{-3} \pm 5.80 \times 10^{-4}$
Kr-85	$1.165 \times 10^{-1} \pm 1.83 \times 10^{-2}$
Kr-88	$< 4.06 \times 10^{-5}$

(Second Quarter)

Xe-133	203.0413 ± 5.28
Xe-135	154.5557 ± 6.18
Xe-133m	$.0763 \pm 6.03 \times 10^{-3}$
Kr-85m	$1.802 \times 10^{-2} \pm 1.06 \times 10^{-3}$
Kr-87	$< 9.84 \times 10^{-6}$
Ar-41	$8.935 \times 10^{-3} \pm 1.72 \times 10^{-3}$
Kr-85	$6.153 \times 10^{-2} \pm 9.66 \times 10^{-3}$
Kr-88	$1.488 \times 10^{-2} \pm 2.56 \times 10^{-3}$

B. Iodines

1. Total I-131 released, curies

$1.3571 \times 10^{-4} \pm 1.11 \times 10^{-5}$	$8.3310 \times 10^{-4} \pm 7.59 \times 10^{-5}$

2. Average release rate, $\mu Ci/sec$

$1.7452 \times 10^{-5} \pm 1.42 \times 10^{-6}$	$1.0481 \times 10^{-4} \pm 9.65 \times 10^{-6}$

First Quarter — Second Quarter

3. Percent of Technical Specifications limit

   .00314 — .0189

4. Total curies of each iodine isotope released

   I-131 $1.3571 \times 10^{-4} \pm 1.04 \times 10^{-5}$ — $8.3310 \times 10^{-4} \pm 6.41 \times 10^{-5}$

   I-133 $3.1943 \times 10^{-6} \pm 7.31 \times 10^{-7}$ — $5.1487 \times 10^{-5} \pm 1.18 \times 10^{-5}$

C. Particulates

1. Total (half-life greater than 8 days), curies

   $< 1.566 \times 10^{-13}$ — $< 1.566 \times 10^{-13}$

2. Average release rate, μCi/sec

   $< 1.992 \times 10^{-14}$ — $< 1.992 \times 10^{-14}$

3. Percent of Technical Specification limit

   $< 3.586 \times 10^{-12}$ — $< 3.586 \times 10^{-12}$

4. Total release of each radionuclide, curies

   $< 1.566 \times 10^{-13}$ — $< 1.566 \times 10^{-13}$

5. Gross alpha release, curies

   $< 3.57 \times 10^{-7}$ — $< 3.57 \times 10^{-7}$

D. Tritium

1. Total release, curies

   $9.7715 \times 10^{-2} \pm 3.18 \times 10^{-3}$ — $3.0752 \times 10^{-3} \pm 9.99 \times 10^{-5}$

2. Average release rate, μCi/sec

   $1.2566 \times 10^{-2} \pm 4.08 \times 10^{-4}$ — $3.8688 \times 10^{-4} \pm 1.26 \times 10^{-5}$

3. Percent of MPC limit

   .1479 (2) — .00455 (2)

First Quarter   Second Quarter

LIQUIDS

E. Mixed Fission and Activation Products

1. Total releasing curies

$1.847 \times 10^{-2} \pm 1.38 \times 10^{-3}$ $2.584 \times 10^{-2} \pm 1.95 \times 10^{-3}$ (3)

2. Average concentration, μCi/ml

$1.649 \times 10^{-9} \pm 1.23 \times 10^{-10}$ $1.581 \times 10^{-9} \pm 1.19 \times 10^{-10}$ (4)

3. Percent of Technical Specification limit

.229   .0471 (5)

4. Total for each radionuclide released, curies

Gross beta	$6.984 \times 10^{-3} \pm 3.91 \times 10^{-4}$	$1.257 \times 10^{-2} \pm 7.04 \times 10^{-4}$
Co-58	$4.729 \times 10^{-3} \pm 1.47 \times 10^{-4}$	$1.753 \times 10^{-2} \pm 5.43 \times 10^{-4}$
Co-60	$9.225 \times 10^{-4} \pm 5.17 \times 10^{-5}$	$2.466 \times 10^{-3} \pm 1.38 \times 10^{-4}$
I-131	$7.534 \times 10^{-3} \pm 4.75 \times 10^{-4}$	$2.122 \times 10^{-3} \pm 1.34 \times 10^{-4}$
I-133	$5.323 \times 10^{-5} \pm 1.14 \times 10^{-5}$	$8.694 \times 10^{-5} \pm 1.86 \times 10^{-5}$
Cs-137	$2.469 \times 10^{-3} \pm 9.88 \times 10^{-5}$	$1.517 \times 10^{-3} \pm 6.07 \times 10^{-5}$
Cs-134	$2.276 \times 10^{-3} \pm 1.18 \times 10^{-4}$	$8.437 \times 10^{-4} \pm 4.39 \times 10^{-5}$
Mn-54	$3.859 \times 10^{-4} \pm 5.98 \times 10^{-5}$	$3.634 \times 10^{-4} \pm 5.63 \times 10^{-5}$
Cs-136	$9.955 \times 10^{-5} \pm 2.94 \times 10^{-5}$	$2.146 \times 10^{-5} \pm 6.33 \times 10^{-6}$
Cr-51	$< 5.00 \times 10^{-5}$	$4.336 \times 10^{-4} \pm 9.28 \times 10^{-5}$
Zn-65	$< 1.54 \times 10^{-4}$	$9.730 \times 10^{-7} \pm 3.89 \times 10^{-7}$
Nb-95		$8.188 \times 10^{-5} \pm 2.31 \times 10^{-5}$
Zr-95		$3.030 \times 10^{-6} \pm 9.79 \times 10^{-7}$
Ce-139		$4.100 \times 10^{-5} \pm 1.64 \times 10^{-5}$
Ba-133		$2.249 \times 10^{-4} \pm 9.0 \times 10^{-5}$
Ba-140		$1.242 \times 10^{-5} \pm 5.0 \times 10^{-6}$
Sb-124		$4.921 \times 10^{-5} \pm 4.92 \times 10^{-7}$
Fe-59		$1.501 \times 10^{-5} \pm 4.17 \times 10^{-6}$
Na-24		$1.1410 \pm .354$
Sr-85		$2.227 \times 10^{-5} \pm 8.91 \times 10^{-6}$
Ag-110		$9.010 \times 10^{-6} \pm 3.60 \times 10^{-6}$

F. Tritium

1. Total released, curies

16.409 ± 0.53 47.578 ± 1.55

2. Average concentration, μCi/ml

$1.465 \times 10^{-6} \pm 4.76 \times 10^{-8}$ $2.911 \times 10^{-6} \pm 9.46 \times 10^{-8}$

	First Quarter	Second Quarter
3. Percent of MPC limit	0.0488 6	0.0970 6
G. Dissolved and Entrained Gases		
1. Total released, curies	$1.930 \times 10^{-4} \pm 5.02 \times 10^{-5}$	$0.2899 \pm 7.83 \times 10^{-2}$
2. Average concentration, μCi/ml	$5.666 \times 10^{-10} \pm 4.48 \times 10^{-12}$	$4.241 \times 10^{-8} \pm 4.79 \times 10^{-9}$
3. Percent of Technical Specification limit	7	7
4. Total for each radionuclide, curies		
Ar-41		$1.508 \times 10^{-5} \pm 4.03 \times 10^{-6}$
Xe-133	$1.654 \times 10^{-4} \pm 4.48 \times 10^{-5}$	$0.289 \pm 7.83 \times 10^{-2}$
Xe-133m		$7.642 \times 10^{-4} \pm 1.53 \times 10^{-5}$
Xe-135	$2.762 \times 10^{-5} \pm 5.39 \times 10^{-6}$	$3.183 \times 10^{-5} \pm 6.21 \times 10^{-6}$
Kr-85		$5.26 \times 10^{-5} \pm 1.16 \times 10^{-5}$
H. Alpha radioactivity, curies	$8.159 \times 10^{-5} \pm 1.71 \times 10^{-5}$	$5.784 \times 10^{-5} \pm 1.21 \times 10^{-5}$
I. Volumes		
1. Total volumes, prior to dilution, liters	4.506×10^{5} 8	6.764×10^{5} 9
2. Total dilution water, liters	1.1199×10^{10}	1.6346×10^{10} 10

First Quarter | Second Quarter

J. Solid Waste, Semi-Annual

I. Evaporator Bottoms

30.564 cubic meters

.284 curies

Co-58, Co-60 - Two shipments by truck to Moorehead, Kentucky

Dry Compressible

25.00 cubic meters

2.840 curies

Co-60 was the major nuclide.

Two shipments by truck to Sheffield

One shipment by truck to Moorehead, Kentucky

NOTES

1. Based on Technical Specifications 2.4.3.b Beta dose limit. Using the gamma does limit would yield .0199 in the first quarter and .0724 for the second quarter.

2. Using 2×10^{-7} µCi/cc as the applicable limit.

3. Not including the Na-24 released durinf secondary testing. Including the Na-24 released during secondary testing would give 1.1668 Ci ± .356.

4. Not including the Na-24 released during secondary testing. Including the Na-24 released during secondary testing and the additional dilution water would give 2.040×10^{-8} µCi/ml.

5. Not including Na-24 released during secondary testing. Na-24 released during secondary testing gives .280.

6. Using 3×10^{-3} as the applicable limit.

7. No limit established in Technical Specifications on dissolved and entrained gases.

8. Not including the draining of the spent fuel pit which was 3.402×10^{6} liters.

9. Not including the volume released during secondary side testing, which was 7.489×10^{6} liters.

10. Not including the volume of dilution water during testing of the secondary side, which was 3.9357×10^{10} liters.

Appendix E
Environmental Radiation Data

AIRBORNE IODINE-131 AND GROSS BETA IN AIR PARTICULATE FILTERS
Indicator Stations

Collection Date	ON-SITE 1 Volume (m^3)	ON-SITE 1 10^{-2} pCi/m^3 Gross Beta*	ON-SITE 1 10^{-2} pCi/m^3 I-131	ON-SITE 2 Volume (m^3)	ON-SITE 2 10^{-2} pCi/m^3 Gross Beta*	ON-SITE 2 10^{-2} pCi/m^3 I-131
07/02/76	267	3 ± 1	<10	321	3 ± 1	<10
07/09/76	270	4 ± 1	<10	340	4 ± 1	<10
07/16/76	265	3 ± 1	<10	325	3 ± 1	<10
07/23/76	255	3 ± 1	<10	330	4 ± 1	<10
07/30/76	275	3 ± 1	<10	330	4 ± 1	<10
08/06/76	255	3 ± 1	<10	325	4 ± 1	<10
08/13/76	245	5 ± 1	<10	320	4 ± 1	<10
08/20/76	200	4 ± 1	<10	325	3 ± 1	<10
08/27/76	200	6 ± 1	<10	335	5 ± 1	<10
09/03/76	195	3 ± 1	<10	330	3 ± 1	<10
09/11/76	220	5 ± 1	<10	375	3 ± 1	<10
09/18/76	180	6 ± 1	<10	320	4 ± 1	<10
09/25/76	170	4 ± 1	<10	325	4 ± 1	<10
10/02/76	180	6 ± 1	<10	300	6 ± 1	<10
10/09/76	160	6 ± 1	<10	315	6 ± 1	<10
10/16/76	160	10 ± 1	<10	315	10 ± 1	<10
10/24/76	150	6 ± 1	<10	315	8 ± 1	<10
10/30/76	145	23 ± 3	<10	320	19 ± 3	<10
11/06/76	140	8 ± 1	<10	310	17 ± 2	<10
11/13/76	135	19 ± 4	<10	310	16 ± 3	<10
11/20/76	105	12 ± 3	<10	310	16 ± 3	<10
11/27/76	270	19 ± 2	<10	305	16 ± 2	<10
12/04/76	265	9 ± 2	**	305	19 ± 3	**
12/11/76	255	19 ± 3	<10	325	<10	<10
12/17/76	235	13 ± 2	<10	285	5 ± 1	<10
12/23/76	215	7 ± 2		245	8 ± 2	

*(±2σ) **Sample lost in transit.
Data reported as "<" are at the 99% confidence level. All other data are at the 95% confidence level, all based on counting errors.

AIRBORNE IODINE-131 AND GROSS BETA IN AIR PARTICULATE FILTERS
Indicator Stations

Collection Date	ON-SITE 3 Volume (m^3)	ON-SITE 3 10^{-2} pCi/m^3 Gross Beta (±2σ)	ON-SITE 3 10^{-2} pCi/m^3 I-131	ON-SITE 4 Volume (m^3)	ON-SITE 4 10^{-2} pCi/m^3 Gross Beta (±2σ)	ON-SITE 4 10^{-2} pCi/m^3 I-131
07/02/76	267	2 ± 1	<10	296	3 ± 1	<10
07/09/76	265(a)	5 ± 1	<10	290	5 ± 1	<10
07/16/76	265	3 ± 1	<10	270	4 ± 1	<10
07/23/76	255	6 ± 1	<10	75	13 ± 3	<10
07/30/76	250	2 ± 1	<10	270 (a)	5 ± 1	<10
08/06/76	240	3 ± 1	<10	280 (a)	4 ± 1	<10
08/13/76	255	5 ± 1	<10	270 (a)	3 ± 1	<10
08/20/76	80(b)	5 ± 3	<10	330	3 ± 1	<10
08/27/76	295	5 ± 1	<10	275	7 ± 1	<10
09/03/76	305	2 ± 1	<10	275	4 ± 1	<10
09/11/76	330	3 ± 1	<10	315	5 ± 1	<10
09/18/76	290	4 ± 1	<10	275	4 ± 1	<10
09/25/76	305	2 ± 1	<10	285	3 ± 1	<10
10/02/76	295	5 ± 1	<10	280	5 ± 1	<10
10/09/76	285	10 ± 1	<10	275	5 ± 1	<10
10/16/76	285	15 ± 1	<10	275	9 ± 1	<10
10/24/76	285	6 ± 1	<10	255	11 ± 2	<10
10/30/76	290	24 ± 3	<10	260	22 ± 3	<10
11/06/76	295	21 ± 2	<10	265	12 ± 1	<10
11/13/76	290	18 ± 3	<10	265	14 ± 2	<10
11/20/76	290	14 ± 3	<10	265	15 ± 3	<10
11/27/76	290	20 ± 2	<10	260	18 ± 2	<10
12/04/76	280	17 ± 3	<10	250	17 ± 3	(c)
12/11/76	330	<10	<10	250	20 ± 3	<10
12/17/76	260	9 ± 2	<10	230	14 ± 2	<10
12/23/76	235	7 ± 2		210	8 ± 2	

Data reported as "<" are at the 99% confidence level. All other data are at the 95% confidence level, all based on counting errors.
(a) Volumetric equipment out-of-order. Average volume used for evaluation.
(b) Low volume - switch turned off.
(c) Sample lost in transit.

AIRBORNE IODINE-131 AND GROSS BETA IN AIR PARTICULATE FILTERS
Indicator Stations

Collection Date	ON-SITE 5 Volume (m^3)	ON-SITE 5 10^{-2} pCi/m^3 Gross Beta (±2σ)	ON-SITE 5 10^{-2} pCi/m^3 I-131	ON-SITE 6 Volume (m^3)	ON-SITE 6 10^{-2} pCi/m^3 Gross Beta (±2σ)	ON-SITE 6 10^{-2} pCi/m^3 I-131
07/02/76	270(a)	4 ± 1	<10	290	< 1	<10
07/09/76	270(a)	6 ± 1	<10	255	4 ± 1	<10
07/16/76	270(a)	4 ± 1	<10	260	4 ± 1	<10
07/23/76	(b)	(b)	(b)	260	4 ± 1	<10
07/30/76	270(a)	4 ± 1	<10	245	3 ± 1	<10
08/06/76	265(a)	5 ± 1	<10	(b)	---	(b)
08/13/76	260(a)	5 ± 1	<10	85	5 ± 2	<10
08/20/76	240	4 ± 1	<10	275	4 ± 1	<10
08/27/76	235	5 ± 1	<10	(b)	(b)	(b)
09/03/76	225	4 ± 1	<10	(b)	(b)	(b)
09/11/76	255	4 ± 1	<10	140	3 ± 1	<10
09/18/76	235	5 ± 1	<10	(b)	(b)	(b)
09/25/76	210	2 ± 1	<10	(b)	(b)	(b)
10/02/76	210	6 ± 1	<10	45	9 ± 5	<40(c)
10/09/76	200	4 ± 1	<10	120	7 ± 1	<10
10/16/76	185	13 ± 1	<10	165	33 ± 3	<10
10/24/76	180	8 ± 1	<10	265	5 ± 1	<10
10/30/76	175	25 ± 4	<10	260(a)	23 ± 2	<10
11/06/76	260(a)	8 ± 1	<10	260(a)	13 ± 1	<10
11/13/76	90	23 ± 5	<10	150	14 ± 3	<10
11/20/76	165	18 ± 3	<10	275	4 ± 1	<10
11/27/76	270	19 ± 2	<10	255	17 ± 2	<10
12/04/76	265	16 ± 3	<10	235	15 ± 2	(d)
12/11/76	270	11 ± 2	<10	285(a)	<10	<10
12/17/76	240	14 ± 2	<10	225(a)	2 ± 1	<10
12/23/76	230	7 ± 2		225(a)	< 1	

Data reported as "<" are at the 99% confidence level. All other data are at the 95% confidence level, all based on counting errors.
(a) Volumetric equipment out-of-order. Average volume used for evaluation. (b) System out-of-order.
(c) Lower sensitivity due to small sample. (d) Sample lost in transit.

AIRBORNE IODINE-131 AND GROSS BETA IN AIR PARTICULATE FILTERS
Background Stations

Collection Date	NEW BUFFALO Volume (m^3)	NEW BUFFALO 10^{-2} pCi/m^3 Gross Beta (±2σ)	NEW BUFFALO 10^{-2} pCi/m^3 I-131	SOUTH BEND Volume (m^3)	SOUTH BEND 10^{-2} pCi/m^3 Gross Beta (±2σ)	SOUTH BEND 10^{-2} pCi/m^3 I-131
07/02/76	100	3 ± 2	<10	275	3 ± 1	<10
07/09/76	(a)	(a)	(a)	800	4 ± 1	<10
07/16/76	(a)	(a)	(a)	275	4 ± 1	<10
07/23/76	(a)	(a)	(a)	275	3 ± 1	<10
07/30/76	75	<3	<10	265	4 ± 1	<10
08/06/76	265	4 ± 1	<10	270	4 ± 1	<10
08/13/76	250	4 ± 1	<10	270	5 ± 1	<10
08/20/76	240	4 ± 1	<10	270	3 ± 1	<10
08/27/76	235	7 ± 1	<10	275	5 ± 1	<10
09/03/76	215	3 ± 1	<10	275	4 ± 1	<10
09/11/76	275	5 ± 1	<10	315	3 ± 1	<10
09/18/76	220	6 ± 1	<10	270	5 ± 1	<10
09/25/76	285	3 ± 1	<10	290	2 ± 1	<10
10/02/76	205	7 ± 1	<10	285	5 ± 1	<10
10/09/76	215	4 ± 1	<10	270	6 ± 1	<10
10/16/76	185	13 ± 1	<10	265	8 ± 1	<10
10/24/76	200	5 ± 1	<10	275	5 ± 1	<10
10/30/76	105	66 ±10	<10	270	14 ± 2	<10
11/06/76	260(b)	20 ± 2	<10	270	15 ± 1	<10
11/13/76	260(b)	18 ± 2	<10	250	16 ± 3	<10
11/20/76	155	29 ± 5	<10	255	14 ± 3	<10
11/27/76	250	19 ± 2	<10	275	14 ± 2	<10
12/04/76	280	20 ± 3	<10	240	19 ± 3	(c)
12/11/76	265	<10	<10	255	21 ± 3	<10
12/17/76	195(b)	< 1	<10	225	12 ± 1	<10
12/23/76	225(b)	3 ± 1		205	7 ± 2	

Data reported as "<" are at the 99% confidence level. All other data are at the 95% confidence level, all based on counting errors.
(a) Station out-of-order. (b) Station out-of-order; average volume used for evaluation. (c) Sample lost in transit.

AIRBORNE IODINE-131 AND GROSS BETA IN AIR PARTICULATE FILTERS
Background Stations

Collection Date	DOWAGIAC Volume (m^3)	DOWAGIAC 10^{-2} pCi/m^3 Gross Beta (±2σ)	DOWAGIAC 10^{-2} pCi/m^3 I-131	COLOMA Volume (m^3)	COLOMA 10^{-2} pCi/m^3 Gross Beta (±2σ)	COLOMA 10^{-2} pCi/m^3 I-131
07/02/76	265	2 ± 1	<10	311	3 ± 1	<10
07/09/76	220	2 ± 1	<10	315	4 ± 1	<10
07/16/76	215	2 ± 1	<10	305	3 ± 1	<10
07/23/76	105	3 ± 2	<10	305	3 ± 1	<10
07/30/76	390	2 ± 1	<10	300	4 ± 1	<10
08/06/76	375	3 ± 1	<10	300	4 ± 1	<10
08/13/76	200	3 ± 1	<10	285	4 ± 1	<10
08/20/76	100(a)	3 ± 2	<10	300	3 ± 1	<10
08/27/76	315	3 ± 1	<10	285	6 ± 1	<10
09/03/76	305	3 ± 1	<10	300	2 ± 1	<10
09/11/76	340	4 ± 1	<10	325	4 ± 1	<10
09/18/76	290	3 ± 1	<10	285	5 ± 1	<10
09/25/76	280	2 ± 1	<10	225	4 ± 1	<10
10/02/76	290	3 ± 1	<10	290	5 ± 1	<10
10/09/76	275	4 ± 1	<10	285	4 ± 1	<10
10/16/76	270	4 ± 1	<10	285	10 ± 1	<10
10/24/76	265	7 ± 1	<10	275	4 ± 1	<10
10/30/76	265	16 ± 2	<10	275	47 ± 6	<10
11/06/76	265	6 ± 1	<10	270	18 ± 2	<10
11/13/76	260	9 ± 2	<10	280	18 ± 3	<10
11/20/76	240	5 ± 1	<10	275	16 ± 3	<10
11/27/76	255	9 ± 2	<10	285	18 ± 2	<10
12/04/76	215	9 ± 2	<10	275	12 ± 2	<10
12/11/76	320	12 ± 2	<10	275	13 ± 2	<10
12/17/76	280	4 ± 1	<10	250	< 1	<10
12/23/76	250	5 ± 2		210	9 ± 2	

Data reported as "<" are at the 99% confidence level. All other data are at the 95% confidence level, all based on counting errors.
(a) Low volume; switch turned off.

GAMMA ISOTOPIC (GeLi) ANALYSES OF
AIR PARTICULATE SAMPLES COMPOSITED MONTHLY

COMPOSITE OF INDICATOR STATIONS

Month	pCi/m^3 Be-7	Other Gamma Emitters*
July	0.8 ± 0.1	< .01
August	0.13± 0.01	< .01
September	0.07 ± 0.02	< .01
October	0.02 ± 0.01	< .01
November**	0.06 ± 0.02	< .01
December		

COMPOSITE OF BACKGROUND STATIONS

Month	pCi/m^3 Be-7	Other Gamma Emitters*
July	.06 ± .01	< .01
August	.10 ± .01	< .01
September	.02 ± .01	< .01
October	.06 ± .02	< .01
November**	.06 ± .02	< .01
December		

**Traces of Ru-103, Rh-102, Ce-141 detected at concentrations below reporting requirement
*The spectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

QUARTERLY TRITIUM AND MONTHLY GAMMA ISOTOPIC (GeLi) ANALYSES OF LAKE MICHIGAN WATERS

Collection Site	Collection Date	Gamma Isotopic pCi/1*	Quarterly Comp. HTO pCi/ml (±2σ)
Indicator Station	July 1976	< 10	
	Aug. 1976		
	Sept 1976	< 10	0.42 ± 0.10
	Oct. 1976	< 10	
	Nov. 1976	< 10	
	Dec. 1976		
Background Station	July 1976	< 10	
	Aug. 1976		
	Sept 1976	< 10	0.36 ± 0.10
	Oct. 1976	< 10	
	Nov. 1976	< 10	
	Dec. 1976		

STRONTIUM-89, STRONTIUM-90 AND GAMMA ISOTOPIC (GeLi) ANALYSES OF PRECIPITATION

Collection Site	Collection Date	Nuclides* Observed	Semi-Annual Comp. Sr-89	Semi-Annual Comp. Sr-90
Indicator	07/23/76	< 10		
	08/20/76	< 10		
	09/18/76	< 10		
	10/09/76	< 10		
	11/13/76	< 10		
	12/11/76	< 10		
Background	07/23/76	< 10		
	08/20/76	< 10		
	09/18/76	< 10		
	10/09/76	< 10		
	11/13/76	< 10		
	12/11/76	< 10		

*ND indicates gamma emitters other than natural radioactivity were not detected. Individual nuclides (Cs-134, Cs-137, Co-60, Ba-140, La-140, I-131) that may be attributable to plant operation are listed when detected. Unless otherwise noted, sensitivity for listed gamma emitters is <10 pCi/1.

GAMMA ISOTOPIC AND TRITIUM ANALYSIS OF WELL WATER

Collection Site	Collection Date	pCi/1 Tritium	pCi/1 Gamma Emitters*
ONS-1	10/12/76	300 ± 90	< 10
ONS-2	"	350 ± 140	< 10
ONS-3	"	220 ± 90	< 10
ONS-4	"	280 ± 90	< 10
ONS-5	"	340 ± 80	< 10
ONS-6	"	410 ± 80	< 10
ONS-7	"	250 ± 80	< 10

*The spectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

IODINE-131 IN MILK SAMPLES

Collection Site		pCi/1 as of collection date					
		07/16/76	08/13/76	09/11/76	10/09/76	11/06/76	12/04/76
Indicator Stations							
Bridgman	K2	< 0.5	< 3.0	< 0.5	< 0.5	< 0.5	< 1.1+
Scottsdale	K1	< 0.5	< 0:5	< 0.5	< 0.5	< 0.5	< 1.1+
Stevensville	K1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Stevensville	K2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0+
Background Stations							
Dowagiac	K1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.1+
South Bend	K1	< 0.5	< 0.5*	< 0.6**	< 0.5	< 0.5	< 0.5

*collected 08/20/76
**collected 09/18/76
+Damage and delay of samples in transit precludes obtaining higher sensitivity.

STRONTIUM-89* AND STRONTIUM-90 ANALYSES OF MILK SAMPLES
STRONTIUM-90 (pCi/l)

Collection Site	pCi/l 07/16/76	08/13/76	09/11/76	10/09/76
Indicator Stations				
Bridgman K2	6 ± 2	4 ± 2	4 ± 1	8 ± 2
Scottsdale K1	5 ± 2	5 ± 2	5 ± 1	6 ± 2
Stevensville K1	4 ± 2	3 ± 2	4 ± 1	3 ± 1
Stevensville K2	8 ± 3	< 1	3 ± 1	5 ± 2
Background Stations				
Dowagiac K1	5 ± 2	8 ± 3	9 ± 2	9 ± 2
South Bend K1	4 ± 2	8 ± 3(a)	8 ± 2(b)	5 ± 1

*Strontium-89 was determined on each sample and was <5 pCi/l unless otherwise noted.
(a)Collected 08/20/76
(b)Collected 09/18/76

GAMMA ISOTOPIC (GeLi) ANALYSES OF MILK SAMPLES

Collection Date	Collection Site		pCi/l K-40	pCi/l Cs-137	pCi/l Gamma*
07/16/76	Bridgman	K-2	1067 ± 27	<5	<5
07/16/76	Scottsdale	K-1	926 ± 79	<5	<5
07/16/76	Stevensdale	K-1	1074 ± 85	<5	<5
07/16/76	Stevensdale	K-2	1247 ± 29	4.3 ± 0.4	<5
07/16/76	Dowagiac	K-1	1033 ± 84	<5	<5
07/16/76	South Bend	K-1	969 ± 81	<5	<5
08/13/76	Bridgman	K-2	1219 ± 104	<10	<10
08/13/76	Scottsdale	K-1	930 ± 80	<10	<10
08/13/76	Stevensdale	K-1	923 ± 79	<10	<10
08/13/76	Stevensdale	K-2	1112 ± 36	<10	<10
08/13/76	Dowagiac	K-1	873 ± 77	<10	<10
08/20/76	South Bend	K-1	1064 ± 85	< 5	< 5
09/11/76	Bridgman	K-2	957 ± 114	<10	<10
09/11/76	Scottsdale	K-1	913 ± 111	<10	<10
09/11/76	Stevensdale	K-1	1037 ± 119	< 3	< 3
09/11/76	Stevensdale	K-2	1064 ± 120	< 3	< 3
09/11/76	Dowagiac	K-1	802 ± 52	<10	<10
09/18/76	South Bend	K-1	897 ± 110	< 5	< 5
10/09/76	Bridgman	K-2	1186 ± 127	<10	<10
10/09/76	Scottsdale	K-1	829 ± 54	<10	<10
10/09/76	Stevensdale	K-1	894 ± 110	< 5	< 5
10/09/76	Stevensdale	K-2	823 ± 106	< 5	< 5
10/09/76	Dowagiac	K-1	1051 ± 85	<10	<10
10/09/76	South Bend	K-1	1034 ± 119	<10	<10
11/06/76	Bridgman	K-2	1205 ± 128	<10	<10
11/06/76	Scottsdale	K-1	877 ± 109	<10	<10
11/06/76	Stevensdale	K-1	920 ± 112	<10	<10
11/06/76	Stevensdale	K-2	1068 ± 121	<10	<10
11/06/76	Dowagiac	K-1	928 ± 112	<10	<10
11/06/76	South Bend	K-1	949 ± 114	<10	<10

*The spectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

Sr-89, Sr-90 and Gamma Isotopic* Analyses of
Sediment Samples

Collection Site	Collection Date	pCi/g (dry) K-40	Cs-137	Sr-89	Sr-90
On-Site North	09/03/76	4 ± 1	< 1	< .05	< .015
Off-Site North	09/03/76	5 ± 1	< 1	< .05	< .013
On-Site South	09/03/76	6 ± 1	< 1	< .05	< .012
Off-Site South	09/03/76	8 ± 1	< 1	< .05	< .010

GAMMA ISOTOPIC* ANALYSIS OF FOOD CROPS

Collection Site	Collection Date	Sample Type	pCi/g (dry) Gamma Emitters
Local	10/01/76	Grapes	< 1
Local	10/01/76	Grape Leaves	< 1
Remove	10/01/76	Grape Leaves	< 1

*The spectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

GAMMA RADIATION
Quarterly

(Measured using Thermoluminescent Dosimeters)

Date Annealed: 06/24/76
Date Read: 10/12/76

Location	Measured mR/Week	Measured mR/Week
Control	1.15 ± 0.09	
Indicator Stations		
On-Site 1	1.39 ± 0.31	
On-Site 2	1.37 ± 0.14	
On-Site 3	1.23 ± 0.22	
On-Site 4	1.30 ± 0.10	
On-Site 5	1.47 ± 0.47	
On-Site 6	1.36 ± 0.08	
Background Stations		
Coloma	1.21 ± 0.21	
Dowagiac	1.15 ± 0.18	
South Bend	1.50 ± 0.12	
New Buffalo	1.50 ± 0.14	

LAKE WATER SAMPLES

The following is a listing of the minimum detectable activities from the samples taken from Benton Harbor, St. Joseph, Lake Township, Bridgman, New Buffalo, D. C. Cook Plant intakes and the lake meter north and south of the plant site.*

Isotope	µCi/ml
I-131	$< 1.17 \times 10^{-7}$
Cs-137	$< 1.62 \times 10^{-7}$
Cs-134	$< 1.44 \times 10^{-7}$
Co-60	$< 1.84 \times 10^{-7}$
Co-58	$< 1.11 \times 10^{-7}$
Cr-51	$< 1.11 \times 10^{-7}$
Mn-54	$< 9.56 \times 10^{-8}$
Zn-65	$< 3.41 \times 10^{-7}$

For Quarterly Composites

Sr-89	$< 3.80 \times 10^{-6}$
Sr-90	$< 3.40 \times 10^{-6}$
H3	$< 3.30 \times 10^{-6}$

*Analyzed by Cook Nuclear Plant staff.

Completed Environmental Radiation Monitoring Data for the Previous Report

GAMMA ISOTOPIC (GeLi) ANALYSES OF AIR PARTICULATE SAMPLES COMPOSITED MONTHLY

COMPOSITE OF INDICATOR STATIONS

Month	pCi/m^3 Be-7	pCi/m^3 Other Gamma Emitters*
January	<.11	< .01
February	.07 ± .004	< .01
March	.07 ± .01	< .01
April	.10 ± .01	< .01
May	.05 ± .01	< .01
June	.13 ± .01	< .01

COMPOSITE OF BACKGROUND STATIONS

Month	pCi/m^3 Be-7	pCi/m^3 Other Gamma Emitters*
January	<.6	< .01
February	.22 ± .01	< .01
March	<.01	< .01
April	.11 ± .01	< .01
May	.04 ± .01	< .01
June	.11 ± .01	< .01

*T[illegible]pectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

STRONTIUM-89 AND STRONTIUM-90 ANALYSES OF
AIR PARTICULATE SAMPLES COMPOSITED QUARTERLY

Collection Site	Collection Date	pCi/m^3 Sr-89	pCi/m^3 Sr-90
Indicator Stations	1st Quarter	<.002	<.001
	2nd Quarter	<.002	<.001
Background Stations	1st Quarter	<.001	.002 ± .001
	2nd Quarter	<.001	<.001

Data reported as "<" are at the 99% confidence level. All other data are at the 95% confidence level, all based on counting errors.

GAMMA RADIATION
(Quarterly)
(Measured using Thermoluminescent Dosimeters)

Date Annealed:	12/23/75	Date Annealed:	03/31/76
Date Read:	04/09/76	Date Read:	07/08/76

Location	Measured mR/Week	Measured mR/Week
Control	1.03 ± .11	0.86 ± .10
Indicator Stations		
On-Site 1	1.20 ± .14	1.01 ± .19
On-Site 2	1.88 ± .17	1.70 ± .08
On-Site 3	1.12 ± .08	1.06 ± .08
On-Site 4	1.03 ± .08	0.97 ± .07
On-Site 5	.90 ± .31	1.05 ± .05
On-Site 6	.95 ± .19	1.07 ± .05
Background Stations		
Coloma	.89 ± .09	0.97 ± .09
Dowagiac	.87 ± .10	0.94 ± .14
South Bend	1.09 ± .12	1.14 ± .12
New Buffalo	1.07 ± .09	1.15 ± .12

STRONTIUM-89* AND STRONTIUM-90 ANALYSES OF MILK SAMPLES

STRONTIUM-90 (pCi/l)

Collection Site		01/03/76	01/31/76	02/28/76	03/27/76	04/24/76	05/22/76	06/18/76
Indicator Stations								
Bridgman	K2	8 ± 3	6 ± 3	3 ± 1	4 ± 1	7 ± 2	11 ± 3	<2
Scottsdale	K1	7 ± 1	7 ± 2	2 ± 2	7 ± 2	6 ± 2	10 ± 2	4 ± 2
Stevensville	K1	<2	3 ± 3	3 ± 1	4 ± 2	5 ± 1	16 ± 3	3 ± 2
Stevensville	K2	2 ± 2	3 ± 1	5 ± 2	5 ± 2	4 ± 1	<1	<1
Background Stations								
Dowagiac	K1	10 ± 2	7 ± 2	17 ± 3**	18 ± 5(a)	9 ± 2	14 ± 3	14 ± 3
South Bend	K1	11 ± 3	6 ± 1	9 ± 2	8 ± 2	8 ± 4	7 ± 2	19 ± 4

*Strontium-89 was determined on each sample and was <5 pCi/l unless otherwise noted.
**Collected 02/07/76. (a) Sr-89 = <7.9 - low chemical yield.

TABLE VIII

IODINE-131 IN MILK SAMPLES (pCi/l)

Collection Site		01/03/76	01/31/76	02/28/76	03/27/76	04/24/76	05/22/76	06/18/76
Indicator Stations								
Bridgman	K2	<0.5	<0.5	<0.6(b)	<0.5	<0.5	<0.5	<0.7(c)
Scottsdale	K1	<0.5	<0.5	<0.7(b)	<0.5	<0.5	<0.5	<0.6(c)
Stevensville	K1	<0.5	<0.5	<1.0(c)	<0.5	<0.5	<0.5	<0.5
Stevensville	K2	<0.5	<0.5	<0.7(b)	<0.5	<0.5	<0.5	<1.9(c)
Background Stations								
Dowagiac	K1	<0.5	<0.5(a)	<1.0(b)	<0.5	<0.5	<0.5	<0.5
South Bend	K1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

(a) Collected 02/07/76
(b) Part of sample lost in shipment. Higher sensitivity not practical with residual sample.
(c) Lower sensitivity due to delay in shipment.

GAMMA ISOTOPIC (GeLi) ANALYSES OF MILK SAMPLES

Collection Date	Collection Site	pCi/l K-40	pCi/l Cs-137	pCi/l Gamma*
01-03-76	Bridgman K2	1160 ± 80	<5	<10
	Scottsdale K1	925 ± 110	<5	<10
	Stevensville K1	1000 ± 70	<5	<10
	Stevensville K2	990 ± 70	<5	<10
	Coloma K1	**	**	**
	Dowagiac K1	1340 ± 80	8 ± 2	<10
	South Bend K1	1000 ± 70	<5	<10
01-31-76	Bridgman K2	1100 ± 200	<5	<10
	Scottsdale K1	980 ± 115	<5	<10
	Stevensville K1	970 ± 150	<5	<10
	Stevensville K2	1200 ± 130	<5	<10
	Coloma K1	**	**	**
	Dowagiac K1(a)	1183 ± 35	10 ± 1	<10
	South Bend K1	990 ± 65	9 ± 2	<10
2-28-76	Dowagiac K-1	1157 ± 77	<5	<10
	Scottsdale K-1	875 ± 67	<5	<10
	Stevensville	1011 ± 72	<5	<10
	Stevensville K-2	1175 ± 76	<5	<10
	Bridgman K-2	974 ± 70	<5	<10
	South Bend K-1	1069 ± 73	6 ± 1	<10
03-27-76	Bridgman K-2	999 ± 72	<5	<10
	Scottsdale K-1	562 ± 51	<5	<10
	Stevensville K-1	954 ± 73	<5	<10
	Stevensville K-2	990 ± 72	<5	<10
	Dowagiac K-1	1262 ± 83	7 ± 2	<10
	South Bend K-1	648 ± 54	<5	<10
04-24-76	Bridgman K-2	1136 ± 88	<5	<10
	Scottsdale K-1	1034 ± 84	<5	<10
	Stevensville K-1	1051 ± 85	<5	<10
	Stevensville K-2	1202 ± 90	<5	<10
	Dowagiac K-1	1096 ± 86	<5	<10
	South Bend K-1	1089 ± 86	<5	<10

(a) collected 02/07/76

**Milk no longer produced at this station.

*The spectrum is computer scanned from ~20 to ~2000 KeV. Data listed as "<" are at the 3σ level, others are 2σ. Specifically included in the gamma analyses are Ce-144, Cr-51, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here.

GAMMA ISOTOPIC (GeLi) ANALYSES OF
MONTHLY LAKE WATER COMPOSITE SAMPLES

Month	Gamma Emitters pCi/l* Background Stations	Indicator Stations
January	<10	Not Available (ice)
February	<10	<10
March	<10	<10
April	<10	<10
May	<10	<10
June	<10	<10

TRITIUM IN QUARTERLY LAKE WATER
COMPOSITE SAMPLES

Period	Tritium pCi/l Background Stations	Indicator Stations
Jan. - Mar. 1976	560 ± 110	440 ± 100
Apr. - Jun. 1976	420 ± 200	340 ± 160

*The spectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

GAMMA ISOTOPIC ANALYSES OF MONTHLY
PRECIPITATION COMPOSITE SAMPLES

Month	Average pCi/m^2		pCi/1*	
	Bkg Station	Ind. Station	Bkg. Station	Ind. Station
January	<2000	<2000	<10	<10
February	<2000	<2000	<10	<10
March	<2000	<2000	<10	<10
April	<2000	<2000	<10	<10
May	<2000	<2000	<10	<10
June	<2000	<2000	<10	<10

STRONTIUM-89 AND STRONTIUM-90 IN
SEMI-ANNUAL PRECIPITATION COMPOSITE SAMPLES

	pCi/1 (3σ)	
	Sr-89	Sr-90
Indicator Stations	<2	<1
Background Stations	<2	<1

*The spectrum is computer scanned from ~20 to ~2000 KeV. Specifically included are Ce-144, Ba-La-140, Cs-134, Cs-137, Zr-Nb-95, Co-58, Co-60, Mn-54, Zn-65. Naturally occurring gamma emitters such as K-40 and Ra daughters are frequently detected but not listed here. Data listed as "<" are at the 3σ level, others are 2σ. Listed concentration is for Cs-137 and may be slightly more or less sensitive for other nuclides.

Appendix F
Meteorological Data

WIND ROSE FOR COOK 7-9/76 LOCATION 50FT DEG C/100M (180-30FT) -1.8/ -1.7

SPEEDS(MI/HR)

	0-3		4-7		8-12		13-18		19-23		24.PLUS			
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
22.5	0	0.0	5	.2	1	.0	0	0.0	0	0.0	0	0.0	6	.3
45.0	0	0.0	7	.3	10	.5	5	.2	0	0.0	0	0.0	22	1.0
67.5	0	0.0	3	.1	6	.3	0	0.0	0	0.0	0	0.0	9	.4
90.0	0	0.0	3	.1	2	.1	0	0.0	0	0.0	0	0.0	5	.2
112.5	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
135.0	1	.0	2	.1	2	.1	0	0.0	0	0.0	0	0.0	5	.2
157.5	0	0.0	3	.1	1	.0	0	0.0	0	0.0	0	0.0	4	.2
180.0	0	0.0	2	.1	1	.0	0	0.0	0	0.0	0	0.0	3	.1
202.5	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	0	0.0	2	.1
225.0	1	.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	3	.1
247.5	1	.0	2	.1	6	.3	0	0.0	0	0.0	0	0.0	9	.4
270.0	1	.0	9	.4	7	.3	2	.1	0	0.0	0	0.0	19	.9
292.5	2	.1	6	.3	2	.1	0	0.0	0	0.0	0	0.0	10	.5
315.0	2	.1	3	.1	3	.1	0	0.0	0	0.0	0	0.0	8	.4
337.5	2	.1	3	.1	1	.0	1	.0	0	0.0	0	0.0	7	.3
360.0	0	0.0	9	.4	12	.5	2	.1	0	0.0	0	0.0	23	1.0
	10	.5	60	2.7	56	2.6	10	.5	0	0.0	0	0.0	136	6.2

MEAN WIND SPEED 7.7

NUMBER OF UNINTERPRETABLE HOURS . 0

WIND ROSE FOR COOK 7-9/76 LOCATION 50FT DEG C/100M -1.6/ -1.5
(180-30FT)

	0-3		4-7		SPEEDS(MI/HR) 8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
90.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
112.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
135.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
157.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
180.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
202.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
225.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
247.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
270.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

MEAN WIND SPEED 0.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 50FT DEG C/100M -1.4/ -0.5
(180-30FT)

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	1	.0	12	.5	7	.3	2	.1	0	0.0	0	0.0	22	1.0
45.0	4	.2	19	.9	43	2.0	3	.1	0	0.0	0	0.0	69	3.1
67.5	3	.1	14	.6	16	.7	0	0.0	0	0.0	0	0.0	33	1.5
90.0	1	.0	10	.5	8	.4	0	0.0	0	0.0	0	0.0	19	.9
112.5	0	0.0	9	.4	10	.5	0	0.0	0	0.0	0	0.0	19	.9
135.0	1	.0	5	.2	9	.4	0	0.0	0	0.0	0	0.0	15	.7
157.5	4	.2	11	.5	2	.1	0	0.0	0	0.0	0	0.0	17	.8
180.0	2	.1	10	.5	6	.3	0	0.0	0	0.0	0	0.0	18	.8
202.5	1	.0	6	.3	0	0.0	0	0.0	0	0.0	0	0.0	7	.3
225.0	4	.2	11	.5	1	.0	0	0.0	0	0.0	0	0.0	16	.7
247.5	1	.0	11	.5	34	1.5	11	.5	0	0.0	0	0.0	57	2.6
270.0	2	.1	32	1.5	38	1.7	8	.4	0	0.0	0	0.0	80	3.6
292.5	2	.1	20	.9	9	.4	1	.0	1	.0	0	0.0	33	1.5
315.0	4	.2	5	.2	5	.2	3	.1	1	.0	0	0.0	18	.8
337.5	0	0.0	7	.3	14	.6	15	.7	0	0.0	0	0.0	36	1.6
360.0	3	.1	20	.9	32	1.5	21	1.0	1	.0	0	0.0	77	3.5
	33	1.5	202	9.2	234	10.7	64	2.9	3	.1	0	0.0	536	24.4

MEAN WIND SPEED 8.4

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 50FT DEG C/100M (180-30FT) -0.4/ 1.5

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS			
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
22.5	5	.2	11	.5	8	.4	0	0.0	0	0.0	0	0.0	24	1.1
45.0	4	.2	29	1.3	25	1.1	3	.1	0	0.0	0	0.0	61	2.8
67.5	4	.2	47	2.1	12	.5	2	.1	0	0.0	0	0.0	65	3.0
90.0	3	.1	35	1.6	18	.8	0	0.0	0	0.0	0	0.0	56	2.6
112.5	2	.1	20	.9	29	1.3	0	0.0	0	0.0	0	0.0	51	2.3
135.0	1	.0	16	.7	25	1.1	3	.1	0	0.0	0	0.0	45	2.1
157.5	2	.1	16	.7	5	.2	0	0.0	0	0.0	0	0.0	23	1.0
180.0	1	.0	30	1.4	9	.4	0	0.0	0	0.0	0	0.0	40	1.8
202.5	1	.0	39	1.8	3	.1	0	0.0	0	0.0	0	0.0	43	2.0
225.0	1	.0	34	1.5	23	1.0	0	0.0	0	0.0	0	0.0	58	2.6
247.5	3	.1	21	1.0	62	2.8	20	.9	4	.2	0	0.0	110	5.0
270.0	2	.1	22	1.0	23	1.0	20	.9	1	.0	1	.0	69	3.1
292.5	1	.0	7	.3	5	.2	0	0.0	0	0.0	0	0.0	13	.6
315.0	1	.0	18	.8	11	.5	6	.3	0	0.0	0	0.0	36	1.6
337.5	2	.1	12	.5	3	.1	3	.1	0	0.0	0	0.0	20	.9
360.0	2	.1	11	.5	12	.5	4	.2	0	0.0	0	0.0	29	1.3
	35	1.6	368	16.8	273	12.4	61	2.8	5	.2	1	.0	743	33.9

MEAN WIND SPEED 7.8

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 50FT DEG C/100M (180-30FT) 1.6 / 4.0

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS			
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
22.5	0	0.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	2	.1
45.0	1	.0	8	.4	0	0.0	0	0.0	0	0.0	0	0.0	9	.4
67.5	1	.0	9	.4	0	0.0	0	0.0	0	0.0	0	0.0	10	.5
90.0	0	0.0	17	.8	6	.3	0	0.0	0	0.0	0	0.0	23	1.0
112.5	2	.1	15	.7	10	.5	0	0.0	0	0.0	0	0.0	27	1.2
135.0	1	.0	19	.9	7	.3	0	0.0	0	0.0	0	0.0	27	1.2
157.5	0	0.0	16	.7	4	.2	0	0.0	0	0.0	0	0.0	20	.9
180.0	1	.0	20	.9	1	.0	0	0.0	0	0.0	0	0.0	22	1.0
202.5	0	0.0	16	.7	3	.1	0	0.0	0	0.0	0	0.0	19	.9
225.0	1	.0	19	.9	17	.8	0	0.0	0	0.0	0	0.0	37	1.7
247.5	0	0.0	7	.3	4	.2	9	.4	0	0.0	0	0.0	20	.9
270.0	1	.0	3	.1	6	.3	2	.1	0	0.0	0	0.0	12	.5
292.5	1	.0	2	.1	0	0.0	0	0.0	0	0.0	0	0.0	3	.1
315.0	1	.0	2	.1	0	0.0	1	.0	0	0.0	0	0.0	4	.2
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	10	.5	154	7.0	59	2.7	12	.5	0	0.0	0	0.0	235	10.7

MEAN WIND SPEED 6.9

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 50FT DEG C/100M (180-30FT) GT 4.0

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS			
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
90.0	2	.1	5	.2	0	0.0	0	0.0	0	0.0	0	0.0	7	.3
112.5	1	.0	9	.4	5	.2	0	0.0	0	0.0	0	0.0	15	.7
135.0	0	0.0	28	1.3	19	.9	0	0.0	0	0.0	0	0.0	47	2.1
157.5	0	0.0	41	1.9	10	.5	0	0.0	0	0.0	0	0.0	51	2.3
180.0	0	0.0	30	1.4	4	.2	0	0.0	0	0.0	0	0.0	34	1.5
202.5	0	0.0	19	.9	4	.2	0	0.0	0	0.0	0	0.0	23	1.0
225.0	0	0.0	4	.2	14	.6	0	0.0	0	0.0	0	0.0	18	.8
247.5	0	0.0	1	.0	0	0.0	2	.1	0	0.0	0	0.0	3	.1
270.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	3	.1	137	6.2	56	2.6	2	.1	0	0.0	0	0.0	198	9.0

MEAN WIND SPEED 6.9

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 . LOCATION 50FT ALL STABILITIES

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	6	.3	46	2.1	26	1.2	2	.1	0	0.0	0	0.0	80	3.6
45.0	9	.4	80	3.6	105	4.8	13	.6	0	0.0	0	0.0	207	9.4
67.5	8	.4	78	3.6	36	1.6	2	.1	0	0.0	0	0.0	124	5.7
90.0	7	.3	76	3.5	40	1.8	0	0.0	0	0.0	0	0.0	123	5.6
112.5	5	.2	57	2.6	56	2.6	0	0.0	0	0.0	0	0.0	118	5.4
135.0	5	.2	75	3.4	66	3.0	3	.1	0	0.0	0	0.0	149	6.8
157.5	6	.3	97	4.4	25	1.1	0	0.0	0	0.0	0	0.0	128	5.8
180.0	4	.2	96	4.4	26	1.2	0	0.0	0	0.0	0	0.0	126	5.7
202.5	2	.1	86	3.9	10	.5	0	0.0	0	0.0	0	0.0	98	4.5
225.0	7	.3	71	3.2	57	2.6	0	0.0	0	0.0	0	0.0	135	6.2
247.5	5	.2	44	2.0	118	5.4	44	2.0	4	.2	0	0.0	215	9.8
270.0	6	.3	78	3.6	93	4.2	32	1.5	1	.0	1	.0	211	9.6
292.5	7	.3	45	2.1	22	1.0	1	.0	1	.0	0	0.0	76	3.5
315.0	11	.5	83	3.8	31	1.4	11	.5	1	.0	0	0.0	137	6.2
337.5	6	.3	46	2.1	23	1.0	20	.9	0	0.0	0	0.0	95	4.3
360.0	5	.2	63	2.9	73	3.3	30	1.4	1	.0	0	0.0	172	7.8
	99	4.5	1121	51.1	807	36.8	158	7.2	8	.4	1	.0	2194	100.0

MISSING HOURS 14

MEAN WIND SPEED 7.7

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

WIND ROSE FOR COOK 7-9/76 LOCATION SOFT DIRECTION VS SPEED

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	6	.3	46	2.1	26	1.2	2	.1	0	0.0	0	0.0	80	3.6
45.0	9	.4	80	3.6	105	4.8	13	.6	0	0.0	0	0.0	207	9.4
67.5	8	.4	78	3.6	36	1.6	2	.1	0	0.0	0	0.0	124	5.7
90.0	7	.3	76	3.5	40	1.8	0	0.0	0	0.0	0	0.0	123	5.6
112.5	5	.2	57	2.6	56	2.6	0	0.0	0	0.0	0	0.0	118	5.4
135.0	5	.2	75	3.4	66	3.0	3	.1	0	0.0	0	0.0	149	6.8
157.5	6	.3	97	4.4	25	1.1	0	0.0	0	0.0	0	0.0	128	5.8
180.0	4	.2	96	4.4	26	1.2	0	0.0	0	0.0	0	0.0	126	5.7
202.5	2	.1	86	3.9	10	.5	0	0.0	0	0.0	0	0.0	98	4.5
225.0	7	.3	71	3.2	57	2.6	0	0.0	0	0.0	0	0.0	135	6.2
247.5	5	.2	44	2.0	118	5.4	44	2.0	4	.2	0	0.0	215	9.8
270.0	6	.3	78	3.6	93	4.2	32	1.5	1	.0	1	.0	211	9.6
292.5	7	.3	45	2.1	22	1.0	1	.0	1	.0	0	0.0	76	3.5
315.0	11	.5	83	3.8	31	1.4	11	.5	1	.0	0	0.0	137	6.2
337.5	6	.3	46	2.1	23	1.0	20	.9	0	0.0	0	0.0	95	4.3
360.0	5	.2	63	2.9	73	3.3	30	1.4	1	.0	0	0.0	172	7.8
	99	4.5	1121	51.1	807	36.8	158	7.2	8	.4	1	.0	2194	100.0

MISSING HOURS 14

MEAN WIND SPEED 7.7

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

MISSING SPEEDS 6 PERCENT .3
MISSING DIRECTIONS 14 PERCENT .6

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M (180-30FT) LE-1.9

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	0	0.0	8	.4	42	2.0	15	.7	3	.1	0	0.0	68	3.2
45.0	0	0.0	1	.0	11	.5	3	.1	0	0.0	0	0.0	15	.7
67.5	0	0.0	1	.0	3	.1	0	0.0	0	0.0	0	0.0	4	.2
90.0	0	0.0	6	.3	8	.4	0	0.0	0	0.0	0	0.0	14	.7
112.5	0	0.0	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	2	.1
135.0	0	0.0	2	.1	2	.1	0	0.0	0	0.0	0	0.0	4	.2
157.5	0	0.0	1	.0	7	.3	0	0.0	0	0.0	0	0.0	8	.4
180.0	1	.0	4	.2	9	.4	6	.3	0	0.0	0	0.0	20	.9
202.5	0	0.0	0	0.0	1	.0	2	.1	0	0.0	0	0.0	3	.1
225.0	0	0.0	0	0.0	4	.2	7	.3	0	0.0	0	0.0	11	.5
247.5	0	0.0	1	.0	5	.2	5	.2	1	.0	0	0.0	12	.6
270.0	0	0.0	6	.3	14	.7	3	.1	0	0.0	0	0.0	23	1.1
292.5	1	.0	8	.4	5	.2	0	0.0	0	0.0	0	0.0	14	.7
315.0	2	.1	26	1.2	22	1.0	5	.2	0	0.0	0	0.0	55	2.6
337.5	1	.0	18	.8	14	.7	6	.3	1	.0	0	0.0	40	1.9
360.0	0	0.0	11	.5	23	1.1	8	.4	0	0.0	0	0.0	42	2.0
	5	.2	93	4.4	172	8.1	60	2.8	5	.2	0	0.0	335	15.8

SPEEDS(MI/HR)

MEAN WIND SPEED 9.6

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M (180-30FT) -1.8/ -1.7

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS			
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
22.5	0	0.0	3	.1	18	.8	8	.4	3	.1	0	0.0	32	1.5
45.0	0	0.0	0	0.0	5	.2	4	.2	0	0.0	0	0.0	9	.4
67.5	0	0.0	2	.1	4	.2	0	0.0	0	0.0	0	0.0	6	.3
90.0	0	0.0	1	.0	3	.1	0	0.0	0	0.0	0	0.0	4	.2
112.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
135.0	0	0.0	2	.1	1	.0	1	.0	0	0.0	0	0.0	4	.2
157.5	0	0.0	0	0.0	1	.0	1	.0	0	0.0	0	0.0	2	.1
180.0	0	0.0	2	.1	3	.1	1	.0	0	0.0	0	0.0	6	.3
202.5	1	.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	3	.1
225.0	0	0.0	0	0.0	2	.1	1	.0	0	0.0	0	0.0	3	.1
247.5	1	.0	3	.1	8	.4	3	.1	0	0.0	0	0.0	15	.7
270.0	0	0.0	5	.2	6	.3	2	.1	0	0.0	0	0.0	13	.6
292.5	0	0.0	2	.1	1	.0	0	0.0	0	0.0	0	0.0	3	.1
315.0	1	.0	2	.1	2	.1	2	.1	0	0.0	0	0.0	7	.3
337.5	2	.1	5	.2	1	.0	0	0.0	1	.0	0	0.0	9	.4
360.0	0	0.0	3	.1	5	.2	4	.2	1	.0	0	0.0	13	.6
	5	.2	31	1.5	61	2.9	27	1.3	5	.2	0	0.0	129	6.1

MEAN WIND SPEED 10.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M (180-30FT) -1.6/ -1.5

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
90.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
112.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
135.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
157.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
180.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
202.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
225.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
247.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
270.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

MEAN WIND SPEED 0.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M -1,4/ -0,5
(180-30FT)

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22,5	4	,2	16	,8	18	,8	26	1,2	2	,1	1	,0	67	3,2
45,0	0	0,0	9	,4	23	1,1	20	,9	2	,1	1	,0	59	2,6
67,5	0	0,0	8	,4	12	,6	2	,1	0	0,0	0	0,0	22	1,0
90,0	1	,0	9	,4	12	,6	2	,1	0	0,0	0	0,0	24	1,1
112,5	0	0,0	3	,1	5	,2	0	0,0	0	0,0	0	0,0	8	,4
135,0	1	,0	0	0,0	2	,1	3	,1	0	0,0	0	0,0	6	,3
157,5	1	,0	3	,1	7	,3	3	,1	0	0,0	0	0,0	14	,7
180,0	1	,0	2	,1	6	,3	13	,6	0	0,0	0	0,0	22	1,0
202,5	2	,1	4	,2	11	,5	0	0,0	0	0,0	0	0,0	17	,8
225,0	1	,0	4	,2	13	,6	9	,4	0	0,0	0	0,0	27	1,3
247,5	1	,0	5	,2	29	1,4	24	1,1	6	,3	0	0,0	65	3,1
270,0	1	,0	17	,8	25	1,2	10	,5	2	,1	1	,0	56	2,6
292,5	1	,0	11	,5	9	,4	2	,1	1	,0	0	0,0	24	1,1
315,0	1	,0	1	,0	3	,1	3	,1	0	0,0	1	,0	9	,4
337,5	4	,2	1	,0	7	,3	13	,6	9	,4	3	,1	37	1,7
360,0	1	,0	8	,4	15	,7	25	1,2	10	,5	11	,5	70	3,3
	20	,9	101	4,8	197	9,3	155	7,3	32	1,5	18	,8	523	24,7

MEAN WIND SPEED 11,5

NUMBER OF UNINTERPRETABLE HOURS 0

F 12

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M -0.4/ 1.5 (180-30FT)

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	1	.0	5	.2	21	1.0	13	.6	1	.0	0	0.0	41	1.9
45.0	4	.2	12	.6	49	2.3	13	.6	2	.1	0	0.0	80	3.8
67.5	0	0.0	11	.5	42	2.0	4	.2	0	0.0	0	0.0	57	2.7
90.0	1	.0	10	.5	23	1.1	25	1.2	0	0.0	0	0.0	59	2.8
112.5	3	.1	6	.3	7	.3	5	.2	0	0.0	0	0.0	21	1.0
135.0	0	0.0	4	.2	10	.5	9	.4	0	0.0	0	0.0	23	1.1
157.5	1	.0	4	.2	4	.2	6	.3	0	0.0	0	0.0	15	.7
180.0	0	0.0	2	.1	17	.8	12	.6	1	.0	0	0.0	32	1.5
202.5	1	.0	5	.2	30	1.4	38	1.8	1	.0	0	0.0	75	3.5
225.0	2	.1	1	.0	26	1.2	34	1.6	1	.0	2	.1	66	3.1
247.5	3	.1	10	.5	18	.8	38	1.8	16	.8	4	.2	89	4.2
270.0	2	.1	7	.3	20	.9	14	.7	13	.6	6	.3	62	2.9
292.5	0	0.0	2	.1	5	.2	6	.3	0	0.0	0	0.0	13	.6
315.0	1	.0	14	.7	9	.4	11	.5	3	.1	0	0.0	38	1.8
337.5	2	.1	3	.1	6	.3	4	.2	2	.1	0	0.0	17	.8
360.0	1	.0	3	.1	10	.5	10	.5	1	.0	3	.1	28	1.3
	22	1.0	99	4.7	297	14.0	242	11.4	41	1.9	15	.7	716	33.8

MEAN WIND SPEED 11.9

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M (180-30FT) 1.6 / 4.0

SPEEDS(MI/HR)

	0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	1	.0	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	3	.1
45.0	2	.1	4	.2	8	.4	0	0.0	0	0.0	0	0.0	14	.7
67.5	1	.0	5	.2	15	.7	0	0.0	0	0.0	0	0.0	21	1.0
90.0	1	.0	3	.1	11	.5	9	.4	0	0.0	0	0.0	24	1.1
112.5	1	.0	4	.2	3	.1	3	.1	0	0.0	0	0.0	11	.5
135.0	0	0.0	4	.2	6	.3	5	.2	0	0.0	0	0.0	15	.7
157.5	0	0.0	1	.0	5	.2	8	.4	0	0.0	0	0.0	14	.7
180.0	0	0.0	0	0.0	11	.5	11	.5	1	.0	0	0.0	23	1.1
202.5	0	0.0	3	.1	1	.0	24	1.1	0	0.0	0	0.0	28	1.3
225.0	0	0.0	2	.1	1	.0	20	.9	0	0.0	0	0.0	23	1.1
247.5	0	0.0	5	.2	6	.3	5	.2	4	.2	4	.2	24	1.1
270.0	2	.1	4	.2	5	.2	3	.1	1	.0	3	.1	18	.8
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	2	.1
337.5	0	0.0	1	.0	1	.0	0	0.0	1	.0	0	0.0	3	.1
360.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
	8	.4	37	1.7	77	3.6	88	4.1	7	.3	7	.3	224	10.6

MEAN WIND SPEED 11.8

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DEG C/100M (180-30FT) GT 4.0

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	2	.1	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	3	.1
67.5	0	0.0	1	.0	2	.1	0	0.0	0	0.0	0	0.0	3	.1
90.0	0	0.0	2	.1	9	.4	0	0.0	0	0.0	0	0.0	11	.5
112.5	2	.1	2	.1	14	.7	5	.2	0	0.0	0	0.0	23	1.1
135.0	1	.0	2	.1	12	.6	3	.1	0	0.0	0	0.0	18	.8
157.5	0	0.0	3	.1	7	.3	16	.8	1	.0	0	0.0	27	1.3
180.0	2	.1	2	.1	16	.8	31	1.5	0	0.0	0	0.0	51	2.4
202.5	1	.0	1	.0	3	.1	15	.7	1	.0	0	0.0	21	1.0
225.0	0	0.0	3	.1	8	.4	11	.5	0	0.0	0	0.0	22	1.0
247.5	0	0.0	2	.1	7	.3	2	.1	0	0.0	0	0.0	11	.5
270.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	2	.1	3	.1
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0
	8	.4	20	.9	79	3.7	83	3.9	2	.1	2	.1	194	9.1

MEAN WIND SPEED 11.7

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT ALL STABILITIES

	SPEEDS(MI/HR)													
	0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCFNT		
22.5	6	.3	32	1.5	101	4.8	62	2.9	9	.4	1	.0	211	9.9
45.0	8	.4	27	1.3	96	4.5	40	1.9	4	.2	1	.0	176	8.3
67.5	1	.0	28	1.3	78	3.7	6	.3	0	0.0	0	0.0	113	5.3
90.0	3	.1	31	1.5	66	3.1	36	1.7	0	0.0	0	0.0	136	6.4
112.5	6	.3	15	.7	31	1.5	13	.6	0	0.0	0	0.0	65	3.1
135.0	2	.1	14	.7	33	1.6	21	1.0	0	0.0	0	0.0	70	3.3
157.5	2	.1	12	.6	31	1.5	34	1.6	1	.0	0	0.0	80	3.8
180.0	4	.2	12	.6	62	2.9	74	3.5	2	.1	0	0.0	154	7.3
202.5	5	.2	14	.7	47	2.2	79	3.7	2	.1	0	0.0	147	6.9
225.0	3	.1	10	.5	54	2.5	82	3.9	1	.0	2	.1	152	7.2
247.5	5	.2	26	1.2	73	3.4	77	3.6	27	1.3	8	.4	216	10.2
270.0	5	.2	39	1.8	71	3.3	32	1.5	16	.8	12	.6	175	8.3
292.5	2	.1	23	1.1	20	.9	8	.4	1	.0	0	0.0	54	2.5
315.0	5	.2	44	2.1	37	1.7	21	1.0	3	.1	1	.0	111	5.2
337.5	9	.4	28	1.3	29	1.4	23	1.1	14	.7	3	.1	106	5.0
360.0	2	.1	26	1.2	54	2.5	47	2.2	12	.6	14	.7	155	7.3
	68	3.2	381	18.0	883	41.6	655	30.9	92	4.3	42	2.0	2121	100.0

MISSING HOURS 87

MEAN WIND SPEED 11.3

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

WIND ROSE FOR COOK 7-9/76 LOCATION 150FT DIRECTION VS SPEED

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	6	.3	32	1.5	101	4.8	62	2.9	9	.4	1	.0	211	9.9
45.0	8	.4	27	1.3	96	4.5	40	1.9	4	.2	1	.0	176	8.3
67.5	1	.0	28	1.3	78	3.7	6	.3	0	0.0	0	0.0	113	5.3
90.0	3	.1	31	1.5	66	3.1	36	1.7	0	0.0	0	0.0	136	6.4
112.5	6	.3	15	.7	31	1.5	13	.6	0	0.0	0	0.0	65	3.1
135.0	2	.1	14	.7	33	1.6	21	1.0	0	0.0	0	0.0	70	3.3
157.5	2	.1	12	.6	31	1.5	34	1.6	1	.0	0	0.0	80	3.8
180.0	4	.2	12	.6	62	2.9	74	3.5	2	.1	0	0.0	154	7.3
202.5	5	.2	14	.7	47	2.2	79	3.7	2	.1	0	0.0	147	6.9
225.0	3	.1	10	.5	54	2.5	82	3.9	1	.0	2	.1	152	7.2
247.5	5	.2	26	1.2	73	3.4	77	3.6	27	1.3	8	.4	216	10.2
270.0	5	.2	39	1.8	71	3.3	32	1.5	16	.8	12	.6	175	8.3
292.5	2	.1	23	1.1	20	.9	8	.4	1	.0	0	0.0	54	2.5
315.0	5	.2	44	2.1	37	1.7	21	1.0	3	.1	1	.0	111	5.2
337.5	9	.4	28	1.3	29	1.4	23	1.1	14	.7	3	.1	106	5.0
360.0	2	.1	26	1.2	54	2.5	47	2.2	12	.6	14	.7	155	7.3
	68	3.2	381	18.0	883	41.6	655	30.9	92	4.3	42	2.0	2121	100.0

MISSING HOURS 87

MEAN WIND SPEED 11.3

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

MISSING SPEEDS 20 PERCENT .9
MISSING DIRECTIONS 83 PERCENT 3.9

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT DEG C/100M (160-30FT) LE=1.9

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	0	0.0	2	.1	1	.0	0	0.0	0	0.0	0	0.0	3	.1
45.0	0	0.0	5	.2	5	.2	1	.0	0	0.0	0	0.0	11	.5
67.5	1	.0	3	.1	1	.0	0	0.0	0	0.0	0	0.0	5	.2
90.0	1	.0	6	.3	14	.6	0	0.0	0	0.0	0	0.0	21	1.0
112.5	0	0.0	3	.1	3	.1	1	.0	0	0.0	0	0.0	7	.3
135.0	1	.0	3	.1	12	.5	0	0.0	0	0.0	0	0.0	16	.7
157.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
180.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
202.5	0	0.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	2	.1
225.0	0	0.0	1	.0	3	.1	2	.1	0	0.0	0	0.0	6	.3
247.5	0	0.0	0	0.0	1	.0	1	.0	3	.1	0	0.0	5	.2
270.0	0	0.0	2	.1	3	.1	4	.2	0	0.0	0	0.0	9	.4
292.5	0	0.0	0	0.0	1	.0	1	.0	0	0.0	0	0.0	2	.1
315.0	1	.0	3	.1	3	.1	6	.3	4	.2	1	.0	18	.8
337.5	0	0.0	3	.1	0	0.0	0	0.0	0	0.0	0	0.0	3	.1
360.0	0	0.0	1	.0	4	.2	0	0.0	1	.0	0	0.0	6	.3
	4	.2	33	1.5	53	2.4	16	.7	8	.4	1	.0	115	5.2

MEAN WIND SPEED 9.6

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION SOFT DEG C/100M -1.8/ -1.7
(180-30FT)

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS			
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	0	0.0	2	.1
67.5	0	0.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	2	.1
90.0	0	0.0	5	.2	4	.2	0	0.0	0	0.0	0	0.0	9	.4
112.5	0	0.0	0	0.0	1	.0	1	.0	0	0.0	0	0.0	2	.1
135.0	0	0.0	2	.1	2	.1	0	0.0	0	0.0	0	0.0	4	.2
157.5	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	0	0.0	2	.1
180.0	0	0.0	1	.0	1	.0	0	0.0	0	0.0	0	0.0	2	.1
202.5	0	0.0	2	.1	1	.0	0	0.0	0	0.0	0	0.0	3	.1
225.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
247.5	0	0.0	0	0.0	4	.2	3	.1	0	0.0	0	0.0	7	.3
270.0	0	0.0	1	.0	2	.1	4	.2	0	0.0	3	.1	10	.5
292.5	0	0.0	0	0.0	2	.1	1	.0	0	0.0	0	0.0	3	.1
315.0	0	0.0	1	.0	1	.0	2	.1	2	.1	4	.2	10	.5
337.5	0	0.0	0	0.0	0	0.0	2	.1	1	.0	1	.0	4	.2
360.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
	0	0.0	17	.8	21	1.0	13	.6	3	.1	8	.4	62	2.8

MEAN WIND SPEED 12.5

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT DEG C/100M (180-50FT) -1.6/ -1.5

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.000000000000000000000000000000000000000000000000000000000000000000000000000								
90.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
112.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
135.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
157.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
180.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
202.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
225.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
247.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
270.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

MEAN WIND SPEED 0.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT DEG C/100M -1.4/ -0.5
(180-30FT)

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM PERCENT	
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	3	.1	7	.3	5	.2	0	0.0	0	0.0	15	.7
45.0	1	.0	5	.2	14	.6	6	.3	0	0.0	0	0.0	26	1.2
67.5	0	0.0	8	.4	8	.4	1	.0	0	0.0	0	0.0	17	.8
90.0	1	.0	19	.9	21	1.0	3	.1	0	0.0	0	0.0	44	2.0
112.5	0	0.0	18	.8	32	1.5	4	.2	0	0.0	0	0.0	54	2.5
135.0	7	.3	11	.5	21	1.0	5	.2	0	0.0	0	0.0	44	2.0
157.5	1	.0	11	.5	11	.5	0	0.0	0	0.0	0	0.0	23	1.0
180.0	2	.1	10	.5	14	.6	0	0.0	0	0.0	0	0.0	26	1.2
202.5	1	.0	11	.5	1	.0	0	0.0	0	0.0	0	0.0	13	.6
225.0	1	.0	9	.4	16	.7	7	.3	0	0.0	0	0.0	33	1.5
247.5	1	.0	12	.5	24	1.1	15	.7	8	.4	2	.1	62	2.8
270.0	2	.1	8	.4	34	1.5	61	2.8	37	1.7	14	.6	156	7.1
292.5	0	0.0	7	.3	15	.7	57	2.6	26	1.2	5	.2	110	5.0
315.0	0	0.0	9	.4	44	2.0	163	7.4	89	4.1	26	1.2	331	15.1
337.5	2	.1	1	.0	24	1.1	48	2.2	32	1.5	13	.6	120	5.5
360.0	0	0.0	2	.1	14	.6	27	1.2	5	.2	10	.5	58	2.6
	19	.9	144	6.6	300	13.7	402	18.3	197	9.0	70	3.2	1132	51.6

MEAN WIND SPEED 14.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT DEG C/100M (100-50FT) -0.4/ 1.5

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	8	.4	6	.3	0	0.0	0	0.0	0	0.0	14	.6
45.0	0	0.0	4	.2	7	.3	0	0.0	0	0.0	0	0.0	11	.5
67.5	1	.0	8	.4	6	.3	3	.1	0	0.0	0	0.0	18	.8
90.0	1	.0	12	.5	10	.5	2	.1	0	0.0	0	0.0	25	1.1
112.5	2	.1	19	.9	11	.5	0	0.0	0	0.0	0	0.0	32	1.5
135.0	2	.1	22	1.0	25	1.1	4	.2	0	0.0	0	0.0	53	2.4
157.5	1	.0	24	1.1	23	1.0	1	.0	0	0.0	0	0.0	49	2.2
180.0	2	.1	33	1.5	27	1.2	2	.1	0	0.0	0	0.0	64	2.9
202.5	1	.0	25	1.1	28	1.3	2	.1	0	0.0	0	0.0	56	2.6
225.0	0	0.0	8	.4	61	2.8	38	1.7	4	.2	0	0.0	111	5.1
247.5	0	0.0	8	.4	15	.7	37	1.7	20	.9	0	0.0	80	3.6
270.0	1	.0	2	.1	14	.6	12	.5	9	.4	1	.0	39	1.8
292.5	0	0.0	3	.1	8	.4	6	.3	12	.5	1	.0	30	1.4
315.0	0	0.0	6	.3	23	1.0	22	1.0	13	.6	1	.0	65	3.0
337.5	0	0.0	3	.1	5	.2	8	.4	4	.2	0	0.0	20	.9
360.0	2	.1	5	.2	20	.9	16	.7	1	.0	0	0.0	44	2.0
	13	.6	190	8.7	289	13.2	153	7.0	63	2.9	3	.1	711	32.4

MEAN WIND SPEED 10.7

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 30FT DEG C/100M (180-30FT) 1.6 / 4.0

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0
90.0	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	0	0.0	2	.1
112.5	1	.0	7	.3	1	.0	0	0.0	0	0.0	0	0.0	9	.4
135.0	0	0.0	8	.4	15	.7	0	0.0	0	0.0	0	0.0	23	1.0
157.5	0	0.0	5	.2	9	.4	0	0.0	0	0.0	0	0.0	14	.6
180.0	0	0.0	3	.1	0	0.0	0	0.0	0	0.0	0	0.0	3	.1
202.5	0	0.0	6	.3	9	.4	0	0.0	0	0.0	0	0.0	15	.7
225.0	0	0.0	4	.2	3	.1	0	0.0	0	0.0	0	0.0	7	.3
247.5	0	0.0	5	.2	5	.2	0	0.0	1	.0	0	0.0	11	.5
270.0	0	0.0	1	.0	3	.1	2	.1	0	0.0	0	0.0	6	.3
292.5	0	0.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	1	.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	1	.0	42	1.9	45	2.1	3	.1	1	.0	0	0.0	92	4.2

MEAN WIND SPEED 7.8

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT DEG C/100M (180-30FT) GT 4.0

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
90.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
112.5	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0
135.0	0	0.0	9	.4	13	.6	0	0.0	0	0.0	0	0.0	22	1.0
157.5	0	0.0	14	.6	4	.2	0	0.0	0	0.0	0	0.0	18	.8
180.0	0	0.0	6	.3	4	.2	0	0.0	0	0.0	0	0.0	10	.5
202.5	0	0.0	7	.3	13	.6	0	0.0	0	0.0	0	0.0	20	.9
225.0	0	0.0	3	.1	6	.3	0	0.0	0	0.0	0	0.0	9	.4
247.5	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0
270.0	0	0.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	1	.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	0	0.0	41	1.9	40	1.8	1	.0	0	0.0	0	0.0	82	3.7

MEAN WIND SPEED 7.6

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT ALL STABILITIES

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	0	0.0	13	.6	14	.6	5	.2	0	0.0	0	0.0	32	1.5
45.0	1	.0	16	.7	26	1.2	7	.3	0	0.0	0	0.0	50	2.3
67.5	2	.1	21	1.0	16	.7	4	.2	0	0.0	0	0.0	43	2.0
90.0	3	.1	44	2.0	49	2.2	5	.2	0	0.0	0	0.0	101	4.6
112.5	3	.1	48	2.2	48	2.2	6	.3	0	0.0	0	0.0	105	4.8
135.0	10	.5	55	2.5	88	4.0	9	.4	0	0.0	0	0.0	162	7.4
157.5	2	.1	56	2.6	47	2.1	1	.0	0	0.0	0	0.0	106	4.8
180.0	4	.2	53	2.4	47	2.1	2	.1	0	0.0	0	0.0	106	4.8
202.5	2	.1	52	2.4	53	2.4	2	.1	0	0.0	0	0.0	109	5.0
225.0	1	.0	25	1.1	90	4.1	47	2.1	4	.2	0	0.0	167	7.6
247.5	1	.0	26	1.2	49	2.2	56	2.6	32	1.5	2	.1	166	7.6
270.0	3	.1	14	.6	56	2.6	84	3.8	46	2.1	18	.8	221	10.1
292.5	0	0.0	10	.5	26	1.2	66	3.0	38	1.7	6	.3	146	6.7
315.0	1	.0	19	.9	71	3.2	193	8.8	108	4.9	32	1.5	424	19.3
337.5	2	.1	7	.3	29	1.3	58	2.6	37	1.7	14	.6	147	6.7
360.0	2	.1	8	.4	39	1.8	43	2.0	7	.3	10	.5	109	5.0
	37	1.7	467	21.3	748	34.1	588	26.8	272	12.4	82	3.7	2194	100.0

MISSING HOURS 14

MEAN WIND SPEED 12.2

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 50FT DIRECTION VS SPEED

SPEEDS(MI/HR)

	0-3		4-7		8-12		13-18		19-24		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22,5	0	0,0	13	,6	14	,6	5	,2	0	0,0	0	0,0	32	1,5
45,0	1	,0	16	,7	26	1,2	7	,3	0	0,0	0	0,0	50	2,3
67,5	2	,1	21	1,0	16	,7	4	,2	0	0,0	0	0,0	43	2,0
90,0	3	,1	44	2,0	49	2,2	5	,2	0	0,0	0	0,0	101	4,6
112,5	3	,1	48	2,2	48	2,2	6	,3	0	0,0	0	0,0	105	4,8
135,0	10	,5	55	2,5	88	4,0	9	,4	0	0,0	0	0,0	162	7,4
157,5	2	,1	56	2,6	47	2,1	1	,0	0	0,0	0	0,0	106	4,8
160,0	4	,2	53	2,4	47	2,1	2	,1	0	0,0	0	0,0	106	4,8
202,5	2	,1	52	2,4	53	2,4	2	,1	0	0,0	0	0,0	109	5,0
225,0	1	,0	25	1,1	90	4,1	47	2,1	4	,2	0	0,0	167	7,6
247,5	1	,0	26	1,2	49	2,2	56	2,6	32	1,5	2	,1	166	7,6
270,0	3	,1	14	,6	56	2,6	84	3,8	46	2,1	18	,8	221	10,1
292,5	0	0,0	10	,5	26	1,2	66	3,0	38	1,7	6	,3	146	6,7
315,0	1	,0	19	,9	71	3,2	193	8,8	108	4,9	32	1,5	424	19,3
337,5	2	,1	7	,3	29	1,3	58	2,6	37	1,7	14	,6	147	6,7
360,0	2	,1	8	,4	39	1,8	43	2,0	7	,3	10	,5	109	5,0
	37	1,7	467	21,3	748	34,1	588	26,8	272	12,4	82	3,7	2194	100,0

MISSING HOURS 14

MEAN WIND SPEED 12,2

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0,0

MISSING SPEEDS 13 PERCENT ,6
MISSING DIRECTIONS 14 PERCENT ,6

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M (180-30FT) LE=1.9

DIRECTION	0-5 SUM	0-5 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	0	0.0	1	.0	4	.2	1	.0	0	0.0	0	0.0	6	.3
45.0	1	.0	1	.0	4	.2	2	.1	0	0.0	0	0.0	8	.4
67.5	0	0.0	2	.1	4	.2	2	.1	0	0.0	0	0.0	8	.4
90.0	0	0.0	1	.0	10	.5	3	.1	0	0.0	0	0.0	14	.7
112.5	0	0.0	0	0.0	1	.0	1	.0	1	.0	0	0.0	3	.1
135.0	0	0.0	4	.2	5	.2	6	.3	0	0.0	0	0.0	15	.7
157.5	0	0.0	0	0.0	0	0.0	4	.2	0	0.0	0	0.0	4	.2
180.0	0	0.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	1	.0
202.5	0	0.0	0	0.0	0	0.0	7	.3	0	0.0	0	0.0	7	.3
225.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0	0	0.0	1	.0
247.5	0	0.0	0	0.0	0	0.0	1	.0	1	.0	3	.1	5	.2
270.0	0	0.0	0	0.0	3	.1	3	.1	2	.1	0	0.0	8	.4
292.5	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	0	0.0	2	.1
315.0	0	0.0	2	.1	4	.2	5	.2	4	.2	2	.1	17	.8
337.5	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	3	.1	5	.2
360.0	0	0.0	1	.0	1	.0	3	.1	1	.0	0	0.0	6	.3
	1	.0	16	.7	36	1.7	39	1.8	10	.5	8	.4	110	5.1

SPEEDS(MI/HR)

MEAN WIND SPEED 13.1

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M (180-30FT) -1.8/ -1.7

	SPEEDS(MI/HR)													
	0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
45.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0
67.5	0	0.0	0	0.0	3	.1	0	0.0	0	0.0	0	0.0	3	.1
90.0	0	0.0	0	0.0	4	.2	0	0.0	0	0.0	0	0.0	4	.2
112.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
135.0	0	0.0	0	0.0	1	.0	2	.1	1	.0	0	0.0	4	.2
157.5	0	0.0	0	0.0	2	.1	1	.0	0	0.0	0	0.0	3	.1
180.0	0	0.0	0	0.0	2	.1	1	.0	0	0.0	0	0.0	3	.1
202.5	0	0.0	0	0.0	2	.1	2	.1	0	0.0	0	0.0	4	.2
225.0	0	0.0	0	0.0	0	0.0	2	.1	0	0.0	0	0.0	2	.1
247.5	0	0.0	0	0.0	1	.0	2	.1	2	.1	1	.0	6	.3
270.0	0	0.0	0	0.0	3	.1	2	.1	1	.0	5	.2	11	.5
292.5	0	0.0	0	0.0	1	.0	1	.0	0	0.0	0	0.0	2	.1
315.0	0	0.0	1	.0	0	0.0	2	.1	1	.0	6	.3	10	.5
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	.3	6	.3
360.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
	0	0.0	2	.1	21	1.0	15	.7	5	.2	18	.8	61	2.8

MEAN WIND SPEED 18.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M (180-30FT) -1.6/ -1.5

	SPEEDS(MI/HR) 0-3		4-7		6-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
90.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
112.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
135.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
157.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
180.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
202.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
225.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
247.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
270.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

MEAN WIND SPEED 0.0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M (180-30FT) -1.4/ -0.5

	SPEEDS(MI/HR) 0-3		4-7		6-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	3	.1	4	.2	7	.3	6	.3	0	0.0	20	.9
45.0	1	.0	3	.1	13	.6	10	.5	0	0.0	0	0.0	27	1.3
67.5	0	0.0	3	.1	9	.4	5	.2	0	0.0	0	0.0	17	.8
90.0	3	.1	4	.2	28	1.3	9	.4	0	0.0	0	0.0	44	2.0
112.5	0	0.0	5	.2	18	.8	12	.6	0	0.0	0	0.0	35	1.6
135.0	3	.1	5	.2	18	.8	12	.6	1	.0	0	0.0	39	1.8
157.5	0	0.0	3	.1	7	.3	8	.4	0	0.0	0	0.0	18	.8
180.0	0	0.0	4	.2	14	.7	17	.8	3	.1	0	0.0	38	1.8
202.5	1	.0	3	.1	10	.5	8	.4	1	.0	0	0.0	23	1.1
225.0	0	0.0	2	.1	10	.5	21	1.0	7	.3	1	.0	41	1.9
247.5	0	0.0	4	.2	14	.7	6	.3	12	.6	12	.6	48	2.2
270.0	1	.0	7	.3	13	.6	34	1.6	30	1.4	47	2.2	132	6.1
292.5	0	0.0	3	.1	9	.4	57	2.6	35	1.6	18	.8	122	5.7
315.0	0	0.0	3	.1	7	.3	48	2.2	101	4.7	107	5.0	266	12.4
337.5	0	0.0	2	.1	3	.1	40	1.9	36	1.7	102	4.7	183	8.5
360.0	1	.0	0	0.0	3	.1	9	.4	21	1.0	15	.7	49	2.3
	10	.5	54	2.5	180	8.4	303	14.1	253	11.8	302.	14.0	1102	51.2

MEAN WIND SPEED 18.9

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M -0,4/ 1,5
(180-30FT)

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22,5	0	0,0	1	,0	5	,2	7	,3	0	0,0	0	0,0	13	,6
45,0	1	,0	4	,2	6	,3	4	,2	0	0,0	0	0,0	15	,7
67,5	0	0,0	5	,2	12	,6	6	,3	0	0,0	0	0,0	23	1,1
90,0	1	,0	5	,2	21	1,0	6	,3	0	0,0	0	0,0	33	1,5
112,5	0	0,0	2	,1	7	,3	3	,1	0	0,0	0	0,0	12	,6
135,0	1	,0	6	,3	11	,5	4	,2	1	,0	0	0,0	23	1,1
157,5	1	,0	5	,2	18	,8	16	,7	8	,4	0	0,0	48	2,2
160,0	1	,0	3	,1	25	1,2	44	2,0	7	,3	2	,1	82	3,8
202,5	0	0,0	2	,1	18	,8	41	1,9	19	,9	0	0,0	80	3,7
225,0	0	0,0	4	,2	18	,8	48	2,2	21	1,0	21	1,0	112	5,2
247,5	0	0,0	1	,0	7	,3	14	,7	11	,5	35	1,6	68	3,2
270,0	1	,0	0	0,0	8	,4	10	,5	7	,3	9	,4	35	1,6
242,5	1	,0	1	,0	4	,2	5	,2	6	,3	6	,3	23	1,1
315,0	0	0,0	1	,0	9	,4	23	1,1	9	,4	19	,9	61	2,8
337,5	0	0,0	3	,1	4	,2	7	,3	9	,4	11	,5	34	1,6
360,0	1	,0	0	0,0	6	,3	22	1,0	11	,5	2	,1	42	2,0
	8	,4	43	2,0	179	8,3	260	12,1	109	5,1	105	4,9	704	32,7

MEAN WIND SPEED 16,0

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M (180-30FT) 1.6 / 4.0

SPEEDS(MI/HR)

DIRECTION	0-3 SUM	0-3 PERCENT	4-7 SUM	4-7 PERCENT	8-12 SUM	8-12 PERCENT	13-18 SUM	13-18 PERCENT	19-23 SUM	19-23 PERCENT	24 PLUS SUM	24 PLUS PERCENT	SUM	PERCENT
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0
67.5	1	.0	1	.0	0	0.0	0	0.0	0	0.0	0	0.0	2	.1
90.0	0	0.0	2	.1	5	.2	0	0.0	0	0.0	0	0.0	7	.3
112.5	1	.0	0	0.0	2	.1	4	.2	0	0.0	0	0.0	7	.3
135.0	0	0.0	1	.0	2	.1	8	.4	0	0.0	0	0.0	11	.5
157.5	0	0.0	0	0.0	5	.2	8	.4	3	.1	0	0.0	16	.7
180.0	0	0.0	0	0.0	2	.1	5	.2	0	0.0	0	0.0	7	.3
202.5	0	0.0	0	0.0	1	.0	6	.3	0	0.0	0	0.0	7	.3
225.0	1	.0	0	0.0	5	.2	8	.4	1	.0	0	0.0	15	.7
247.5	0	0.0	0	0.0	5	.2	3	.1	0	0.0	1	.0	9	.4
270.0	0	0.0	0	0.0	3	.1	3	.1	0	0.0	1	.0	7	.3
292.5	0	0.0	0	0.0	0	0.0	2	.1	1	.0	0	0.0	3	.1
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	3	.1	5	.2	30	1.4	47	2.2	5	.2	2	.1	92	4.3

MEAN WIND SPEED 12.9

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DEG C/100M (180-30FT) GT 4.0

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
45.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
67.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
90.0	0	0.0	0	0.0	2	.1	0	0.0	0	0.0	0	0.0	2	.1
112.5	1	.0	1	.0	3	.1	3	.1	0	0.0	0	0.0	8	.4
135.0	0	0.0	0	0.0	6	.3	3	.1	0	0.0	0	0.0	9	.4
157.5	0	0.0	0	0.0	2	.1	3	.1	0	0.0	0	0.0	5	.2
180.0	0	0.0	0	0.0	3	.1	13	.6	3	.1	0	0.0	19	.9
202.5	0	0.0	0	0.0	3	.1	4	.2	0	0.0	0	0.0	7	.3
225.0	0	0.0	0	0.0	4	.2	17	.8	2	.1	0	0.0	23	1.1
247.5	0	0.0	0	0.0	6	.3	1	.0	0	0.0	0	0.0	7	.3
270.0	0	0.0	0	0.0	1	.0	0	0.0	0	0.0	0	0.0	1	.0
292.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	.0	1	.0
315.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
337.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
360.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	1	.0	1	.0	30	1.4	44	2.0	5	.2	1	.0	82	3.8

MEAN WIND SPEED 13.3

NUMBER OF UNINTERPRETABLE HOURS 0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT ALL STABILITIES

	0-3		4-7		SPEEDS(MI/HR) 8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	5	.2	14	.7	15	.7	6	.3	0	0.0	40	1.9
45.0	3	.1	10	.5	23	1.1	16	.7	0	0.0	0	0.0	52	2.4
67.5	1	.0	11	.5	28	1.3	13	.6	0	0.0	0	0.0	53	2.5
90.0	4	.2	12	.6	70	3.3	18	.8	0	0.0	0	0.0	104	4.8
112.5	2	.1	8	.4	31	1.4	23	1.1	1	.0	0	0.0	65	3.0
135.0	4	.2	16	.7	43	2.0	35	1.6	3	.1	0	0.0	101	4.7
157.5	1	.0	8	.4	34	1.6	40	1.9	11	.5	0	0.0	94	4.4
180.0	1	.0	7	.3	46	2.1	81	3.8	13	.6	2	.1	150	7.0
202.5	1	.0	5	.2	34	1.6	68	3.2	20	.9	0	0.0	128	6.0
225.0	1	.0	6	.3	37	1.7	96	4.5	32	1.5	22	1.0	194	9.0
247.5	0	0.0	5	.2	33	1.5	27	1.3	26	1.2	52	2.4	143	6.6
270.0	2	.1	7	.3	31	1.4	52	2.4	40	1.9	62	2.9	194	9.0
292.5	1	.0	6	.3	14	.7	65	3.0	42	2.0	25	1.2	153	7.1
315.0	0	0.0	7	.3	20	.9	78	3.6	115	5.3	134	6.2	354	16.5
337.5	0	0.0	7	.3	7	.3	47	2.2	45	2.1	122	5.7	228	10.6
360.0	2	.1	1	.0	11	.5	34	1.6	33	1.5	17	.8	98	4.6
	23	1.1	121	5.6	476	22.1	708	32.9	387	18.0	436	20.3	2151	100.0

MISSING HOURS 57

MEAN WIND SPEED 17.2

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

WIND ROSE FOR COOK 10/76-12/76 LOCATION 150FT DIRECTION VS SPEED

	SPEEDS(MI/HR) 0-3		4-7		8-12		13-18		19-23		24 PLUS		SUM	PERCENT
DIRECTION	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT	SUM	PERCENT		
22.5	0	0.0	5	.2	14	.7	15	.7	6	.3	0	0.0	40	1.9
45.0	3	.1	10	.5	23	1.1	16	.7	0	0.0	0	0.0	52	2.4
67.5	1	.0	11	.5	28	1.3	13	.6	0	0.0	0	0.0	53	2.5
90.0	4	.2	12	.6	70	3.3	18	.8	0	0.0	0	0.0	104	4.8
112.5	2	.1	8	.4	31	1.4	23	1.1	1	.0	0	0.0	65	3.0
135.0	4	.2	16	.7	43	2.0	35	1.6	3	.1	0	0.0	101	4.7
157.5	1	.0	8	.4	34	1.6	40	1.9	11	.5	0	0.0	94	4.4
180.0	1	.0	7	.3	46	2.1	81	3.8	13	.6	2	.1	150	7.0
202.5	1	.0	5	.2	34	1.6	68	3.2	20	.9	0	0.0	128	6.0
225.0	1	.0	6	.3	37	1.7	96	4.5	32	1.5	22	1.0	194	9.0
247.5	0	0.0	5	.2	33	1.5	27	1.3	26	1.2	52	2.4	143	6.6
270.0	2	.1	7	.3	31	1.4	52	2.4	40	1.9	62	2.9	194	9.0
292.5	1	.0	6	.3	14	.7	65	3.0	42	2.0	25	1.2	153	7.1
315.0	0	0.0	7	.3	20	.9	78	3.6	115	5.3	134	6.2	354	16.5
337.5	0	0.0	7	.3	7	.3	47	2.2	45	2.1	122	5.7	228	10.6
360.0	2	.1	1	.0	11	.5	34	1.6	33	1.5	17	.8	98	4.6
	23	1.1	121	5.6	476	22.1	708	32.9	387	18.0	436	20.3	2151	100.0

MISSING HOURS 57

MEAN WIND SPEED 17.2

TOTAL NUMBER OF UNINTERPRETABLE HOURS 0
TOTAL NUMBER OF CALM HOURS 0 PERCENT 0.0

MISSING SPEEDS 15 PERCENT .7
MISSING DIRECTIONS 56 PERCENT 2.6

COOK [illegible] STATION

	WIND								TEMPERATURE			
	60FT				150FT				60FT	160-30		
HOUR	DIR	SP	DIR	SP	SPAN	[illegible]	[illegible]	SP	TEMP	DELTA T	HOUR	DATE
1	180	7	165	12	15	3	150	7	71	2.2	1	8/25/76
2	190	7	160	14	20	3	150	9	71	1.4	2	
3	190	7	160	14	15	2	155	1	70	1.2	3	
4	140	7	165	14	20	2	145	5	70	1.6	4	
5	150	6	165	12	20	2	140	9	69	1.4	5	
6	105	6	170	13	15	4	105	2	69	1.4	6	
7	145	6	170	12	20	2	145	2	69	1.6	7	
8	140	6	160	11	90	2	145	9	69	.0	8	
9	135	6	155	9	75	2	140	5	71	-.3	9	
10	140	3	165	5	125	2	105	3	77	-.5	10	
11	135	4	145	4	80	2	145	3	74	-1.4	11	
12	140	5	175	3	120	2	330	1	80	-1.5	12	
13	285	4	260	4	85	2	350	0	79	-1.0	13	
14	220	4	195	6	165	2	330	0	78	-.5	14	
15	150	6	165	9	75	2	165	5	79	-1.2	15	
16	170	6	160	7	100	2	170	2	79	-1.4	16	
17	170	5	175	8	110	2	205	3	82	-1.6	17	
18	180	4	190	7	100	2	220	3	81	-1.2	18	
19	160	4	155	7	75	2	170	1	79	-.4	19	
20	150	3	175	7	50	2	150	4	76	.2	20	
21	145	5	170	10	45	2	150	4	75	1.4	21	
22	150	4	185	9	80	2	150	5	74	1.2	22	
23	155	5	180	13	35	3	160	6	72	2.5	23	
24	165	5	180	12	45	3	160	6	72	1.6	24	
1	155	5	180	12	65	3	155	7	72	.5	1	8/26/76
2	180	7	190	16	50	3	170	6	72	.3	2	
3	175	6	195	14	70	3	165	7	72	.6	3	
4	225	6	220	11	60	3	225	5	72	.6	4	
5	225	6	210	11	60	3	225	6	73	.0	5	
6	180	4	195	9	55	3	170	2	72	.2	6	
7	175	4	200	9	55	3	165	2	71	.4	7	
8	210	5	210	10	70	3	205	3	72	-.4	8	
9	235	6	225	9	90	2	235	8	75	-1.2	9	
10	255	7	240	9	90	2	240	8	76	-1.2	10	
11	255	6	240	9	90	2	240	8	78	-1.4	11	
12	250	6	250	8	80	2	245	9	78	-1.2	12	
13	265	7	255	7	95	2	265	5	81	-1.6	13	
14	260	7	265	7	85	2	275	6	81	-1.8	14	
15	270	6	260	7	95	2	260	4	83	-2.2	15	
16	265	7	245	4	100	2	205	3	82	-1.4	16	
17	255	6	240	11	100	2	245	9	84	-1.6	17	
18	245	6	220	5	105	2	250	5	84	-1.3	18	
19	230	5	215	9	60	2	230	4	84	-1.3	19	
20	210	4	210	9	45	2	220	3	81	.2	20	
21	185	5	195	11	50	2	170	4	75	1.2	21	
22	175	5	185	11	60	3	170	5	76	.6	22	
23	190	6	195	14	60	3	170	5	75	.6	23	
24	205	7	205	15	30	3	205	4	75	.4	24	

COOK GENERATING STATION

	WIND****								TEMPERATURE			
	50FT				150FT		BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
												9/ 9/76
1	215	7	210	15	40	3	205	4	76	1.6	1	
2	240	8	255	14	60	3	220	8	77	.6	2	
3	250	10	235	15	70	3	225	10	78	-.2	3	
4	310	15	315	22	25	3	315	16	75	-.4	4	
5	320	8	320	12	60	3	325	8	72	-.6	5	
6	345	7	345	11	60	2	340	11	70	-.6	6	
7	60	5	50	7	65	2	50	4	69	-.4	7	
8	30	3	20	6	80	2	20	8	68	-.4	8	
9	10	5	15	8	80	2	15	10	67	-.4	9	
10	15	8	15	12	90	2	10	16	66	-.6	10	
11	20	9	15	16	100	2	15	21	64	-.6	11	
12	35	10	15	18	105	2	15	23	63	-.6	12	
13	15	10	999	99	999	9	15	23	63	-.4	13	
14	10	12	999	99	999	9	10	22	63	-.4	14	
15	360	17	355	25	75	2	355	24	63	-.8	15	
16	360	18	360	26	70	2	355	25	65	-.6	16	
17	10	14	10	22	90	2	10	25	67	-1.0	17	
18	25	9	15	16	95	2	15	21	67	-1.0	18	
19	45	9	20	14	90	2	15	19	66	-.4	19	
20	45	7	20	12	90	2	20	16	65	-.2	20	
21	30	6	15	14	95	2	10	13	65	-.2	21	
22	10	7	5	11	80	2	5	12	66	-.4	22	
23	20	7	35	16	40	2	25	16	60	1.2	23	
24	55	6	40	11	35	2	60	5	58	1.8	24	
												9/10/76
1	60	12	90	16	50	2	10	26	63	-.2	1	
2	20	8	100	11	35	2	110	6	54	.4	2	
3	165	6	999	9	999	9	130	6	53	.8	3	
4	165	7	999	8	999	9	150	6	51	2.0	4	
5	205	7	270	7	80	2	160	4	53	3.0	5	
6	355	15	355	24	60	2	355	24	62	.4	6	
7	360	16	355	24	80	2	350	24	62	-.4	7	
8	350	16	350	24	80	2	350	23	63	-.4	8	
9	350	16	355	24	80	2	350	22	63	-.6	9	
10	340	15	345	23	70	2	340	21	63	-.6	10	
11	340	15	345	24	70	2	340	22	63	-.8	11	
12	345	15	345	23	70	2	340	21	63	-.6	12	
13	340	15	340	22	70	2	340	20	66	-1.2	13	
14	335	14	340	20	70	2	335	19	66	-1.4	14	
15	330	15	330	22	50	2	330	18	68	-2.0	15	
16	330	12	340	17	60	2	335	15	68	-1.6	16	
17	325	9	330	13	65	2	330	11	69	-2.0	17	
18	330	7	330	9	80	2	330	8	69	-1.6	18	
19	325	6	325	99	25	2	315	5	66	-.6	19	
20	245	4	999	99	999	9	155	2	65	0.0	20	
21	210	6	999	99	999	9	190	4	60	3.4	21	
22	225	8	999	99	999	9	210	7	59	3.8	22	
23	230	8	240	14	40	3	220	8	60	2.4	23	
24	245	10	240	17	55	3	225	11	62	.8	24	

COOK GENERATING STATION

	WIND 50FT		150FT				BEACHPOLE		TEMPERATURE 30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
												9/15/76
1	65	6	50	10	65	2	40	9	66	-.8	1	
2	55	9	45	12	65	2	35	13	66	-.8	2	
3	55	10	45	13	60	2	35	17	66	-.8	3	
4	60	10	45	12	60	2	45	10	65	-.6	4	
5	60	9	45	13	70	2	40	10	65	-.6	5	
6	60	10	45	12	70	2	40	13	64	-.6	6	
7	75	11	60	13	60	2	50	7	62	-.6	7	
8	75	10	60	12	60	2	50	6	62	-.8	8	
9	75	10	65	14	85	2	40	6	62	-1.0	9	
10	75	10	60	11	80	2	35	18	64	-1.4	10	
11	70	9	60	10	90	2	35	14	63	-1.6	11	
12	70	11	55	14	80	2	30	17	63	-1.4	12	
13	60	11	45	13	90	2	30	16	64	-1.4	13	
14	50	10	30	13	100	2	25	17	65	-1.4	14	
15	50	9	30	13	110	2	25	15	66	-1.6	15	
16	60	8	40	11	95	2	30	14	66	-1.6	16	
17	50	8	40	11	95	2	25	13	63	-1.0	17	
18	50	8	35	10	85	2	25	13	63	-.8	18	
19	60	7	40	10	60	2	30	11	63	-.4	19	
20	80	4	65	6	85	2	90	4	62	.2	20	
21	115	4	90	6	40	2	115	3	60	.2	21	
22	120	5	90	6	40	2	120	4	60	.4	22	
23	120	6	95	9	25	2	110	4	59	.6	23	
24	120	7	100	11	20	2	999	99	57	1.6	24	
												9/16/76
1	105	6	90	12	25	4	80	2	57	2.8	1	
2	90	6	80	9	30	4	60	3	57	2.2	2	
3	85	7	70	10	30	4	999	99	57	2.0	3	
4	90	7	70	10	25	2	999	99	57	1.6	4	
5	75	6	60	9	35	2	999	99	58	1.6	5	
6	75	6	60	10	40	2	65	4	58	.8	6	
7	75	5	70	10	30	2	90	4	59	.4	7	
8	90	4	70	6	45	2	100	4	60	0.0	8	
9	80	5	70	6	50	2	60	3	62	-1.0	9	
10	75	5	65	5	65	2	40	5	62	-1.2	10	
11	90	6	80	7	65	2	55	4	63	-1.2	11	
12	85	5	75	6	65	2	40	4	63	-1.0	12	
13	105	5	90	5	55	2	40	3	64	-1.2	13	
14	75	4	65	4	90	2	25	6	66	-1.4	14	
15	360	6	999	8	999	9	10	9	66	-1.2	15	
16	40	6	30	9	85	2	25	11	67	-1.4	16	
17	40	5	30	8	100	2	25	11	69	-1.2	17	
18	45	7	30	9	80	2	30	11	68	-1.0	18	
19	50	7	45	7	40	2	45	6	67	-.6	19	
20	65	6	60	9	60	2	55	4	66	.4	20	
21	105	8	90	12	45	3	85	4	65	0.0	21	
22	75	7	70	9	55	2	50	4	63	-.2	22	
23	75	5	70	6	60	2	50	3	63	-.6	23	
24	45	5	40	6	60	2	45	3	63	-.4	24	

COOK GENERATING STATION

	WIND								TEMPERATURE			
	50FT		150FT				BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
1	55	6	45	8	35	2	50	4	63	-.2	1	9/17/76
2	45	6	35	9	55	2	25	11	64	-.4	2	
3	60	6	50	8	55	2	45	5	65	-.4	3	
4	65	6	50	8	55	2	45	5	65	-.6	4	
5	60	8	50	10	65	2	45	6	66	-.6	5	
6	75	8	65	9	50	2	50	4	65	-.6	6	
7	75	6	65	8	50	2	55	4	65	-.4	7	
8	75	6	60	7	60	2	50	4	65	-.4	8	
9	80	6	70	7	60	2	65	3	65	-.6	9	
10	80	5	65	6	80	2	25	8	66	-1.0	10	
11	10	5	15	5	100	2	25	8	66	-1.2	11	
12	360	6	10	6	95	2	25	7	67	-1.4	12	
13	350	7	350	8	70	2	355	8	68	-1.8	13	
14	355	10	355	13	50	2	355	13	69	-1.2	14	
15	360	10	10	14	80	2	10	15	69	-1.4	15	
16	5	8	15	13	90	2	15	16	69	-1.4	16	
17	5	10	15	12	90	2	15	14	69	-1.4	17	
18	360	8	10	11	80	2	10	14	69	-1.0	18	
19	30	6	20	10	80	2	20	14	67	-.4	19	
20	45	7	20	11	80	2	20	15	66	-.4	20	
21	45	6	30	10	75	2	30	12	66	-.2	21	
22	30	5	15	10	70	2	15	12	66	-.2	22	
23	40	6	25	10	55	2	25	10	66	0.0	23	
24	40	7	30	10	35	3	25	9	66	0.0	24	
1	45	7	35	10	25	3	40	5	66	.2	1	9/18/76
2	30	5	15	8	40	2	15	6	66	0.0	2	
3	350	5	350	8	35	2	350	7	66	-.2	3	
4	340	6	345	8	40	2	345	8	66	-.4	4	
5	330	7	335	11	50	2	340	9	66	-.4	5	
6	335	6	335	10	40	2	340	9	66	-.2	6	
7	5	5	360	9	65	2	360	8	66	-.4	7	
8	20	5	5	8	60	2	10	8	66	-.4	8	
9	999	99	360	7	50	2	355	7	67	-.6	9	
10	999	99	340	4	90	2	340	6	69	-1.2	10	
11	999	99	320	8	25	2	320	7	69	-2.4	11	
12	999	99	310	8	75	2	300	8	70	-2.4	12	
13	999	99	305	8	90	2	300	8	70	-2.2	13	
14	305	9	305	8	100	2	295	9	70	-2.0	14	
15	315	6	310	8	80	2	300	8	70	-2.6	15	
16	325	5	320	6	50	2	310	4	71	-3.0	16	
17	330	4	320	4	70	2	325	2	71	-2.0	17	
18	320	3	335	3	80	2	285	0	71	-1.4	18	
19	25	1	30	2	35	4	285	0	69	-.6	19	
20	145	3	110	3	15	4	145	3	67	.2	20	
21	165	6	150	4	60	4	155	5	66	1.0	21	
22	185	7	999	4	999	9	160	6	66	3.0	22	
23	200	7	200	4	35	4	175	6	66	3.4	23	
24	210	7	230	6	25	4	165	7	66	4.8	24	

COOK GENERATING STATION

HOUR	WIND 50FT DIR	WIND 50FT SP	WIND 150FT DIR	WIND 150FT SP	WIND 150FT SPAN	WIND 150FT G	BEACHPOLE DIR	BEACHPOLE SP	TEMPERATURE 30FT TEMP	TEMPERATURE 180-30 DELTA T	HOUR	DATE
1	215	8	240	5	30	2	160	6	65	5.4	1	9/19/76
2	215	8	255	6	10	4	160	6	68	4.2	2	
3	210	7	240	8	15	4	155	6	63	6.8	3	
4	205	8	240	8	5	4	160	7	63	7.2	4	
5	200	7	220	12	15	3	165	5	62	8.0	5	
6	195	7	210	14	25	2	160	7	62	7.2	6	
7	165	7	200	17	10	4	150	9	58	9.2	7	
8	175	6	200	19	35	2	165	9	60	4.8	8	
9	170	6	185	13	50	3	165	10	66	-.4	9	
10	150	6	170	10	65	2	160	8	71	-1.6	10	
11	155	5	170	9	70	2	175	5	75	-1.6	11	
12	165	5	180	7	110	2	175	5	78	-1.6	12	
13	230	5	190	7	135	2	235	6	80	-1.6	13	
14	300	4	999	5	999	9	15	5	81	-1.8	14	
15	999	5	999	8	999	9	25	5	76	-.8	15	
16	345	4	999	6	999	9	25	5	76	-1.4	16	
17	45	4	999	4	999	9	35	9	75	-.8	17	
18	70	4	999	6	999	9	35	5	73	-.8	18	
19	55	10	999	8	999	9	90	5	71	1.2	19	
20	50	11	40	15	85	3	40	14	70	-.4	20	
21	80	9	70	13	65	3	75	6	65	-.2	21	
22	100	10	90	13	50	3	95	7	63	-.0	22	
23	80	6	70	7	65	2	65	2	62	-.4	23	
24	100	5	80	7	70	2	80	3	62	-.2	24	
1	110	4	90	5	45	2	105	2	62	-.2	1	9/20/76
2	40	3	25	5	40	2	35	1	63	0.0	2	
3	30	7	20	10	80	2	15	12	63	-.4	3	
4	45	8	20	14	90	2	25	18	64	0.0	4	
5	25	10	20	16	100	2	15	21	64	-.4	5	
6	15	11	15	15	90	2	15	20	63	-.6	6	
7	10	11	10	16	85	2	10	20	63	-.6	7	
8	10	12	15	15	80	2	10	19	63	-.6	8	
9	360	14	360	20	60	2	5	20	63	-.6	9	
10	5	12	10	17	90	2	10	20	62	-.8	10	
11	355	12	360	17	70	2	350	19	61	-.8	11	
12	345	14	350	19	80	2	345	20	61	-.8	12	
13	350	14	350	22	75	2	355	20	60	-.8	13	
14	355	12	350	18	80	2	355	18	62	-1.0	14	
15	345	12	345	19	60	2	345	19	61	-1.2	15	
16	360	13	355	20	80	2	355	20	60	-1.0	16	
17	360	12	360	16	70	2	360	16	60	-.8	17	
18	360	12	360	16	100	2	360	17	60	-.8	18	
19	10	12	5	16	80	2	10	18	60	-.6	19	
20	25	8	15	14	95	2	15	19	59	-.2	20	
21	25	6	15	13	90	2	15	16	60	-.2	21	
22	360	9	360	13	65	2	360	13	60	-.4	22	
23	330	12	335	15	70	2	335	13	60	-.6	23	
24	330	13	330	9	40	2	330	16	62	-.6	24	

COOK GENERATING STATION

	WIND								TEMPERATURE			
	50FT				150FT		BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
												11/ 7/76
1	340	15	340	23	60	2	345	20	41	-.6	1	
2	350	15	360	22	65	2	360	20	39	-.6	2	
3	350	15	360	21	70	2	360	20	38	-.6	3	
4	345	16	345	25	70	2	345	21	37	-.8	4	
5	320	16	335	25	50	2	340	21	36	-.8	5	
6	320	19	320	27	30	2	320	21	36	-.8	6	
7	320	16	330	25	40	2	330	20	34	-.8	7	
8	320	17	325	25	50	2	330	20	34	-.6	8	
9	320	16	330	25	40	2	330	20	33	-.8	9	
10	320	16	330	26	45	2	330	21	33	-1.0	10	
11	320	16	330	26	45	2	330	21	33	-1.0	11	
12	320	20	325	27	40	2	330	22	32	-1.0	12	
13	320	22	325	29	45	2	325	23	31	-1.0	13	
14	320	22	325	30	40	2	330	24	31	-1.0	14	
15	320	21	325	29	40	2	330	24	31	-1.0	15	
16	320	21	330	32	50	2	330	26	30	-2.2	16	
17	330	22	330	32	50	2	335	26	30	-.8	17	
18	335	20	345	30	70	2	345	25	30	-.6	18	
19	335	20	340	30	60	2	340	26	30	-.4	19	
20	340	20	345	30	75	2	345	26	30	-.6	20	
21	330	20	335	32	60	2	340	26	30	-.8	21	
22	340	21	340	32	80	2	345	26	30	-.8	22	
23	345	20	345	30	85	2	350	26	29	-.6	23	
24	345	19	345	28	65	2	345	24	28	-.8	24	
												11/ 8/76
1	340	19	345	29	70	2	345	24	27	-.8	1	
2	340	18	340	27	70	2	345	23	27	-.8	2	
3	355	14	360	24	80	2	360	22	27	-.6	3	
4	360	14	5	20	100	2	5	21	27	-.4	4	
5	355	14	355	21	90	2	5	20	27	-.6	5	
6	340	15	345	23	60	2	350	20	27	-.8	6	
7	340	15	345	22	70	2	350	20	27	-.8	7	
8	345	15	345	22	55	2	350	19	27	-.8	8	
9	340	12	350	16	70	2	355	16	27	-.8	9	
10	330	13	355	17	70	2	345	16	27	-.6	10	
11	330	10	330	14	70	2	345	11	28	-1.0	11	
12	310	8	315	14	65	2	315	11	29	-1.4	12	
13	290	8	310	11	75	2	300	9	30	-2.4	13	
14	270	8	280	10	100	2	275	9	28	-1.2	14	
15	260	8	260	10	80	2	250	10	29	-1.2	15	
16	195	4	220	8	90	2	235	7	29	-1.0	16	
17	190	5	185	7	90	2	205	4	30	-1.0	17	
18	190	4	195	9	70	2	205	3	30	-.4	18	
19	170	5	160	10	60	3	160	5	29	-.4	19	
20	190	6	190	12	70	3	160	4	29	-.4	20	
21	185	7	190	11	70	3	160	4	29	-.4	21	
22	200	7	195	14	60	3	210	5	30	-.4	22	
23	200	6	195	13	70	3	210	4	30	-.4	23	
24	160	6	195	13	80	3	195	4	30	-.4	24	

COOK GENERATING STATION

HOUR	WIND 50FT DIR	50FT SP	150FT DIR	150FT SP	150FT SPAN	150FT G	BEACHPOLE DIR	BEACHPOLE SP	TEMPERATURE 50FT TEMP	160-30 DELTA T	HOUR	DATE
												11/ 9/76
1	185	10	190	18	85	2	190	6	31	-.4	1	
2	190	10	185	17	80	2	195	5	30	-.4	2	
3	210	9	200	17	80	2	215	7	31	-.4	3	
4	215	8	205	16	70	2	210	7	32	0.0	4	
5	220	9	215	14	70	2	215	8	33	-.2	5	
6	225	9	215	14	70	2	220	9	32	0.0	6	
7	210	9	220	14	60	2	215	10	33	0.0	7	
8	230	10	220	14	55	2	220	9	33	0.0	8	
9	260	16	200	16	60	2	260	22	34	-.2	9	
10	270	23	275	26	50	2	270	21	37	-.6	10	
11	270	20	275	25	40	2	275	20	38	-1.0	11	
12	275	20	270	24	40	2	275	19	39	-1.0	12	
13	270	15	270	24	55	2	270	18	40	-1.0	13	
14	260	15	260	24	55	2	260	19	42	-.8	14	
15	270	16	265	26	60	2	265	21	45	-.6	15	
16	270	18	265	23	45	2	260	16	47	-.6	16	
17	290	19	285	26	70	2	280	19	48	-.4	17	
18	310	20	315	27	30	3	315	20	45	-.2	18	
19	310	18	310	26	20	3	315	19	45	0.0	19	
20	310	17	315	24	15	3	315	18	45	-.2	20	
21	310	17	305	21	30	3	305	16	45	-.2	21	
22	320	16	330	23	30	2	330	17	44	-.4	22	
23	350	15	350	22	70	2	355	19	42	-.6	23	
24	330	18	340	27	60	2	345	21	41	-.6	24	
												11/10/76
1	320	16	340	28	60	2	340	25	38	-1.0	1	
2	320	20	325	30	35	2	325	24	38	-.8	2	
3	320	18	335	27	50	2	330	21	36	-.8	3	
4	320	17	325	25	35	2	325	20	37	-.8	4	
5	320	18	330	24	40	2	325	19	37	-.6	5	
6	320	16	330	24	35	2	325	18	36	-.8	6	
7	310	19	320	23	35	2	320	19	36	-.8	7	
8	315	20	320	26	30	2	320	21	36	-.8	8	
9	320	14	335	24	60	2	335	20	36	-.6	9	
10	315	14	325	19	35	2	325	15	36	-.8	10	
11	310	14	315	16	25	2	315	15	35	-1.2	11	
12	310	15	305	20	60	2	300	16	36	-1.2	12	
13	305	16	305	20	60	2	300	17	36	-1.2	13	
14	310	15	310	20	30	2	310	16	36	-1.2	14	
15	315	16	320	22	30	2	325	18	36	-1.0	15	
16	315	17	320	20	40	2	320	16	36	-1.0	16	
17	320	13	330	20	50	2	330	14	36	-.8	17	
18	320	13	330	19	50	2	330	15	36	-.8	18	
19	355	14	355	19	60	2	355	19	36	-.8	19	
20	350	11	345	16	70	2	345	14	34	-.8	20	
21	320	11	325	22	55	2	320	19	33	-.8	21	
22	45	5	30	9	90	2	30	8	33	-.6	22	
23	355	14	355	17	80	2	360	17	33	-.6	23	
24	350	12	350	18	65	2	360	18	32	-.4	24	

COOK GENERATING STATION

	WIND								TEMPERATURE			
	50FT				150FT		BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
1	290	20	285	24	95	3	295	24	26	-.4	1	12/23/76
2	285	20	280	24	90	3	290	22	27	-.4	2	
3	280	20	275	26	70	2	280	19	28	-.6	3	
4	260	19	255	24	65	2	255	20	28	-.4	4	
5	270	22	260	30	50	2	265	24	27	-.8	5	
6	280	28	280	31	60	2	280	22	27	-1.2	6	
7	280	26	280	30	80	2	285	24	26	-1.2	7	
8	310	30	310	39	30	2	320	30	21	-1.2	8	
9	310	30	310	38	30	2	320	30	18	-1.2	9	
10	315	31	315	38	30	2	325	30	15	-1.4	10	
11	315	29	320	39	35	2	330	30	13	-1.4	11	
12	315	28	320	37	40	2	330	29	12	-1.2	12	
13	320	27	320	34	35	2	330	26	12	-1.2	13	
14	315	26	315	33	30	2	320	25	12	-1.4	14	
15	310	26	310	32	35	2	315	24	12	-1.2	15	
16	310	24	315	30	35	2	320	23	12	-1.0	16	
17	310	22	310	27	40	2	315	21	12	-1.0	17	
18	315	21	315	26	40	2	320	20	12	-1.0	18	
19	310	19	310	24	40	2	320	19	13	-.8	19	
20	310	16	310	20	70	2	310	16	14	-.8	20	
21	305	15	300	16	80	2	300	14	14	-.6	21	
22	280	14	285	15	85	2	290	12	14	-.6	22	
23	285	12	285	14	85	2	285	12	14	-.6	23	
24	275	13	280	15	65	2	280	12	15	-.6	24	
1	270	9	200	11	55	2	270	10	15	-.4	1	12/24/76
2	195	7	205	14	40	2	200	4	6	2.0	2	
3	200	8	205	14	50	3	200	5	6	2.0	3	
4	200	7	210	14	50	3	205	4	5	-1.6	4	
5	180	8	185	14	45	3	160	6	4	.8	5	
6	180	8	185	15	65	3	160	5	4	.8	6	
7	180	8	185	17	65	3	165	5	4	1.2	7	
8	170	8	180	16	70	3	185	4	6	.6	8	
9	185	8	190	16	70	3	170	4	8	0.0	9	
10	185	8	190	16	85	3	190	5	9	-.4	10	
11	190	10	190	18	85	3	185	5	13	-.6	11	
12	180	10	185	19	75	3	165	5	17	-.6	12	
13	180	10	185	19	100	3	190	5	21	-.6	13	
14	150	13	180	22	90	3	185	6	25	-.4	14	
15	180	13	180	24	100	3	160	10	28	-.2	15	
16	160	17	170	30	80	3	170	6	29	0.0	16	
17	180	10	180	21	100	3	200	5	31	.2	17	
18	210	10	195	17	70	3	215	8	31	.6	18	
19	215	14	205	20	80	3	215	12	31	.4	19	
20	225	14	210	20	80	3	215	10	33	0.0	20	
21	220	14	210	23	70	3	215	10	32	-.2	21	
22	225	16	215	23	85	3	225	14	33	-.2	22	
23	230	15	220	22	60	3	225	13	33	-.2	23	
24	240	12	225	20	70	3	230	13	33	-.2	24	

COOK GENERATING STATION

	WIND								TEMPERATURE			
	50FT				150FT		BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
												12/25/76
1	240	14	230	21	75	3	230	14	33	0.0	1	
2	240	14	230	20	75	3	235	16	33	0.0	2	
3	245	14	240	20	60	3	245	16	33	-0.2	3	
4	250	13	250	19	30	3	250	12	32	-0.2	4	
5	250	13	250	18	30	3	250	12	32	-0.2	5	
6	255	14	250	19	30	3	255	12	31	-0.2	6	
7	260	10	250	17	30	3	290	8	31	0.0	7	
8	300	11	290	10	90	3	325	8	33	0.0	8	
9	310	10	330	16	20	4	350	11	33	0.0	9	
10	345	12	345	18	30	2	355	12	32	-0.4	10	
11	350	12	350	17	50	2	360	12	31	-0.6	11	
12	350	10	350	14	40	2	355	11	31	-0.6	12	
13	330	10	330	14	50	2	350	10	31	-0.6	13	
14	330	10	340	17	50	2	340	14	31	-0.6	14	
15	330	11	330	17	35	2	355	11	30	-0.6	15	
16	350	10	345	15	40	2	360	10	30	-0.6	16	
17	350	10	345	15	45	2	350	12	30	-0.6	17	
18	335	8	340	13	40	2	340	9	30	-0.6	18	
19	320	10	320	14	20	2	325	10	30	-0.4	19	
20	310	12	310	14	30	2	310	10	30	-0.2	20	
21	305	14	305	16	40	2	305	12	30	-0.2	21	
22	300	14	295	17	80	2	290	13	30	-0.4	22	
23	310	15	280	18	80	3	290	14	30	-0.4	23	
24	280	16	280	19	80	3	290	16	30	-0.4	24	
												12/26/76
1	285	16	285	20	100	3	295	16	30	-0.6	1	
2	290	14	290	17	90	3	295	15	30	-0.6	2	
3	285	14	290	17	90	3	295	15	30	-0.6	3	
4	285	14	285	18	90	3	300	14	28	-0.6	4	
5	305	15	305	19	80	2	285	13	28	-0.8	5	
6	275	12	285	14	90	2	285	10	28	-0.6	6	
7	275	12	275	15	60	2	270	12	28	-0.6	7	
8	255	12	250	15	55	2	245	14	27	-0.4	8	
9	255	13	250	17	50	2	245	17	26	-0.4	9	
10	255	13	250	17	60	2	270	14	27	-0.4	10	
11	999	99	285	17	90	2	295	17	28	-1.0	11	
12	999	99	305	24	80	2	320	22	28	-0.8	12	
13	999	99	320	30	70	2	355	25	27	-0.8	13	
14	999	99	350	34	70	2	355	27	24	-0.8	14	
15	999	99	340	37	65	2	350	26	23	-1.0	15	
16	999	99	345	31	60	2	350	26	22	-1.0	16	
17	999	99	340	34	55	2	350	26	21	-1.4	17	
18	999	99	340	32	60	2	350	23	21	-1.6	18	
19	345	20	345	30	60	2	350	24	21	-1.4	19	
20	345	20	340	29	60	2	355	22	20	-1.2	20	
21	350	19	340	26	70	2	359	19	20	-1.6	21	
22	330	16	335	24	70	2	345	18	20	-1.4	22	
23	330	15	330	22	50	2	340	16	19	-1.0	23	
24	15	10	340	15	80	2	345	10	18	-0.8	24	

COOK GENERATING STATION

	WIND 50FT				150FT		BEACHPOLE		TEMPERATURE 30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
1	330	10	320	13	90	2	310	10	19	-.8	1	12/27/76
2	315	9	315	12	55	2	325	9	19	-.6	2	
3	310	8	300	11	90	2	290	9	19	-.6	3	
4	280	8	275	9	70	2	265	10	19	-.6	4	
5	270	10	255	14	90	2	220	8	18	-.6	5	
6	210	6	200	10	80	2	200	2	15	-.6	6	
7	195	6	190	12	70	3	175	4	15	-.6	7	
8	170	6	170	14	80	3	165	4	13	-.6	8	
9	160	10	165	17	80	3	160	9	12	-.8	9	
10	165	9	165	16	80	3	165	5	13	-.8	10	
11	165	9	170	16	80	3	170	6	15	-.8	11	
12	160	10	165	18	90	3	170	7	18	-.8	12	
13	170	6	175	11	110	3	165	5	20	-.8	13	
14	180	6	185	14	100	3	190	5	23	-.8	14	
15	165	8	170	14	80	3	160	6	24	-.8	15	
16	165	6	170	11	80	3	160	6	25	-.6	16	
17	170	6	180	12	80	3	160	6	26	-.4	17	
18	180	6	185	11	60	3	160	6	25	0.0	18	
19	240	6	240	11	80	3	225	6	28	.6	19	
20	270	8	270	12	70	2	265	6	29	.8	20	
21	320	17	320	23	30	2	330	16	33	-.2	21	
22	330	14	330	24	40	2	340	16	31	-.4	22	
23	340	15	340	24	60	2	345	17	30	-.4	23	
24	350	16	345	24	50	2	355	18	28	-.6	24	
1	350	16	345	24	70	2	355	19	27	-.6	1	12/28/76
2	350	16	345	24	60	2	360	18	25	-.8	2	
3	345	16	345	23	70	2	350	18	25	-.8	3	
4	335	16	335	23	50	2	348	18	24	-.8	4	
5	340	14	340	21	60	2	345	17	24	-.6	5	
6	350	14	345	20	70	2	360	16	24	-.6	6	
7	340	15	330	22	70	2	340	16	25	-.6	7	
8	330	20	325	28	55	2	335	20	24	-.8	8	
9	999	99	330	28	40	2	335	20	24	-1.0	9	
10	320	18	330	28	40	2	335	20	24	-1.0	10	
11	320	24	320	29	40	2	330	22	22	-1.0	11	
12	320	21	320	29	35	2	325	21	21	-1.0	12	
13	315	22	320	28	40	2	325	20	19	-.8	13	
14	315	20	315	26	30	2	325	19	18	-.5	14	
15	310	19	310	23	90	2	310	17	17	-.8	15	
16	310	17	305	21	80	2	310	16	15	-.8	16	
17	310	17	305	21	80	2	305	17	15	-.8	17	
18	310	19	310	25	50	2	315	18	14	-1.0	18	
19	310	17	310	22	65	2	310	17	12	-.8	19	
20	310	18	305	22	50	2	310	16	12	-.8	20	
21	310	17	310	23	40	2	315	16	12	-.8	21	
22	310	17	300	20	80	2	300	16	12	-.8	22	
23	310	18	315	22	60	2	320	17	11	-.8	23	
24	315	18	320	22	50	2	325	17	10	-.8	24	

COOK GENERATING STATION

	WIND******************************								TEMPERATURE			
	50FT				150FT		BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE
1	320	19	315	24	55	2	330	18	9	-.8	1	12/29/76
2	320	20	320	26	40	2	330	20	8	-.8	2	
3	320	19	315	25	50	2	320	18	6	-.8	3	
4	315	17	310	21	60	2	315	16	6	-.8	4	
5	310	16	305	20	80	2	310	15	3	-.8	5	
6	300	16	290	18	90	2	300	17	3	-.8	6	
7	300	17	300	22	80	2	300	17	3	-.8	7	
8	305	18	300	23	90	2	300	18	3	-.8	8	
9	305	20	300	25	60	2	305	18	3	-.8	9	
10	290	19	290	22	90	2	295	18	3	-1.0	10	
11	280	20	280	24	90	2	285	18	3	-.8	11	
12	280	19	280	23	90	2	285	18	3	-.8	12	
13	280	19	275	22	90	2	280	16	3	-1.0	13	
14	280	19	270	23	110	2	280	18	3	-1.0	14	
15	270	16	260	21	65	2	270	16	3	-.8	15	
16	275	17	275	24	70	2	280	16	4	-.8	16	
17	275	20	265	25	80	2	275	20	3	-.8	17	
18	280	22	275	25	80	2	280	19	3	-.8	18	
19	270	16	270	22	70	2	270	16	4	-.6	19	
20	220	10	210	15	80	3	220	9	3	-.8	20	
21	220	8	210	13	80	3	220	8	2	-.6	21	
22	215	8	210	12	80	3	220	20	2	-.4	22	
23	230	12	225	17	90	3	220	20	3	-.4	23	
24	275	18	280	22	80	2	260	16	6	-.8	24	
1	220	6	210	10	80	3	220	6	3	-.6	1	12/30/76
2	220	7	205	11	70	3	220	7	3	-.4	2	
3	215	7	205	12	70	3	220	6	3	-.6	3	
4	210	8	200	12	55	3	210	4	3	-.4	4	
5	210	7	200	12	60	3	210	4	4	-.4	5	
6	200	6	195	11	45	3	165	4	4	-.4	6	
7	180	6	185	12	60	3	165	6	4	-.4	7	
8	165	6	175	10	70	3	150	8	5	-.6	8	
9	150	6	155	10	25	2	145	7	6	-.2	9	
10	120	5	135	6	50	2	125	6	6	-.4	10	
11	120	6	130	6	50	2	125	6	7	-.6	11	
12	115	5	110	6	70	2	120	4	9	-.6	12	
13	105	7	100	8	80	2	115	5	10	-.6	13	
14	80	8	75	8	70	2	25	7	12	-.8	14	
15	30	6	20	8	90	2	25	8	10	-.8	15	
16	45	8	35	8	70	2	10	16	9	-.6	16	
17	330	13	350	19	70	2	355	15	10	-.6	17	
18	350	13	340	19	70	2	345	16	10	-.6	18	
19	330	13	330	19	60	2	340	15	10	-.6	19	
20	345	13	340	19	70	2	345	14	10	-.6	20	
21	355	12	345	17	80	2	360	14	9	-.6	21	
22	105	8	90	10	80	2	100	7	9999	-.8	22	
23	135	6	125	8	45	2	125	8	5	-.6	23	
24	160	4	170	8	60	2	145	6	5	-.2	24	

F-46

COOK GENERATING STATION

	WIND************************************								TEMPERATURE			
	50FT				150FT		BEACHPOLE		30FT	180-30		
HOUR	DIR	SP	DIR	SP	SPAN	G	DIR	SP	TEMP	DELTA T	HOUR	DATE 12/31/76
1	165	4	225	3	220	1	150	6	6	2.4	1	
2	15	6	360	10	150	2	350	15	10	1.0	2	
3	100	8	75	11	60	2	115	9	13	#.4	3	
4	125	7	95	10	15	4	120	6	5	3.4	4	
5	120	3	80	3	160	2	135	4	8	.6	5	
6	320	17	325	25	50	2	325	18	12	#.4	6	
7	315	22	310	28	30	2	315	20	12	#.4	7	
8	310	16	315	23	40	2	320	18	12	#.4	8	
9	310	16	315	23	50	2	320	17	11	#.6	9	
10	310	18	310	24	50	2	315	18	11	#.6	10	
11	310	19	305	26	45	2	310	19	10	#.6	11	
12	310	20	305	28	70	2	310	20	9	#.8	12	
13	310	23	305	29	80	2	305	22	9	#.8	13	
14	310	24	300	29	70	2	305	22	9	#1.0	14	
15	310	23	305	28	80	2	300	21	9	#.6	15	
16	295	20	290	23	90	3	295	21	9	#.6	16	
17	300	22	290	25	95	3	295	22	9	#.4	17	
18	290	22	285	24	90	3	300	22	10	#.4	18	
19	295	22	290	26	100	3	295	24	11	#.6	19	
20	310	26	305	34	60	2	310	24	11	#.6	20	
21	310	24	310	32	40	2	315	24	11	#.6	21	
22	310	22	310	30	35	2	315	21	10	#.6	22	
23	315	20	310	26	35	2	315	20	11	#.8	23	
24	315	18	310	25	45	2	320	18	11	#.8	24	

MONTH OF JULY 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) LESS THAN OR EQUAL TO -1.0
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD (MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	1	0	0	0	0	1	0	1	0	0	0	1	2	4	0	1	11	10.9	1.98
3.6 - 7.5	6	3	1	1	2	5	3	1	0	2	1	3	1	17	11	14	71	70.3	5.07
7.6 - 12.5	4	5	0	0	0	0	0	0	0	0	0	0	0	3	0	6	18	17.8	8.93
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1.0	12.62
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	11	8	1	1	2	6	3	2	0	2	1	4	3	24	11	22	101	0.0	4.66
PERCENT	10.9	7.9	1.0	1.0	2.0	5.9	3.0	2.0	0.0	2.0	1.0	4.0	3.0	23.8	10.9	21.8	100.0		
AV SPD	6.6	8.1	5.4	3.6	4.5	4.4	4.5	4.1	0.0	5.4	7.2	3.8	3.0	5.0	5.1	7.1			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.7
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN -1.0 BUT LESS THAN OR EQUAL TO -.9
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD (MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	2	5	10.4	1.93
3.6 - 7.5	4	4	1	0	0	1	1	0	0	0	1	8	1	3	2	7	33	68.8	5.23
7.6 - 12.5	0	3	0	0	0	0	1	0	0	0	1	3	0	1	0	1	10	20.8	8.98
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	4	7	1	0	0	2	2	0	1	0	2	12	1	4	2	10	48	0.0	4.79
PERCENT	8.3	14.6	2.1	0.0	0.0	4.2	4.2	0.0	2.1	0.0	4.2	25.0	2.1	8.3	4.2	20.8	100.0		
AV SPD	5.9	7.3	3.6	0.0	0.0	3.2	7.2	0.0	2.7	0.0	8.1	6.2	5.4	5.9	5.4	5.2			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.9
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

59

MONTH OF JULY 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN -.9 BUT LESS THAN OR EQUAL TO -.8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS I
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN -.8 BUT LESS THAN OR EQUAL TO -.3
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	6	3	1	2	3	2	2	1	4	2	6	6	4	3	0	45	24.5	2.68
3.6 - 7.5	4	6	4	1	3	3	1	5	2	6	4	26	13	1	2	11	92	50.0	5.52
7.6 - 12.5	1	6	0	0	0	0	0	2	0	0	2	6	6	5	6	10	44	23.9	9.58
12.6 - 18.5	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	3	1.6	14.90
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	5	18	7	2	5	7	3	9	3	10	8	40	25	10	11	21	184	0.0	4.80
PERCENT	2.7	9.8	3.8	1.1	2.7	3.8	1.6	4.9	1.6	5.4	4.3	21.7	13.6	5.4	6.0	11.4	100.0		
AV SPD	6.3	5.7	4.6	3.9	4.7	5.5	3.8	5.7	4.9	4.7	6.2	6.5	5.9	6.8	7.2	7.7			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.1
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF JULY 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.3 BUT LESS THAN OR EQUAL TO .8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	6	2	6	4	5	6	1	4	9	3	3	5	3	5	2	3	67	33.0	2.42
3.6 - 7.5	4	5	6	6	2	7	4	8	3	9	13	15	5	6	1	4	98	48.3	5.14
7.6 - 12.5	0	1	2	0	0	0	0	0	0	1	14	10	2	1	1	0	32	15.8	9.11
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	3	2	0	1	0	0	6	3.0	13.50
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	10	8	14	10	7	13	5	12	12	13	33	32	10	13	4	7	203	0.0	4.00
PERCENT	4.9	3.9	6.9	4.9	3.4	6.4	2.5	5.9	5.9	6.4	16.3	15.8	4.9	6.4	2.0	3.4	100.0		
AV SPD	4.0	5.4	4.2	4.1	3.4	3.5	4.5	4.3	3.2	4.3	7.7	7.0	5.6	5.5	5.5	4.6			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN .8 BUT LESS THAN OR EQUAL TO 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	1	2	3	2	3	3	4	3	2	1	0	1	0	0	2	27	41.5	2.77
3.6 - 7.5	0	1	2	4	5	5	2	1	2	6	5	5	0	0	0	0	38	58.5	4.97
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	2	4	7	7	8	5	5	5	8	6	5	1	0	0	2	65	0.0	3.74
PERCENT	0.0	3.1	6.2	10.8	10.8	12.3	7.7	7.7	7.7	12.3	9.2	7.7	1.5	0.0	0.0	3.1	100.0		
AV SPD	0.0	3.7	4.1	3.9	4.5	4.5	3.6	3.1	3.7	4.6	4.7	5.5	1.6	0.0	0.0	2.8			

AVERAGE SPEED FOR THIS TABLE EQUALS 4.2
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

61

MONTH OF JULY 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043124
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	1	0	1	5	0	0	0	0	0	0	0	7	8.1	2.27
3.6 - 7.5	0	0	0	0	15	15	14	15	9	7	3	0	0	0	0	0	78	90.7	5.07
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1.2	14.62
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	15	16	14	16	14	7	3	0	0	1	0	0	86	0.0	4.64
PERCENT	0.0	0.0	0.0	0.0	17.4	18.6	16.3	18.6	16.3	8.1	3.5	0.0	0.0	1.2	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	5.7	6.0	4.6	4.6	4.2	4.5	5.7	0.0	0.0	14.6	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.1
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF AUGUST 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) LESS THAN OR EQUAL TO -1.0
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3.8	2.70
3.6 - 7.5	2	2	1	2	3	1	0	1	1	1	1	3	2	15	2	3	40	76.9	5.24
7.6 - 12.5	1	4	0	3	0	1	1	0	0	0	0	0	0	0	0	0	10	19.2	9.43
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	3	6	1	5	3	2	1	1	1	1	1	4	2	16	2	3	52	0.0	5.51
PERCENT	5.8	11.5	1.9	9.6	5.8	3.8	1.9	1.9	1.9	1.9	1.9	7.7	3.8	30.8	3.8	5.8	100.0		
AV SPD	8.1	8.6	5.4	8.1	5.4	7.2	9.9	3.6	4.5	5.4	4.5	5.9	5.4	5.0	4.5	5.4			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.2
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -1.0 BUT LESS THAN OR EQUAL TO -.9
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.0	2.70
3.6 - 7.5	0	1	0	4	2	0	1	0	2	1	1	4	2	2	2	1	23	69.7	5.09
7.6 - 12.5	2	0	1	1	0	1	0	0	0	0	1	1	0	0	0	0	7	21.2	10.09
12.6 - 18.5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6.1	12.62
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	4	2	1	5	2	1	1	0	2	1	2	5	2	2	2	1	33	0.0	5.75
PERCENT	12.1	6.1	3.0	15.2	6.1	3.0	3.0	0.0	6.1	3.0	6.1	15.2	6.1	6.1	6.1	3.0	100.0		
AV SPD	11.9	4.1	9.9	6.7	5.9	9.0	4.5	0.0	4.5	6.3	8.1	7.2	5.4	3.6	3.6	7.2			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.8
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF AUGUST 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.9 BUT LESS THAN OR EQUAL TO -.8
REQUEST NUMBER 607-14
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS I
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.8 BUT LESS THAN OR EQUAL TO -.3
REQUEST NUMBER 607-14
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	2	2	1	1	1	0	1	2	2	1	4	2	2	1	2	24	15.1	2.99
3.6 - 7.5	2	8	3	10	5	0	2	2	1	6	11	16	4	1	4	7	82	51.6	5.63
7.6 - 12.5	2	3	0	0	7	3	4	0	0	0	15	12	1	1	2	3	53	33.3	9.15
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	4	13	5	11	13	4	6	3	3	8	27	32	7	4	7	12	159	0.0	5.60
PERCENT	2.5	8.2	3.1	6.9	8.2	2.5	3.8	1.9	1.9	5.0	17.0	20.1	4.4	2.5	4.4	7.5	100.0		
AV SPD	7.8	6.4	4.7	5.7	7.3	9.2	8.1	4.1	4.1	4.8	7.7	6.8	5.4	4.8	6.0	6.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.5
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF AUGUST 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.3 BUT LESS THAN OR EQUAL TO .8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	2	4	3	6	4	6	9	5	9	4	2	7	0	1	1	4	67	19.0	2.57
3.6 - 7.5	7	10	5	13	22	6	17	9	16	9	28	17	4	3	3	9	178	50.6	5.21
7.6 - 12.5	0	2	0	5	8	10	2	1	0	0	42	10	2	3	5	9	99	28.1	9.22
12.6 - 18.5	1	0	0	0	2	0	0	0	0	0	0	5	0	0	0	0	8	2.3	13.18
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	10	16	8	24	36	22	28	15	25	13	72	39	6	7	9	22	352	0.0	4.92
PERCENT	2.8	4.5	2.3	6.8	10.2	6.3	8.0	4.3	7.1	3.7	20.5	11.1	1.7	2.0	2.6	6.3	100.0		
AV SPD	5.6	4.8	4.5	5.8	6.3	6.4	5.0	4.5	3.9	4.5	7.8	7.2	6.9	6.4	7.9	6.6			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.2
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN .8 BUT LESS THAN OR EQUAL TO 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	1	0	1	2	4	0	0	0	0	0	3	1	1	0	0	1	14	15.6	2.62
3.6 - 7.5	0	1	3	13	9	2	4	2	5	17	2	5	1	5	1	0	70	77.8	5.05
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	2.2	9.48
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	4	4.4	14.72
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	1	1	4	15	13	2	4	2	5	17	6	10	2	5	2	1	90	0.0	4.57
PERCENT	1.1	1.1	4.4	16.7	14.4	2.2	4.4	2.2	5.6	18.9	6.7	11.1	2.2	5.6	2.2	1.1	100.0		
AV SPD	2.4	4.1	4.5	5.8	4.7	6.1	5.7	4.5	4.4	4.8	4.5	8.2	4.9	4.2	10.2	2.4			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.4
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF AUGUST 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	3	7.3	2.92
3.6 - 7.5	0	0	0	2	9	3	3	9	4	8	0	0	0	0	0	0	38	92.7	5.09
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	2	11	3	3	10	4	8	0	0	0	0	0	0	41	0.0	4.83
PERCENT	0.0	0.0	0.0	4.9	26.8	7.3	7.3	24.4	9.8	19.5	0.0	0.0	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	4.5	5.2	5.4	4.9	5.0	4.7	5.3	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.1
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF SEPTEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14

FOR TEMPERATURE DIFFERENCE (DEG F/100FT) LESS THAN OR EQUAL TO -1.0

SITE COOK

PERIOD OF RECORD FROM 75050101 TO 76043024

SPEED AND DIRECTION FROM 50FT LEVEL

TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	1	0	0	0	0	0	0	0	7	3	0	11	40.7	1.98
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	8	29.6	4.48
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	6	22.2	9.00
12.6 - 18.5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	2	7.4	13.05
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	1	0	1	0	0	0	0	0	0	0	19	6	0	27	0.0	3.31
PERCENT	0.0	0.0	0.0	3.7	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.4	22.2	0.0	100.0		
AV SPD	0.0	0.0	0.0	12.6	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.4	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.2

HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14

FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -1.0 BUT LESS THAN OR EQUAL TO -.9

SITE COOK

PERIOD OF RECORD FROM 75050101 TO 76043024

SPEED AND DIRECTION FROM 50FT LEVEL

TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	1	0	0	3	0	0	0	0	1	2	2	9	33.3	1.43
3.6 - 7.5	1	4	0	0	1	0	0	1	0	0	0	0	4	2	1	0	14	51.9	4.99
7.6 - 12.5	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	3	11.1	9.76
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3.7	12.62
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	1	4	0	0	1	1	0	1	3	2	0	0	4	3	5	2	27	0.0	2.85
PERCENT	3.7	14.8	0.0	0.0	3.7	3.7	0.0	3.7	11.1	7.4	0.0	0.0	14.8	11.1	18.5	7.4	100.0		
AV SPD	3.6	6.5	0.0	0.0	5.4	1.8	0.0	3.6	1.8	9.0	0.0	0.0	5.0	4.2	6.7	1.4			

AVERAGE SPEED FOR THIS TABLE EQUALS 4.9

HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF SEPTEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.9 BUT LESS THAN OR EQUAL TO -.8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS I
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.8 BUT LESS THAN OR EQUAL TO -.3
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	2	1	0	0	1	2	1	7	3.4	.30
CALM+ - 3.5	7	6	2	1	1	7	4	4	2	0	1	6	4	2	8	6	61	29.9	1.92
3.6 - 7.5	7	11	1	6	0	9	1	0	2	3	5	10	4	0	0	1	60	29.4	5.48
7.6 - 12.5	0	6	5	2	0	1	0	0	0	0	1	6	3	3	13	0	40	19.6	10.46
12.6 - 18.5	0	2	0	0	0	0	0	0	0	0	0	7	16	3	6	0	34	16.7	15.74
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	1.0	19.18
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	14	25	8	9	1	17	5	4	4	5	8	30	28	9	29	8	204	0.0	2.83
PERCENT	6.9	12.3	3.9	4.4	.5	8.3	2.5	2.0	2.0	2.5	3.9	14.7	13.7	4.4	14.2	3.9	100.0		
AV SPD	4.2	6.8	7.2	6.4	3.5	4.4	3.3	2.4	3.3	4.0	4.9	9.2	12.3	8.5	8.9	2.1			

AVERAGE SPEED FOR THIS TABLE EQUALS 7.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF SEPTEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.3 BUT LESS THAN OR EQUAL TO .8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	2	0	1	5	2	0	0	0	0	0	0	1	0	0	0	11	3.4	.30
CALM+ - 3.5	6	14	11	7	10	5	10	10	14	10	12	5	5	1	2	9	131	40.6	1.70
3.6 - 7.5	1	8	7	16	5	14	18	7	2	4	16	6	4	9	7	6	130	40.2	5.16
7.6 - 12.5	0	2	0	6	2	4	0	0	0	0	3	3	0	9	8	4	41	12.7	9.34
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	2	2	4	2	0	10	3.1	14.23
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	7	26	18	30	22	25	28	17	16	14	31	16	12	23	19	19	323	0.0	2.24
PERCENT	2.2	8.0	5.6	9.3	6.8	7.7	8.7	5.3	5.0	4.3	9.6	5.0	3.7	7.1	5.9	5.9	100.0		
AV SPD	2.6	3.7	3.3	5.3	2.7	4.8	3.9	3.0	2.5	3.0	4.7	6.6	5.6	8.8	8.0	4.5			

AVERAGE SPEED FOR THIS TABLE EQUALS 4.7
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN .8 BUT LESS THAN OR EQUAL TO 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1.4	.30
CALM+ - 3.5	0	0	2	4	6	9	7	2	4	6	2	0	0	0	2	0	44	62.9	2.31
3.6 - 7.5	0	0	0	3	7	5	4	3	0	1	0	1	0	0	0	0	24	34.3	4.46
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1.4	8.12
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	2	7	13	14	12	5	4	7	2	2	0	0	2	0	70	0.0	2.51
PERCENT	0.0	0.0	2.9	10.0	18.6	20.0	17.1	7.1	5.7	10.0	2.9	2.9	0.0	0.0	2.9	0.0	100.0		
AV SPD	0.0	0.0	2.4	3.4	3.6	3.1	3.2	3.4	2.2	3.1	3.2	6.5	0.0	0.0	2.4	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 3.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF SEPTEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

REQUEST NUMBER 607-14

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD (MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	5	10	17	10	5	1	0	0	0	0	0	0	48	72.7	2.79
3.6 - 7.5	0	0	0	0	3	3	2	5	3	2	0	0	0	0	0	0	18	27.3	4.22
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	8	13	19	15	8	3	0	0	0	0	0	0	66	0.0	3.07
PERCENT	0.0	0.0	0.0	0.0	12.1	19.7	28.8	22.7	12.1	4.5	0.0	0.0	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	3.6	2.9	3.2	3.3	3.5	4.1	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 3.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF OCTOBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) LESS THAN OR EQUAL TO -1.0
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3.0	2.70
3.6 - 7.5	0	0	0	0	0	0	0	0	1	2	0	0	1	3	9	0	16	48.5	5.93
7.6 - 12.5	0	0	0	0	0	0	0	0	4	7	0	1	0	3	0	0	15	45.5	10.22
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3.0	12.62
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	5	9	0	1	1	8	9	0	33	0.0	7.15
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.2	27.3	0.0	3.0	3.0	24.2	27.3	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	8.8	0.0	11.7	7.2	8.2	6.2	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 8.1
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -1.0 BUT LESS THAN OR EQUAL TO -.9
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3.1	2.70
3.6 - 7.5	0	0	0	0	0	0	5	2	1	1	0	1	0	0	1	2	13	40.6	5.46
7.6 - 12.5	0	0	0	0	0	0	0	0	5	3	3	4	0	1	0	0	16	50.0	10.09
12.6 - 18.5	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	6.3	12.62
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	1	0	0	5	2	6	4	3	6	0	2	1	2	32	0.0	7.12
PERCENT	0.0	0.0	0.0	3.1	0.0	0.0	15.6	6.3	18.7	12.5	9.4	18.7	0.0	6.3	3.1	6.3	100.0		
AV SPD	0.0	0.0	0.0	12.6	0.0	0.0	6.5	5.0	8.6	9.5	10.5	10.2	0.0	7.2	5.4	5.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 8.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF OCTOBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.9 BUT LESS THAN OR EQUAL TO -.8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.8 BUT LESS THAN OR EQUAL TO -.3
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	1	4	1	3	2	0	0	0	0	1	0	0	2	0	2	1	17	7.2	2.69
3.6 - 7.5	0	3	1	2	1	2	10	7	6	5	5	3	3	2	4	8	62	26.3	5.65
7.6 - 12.5	3	7	18	14	2	1	1	1	8	3	17	11	9	9	10	7	121	51.3	10.01
12.6 - 18.5	0	1	4	2	0	0	0	0	0	0	0	2	5	7	8	0	29	12.3	14.53
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	4	1	2	0	7	3.0	21.39
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	4	15	24	21	5	3	11	8	14	9	22	16	23	19	26	16	236	0.0	7.45
PERCENT	1.7	6.4	10.2	8.9	2.1	1.3	4.7	3.4	5.9	3.8	9.3	6.8	9.7	8.1	11.0	6.8	100.0		
AV SPD	7.0	7.1	10.6	9.2	7.0	7.3	5.6	5.9	8.1	7.2	9.0	10.0	12.4	12.5	11.2	7.5			

AVERAGE SPEED FOR THIS TABLE EQUALS 9.4
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

72

MONTH OF OCTOBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REOUEST NUMBER 607-14

FOR TEMPFRATURF DIFFEPENCE(DEG F/100FT) GREATER THAN -.3 BUT LESS THAN OR EQUAL TO .8

SITE COOK

PERIOD OF RECORD FROM 75050101 TO 76043024

SPEED AND DIRECTION FROM 50FT LEVEL

TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPFED(MPH)	N	NNF	NF	ENF	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	4	4	1	2	2	0	0	0	0	1	1	1	1	0	2	1	20	7.9	2.14
3.6 - 7.5	0	2	7	14	14	2	8	13	21	10	6	0	2	7	4	0	110	43.7	5.86
7.6 - 12.5	2	1	1	7	4	0	0	11	9	9	50	12	0	5	4	0	115	45.6	9.27
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	6	0	0	1	0	7	2.8	13.11
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	6	7	9	23	20	2	8	24	30	20	57	19	3	12	11	1	252	0.0	6.15
PERCENT	2.4	2.8	3.6	9.1	7.9	.8	3.2	9.5	11.9	7.9	22.6	7.5	1.2	4.8	4.4	.4	100.0		
AV SPD	4.7	3.7	5.7	6.8	6.3	6.5	5.7	7.3	7.0	7.2	9.2	10.6	5.4	7.0	7.5	2.4			

AVERAGE SPEED FOR THIS TABLE EQUALS 7.5

HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REOUEST NUMBER 607-14

FOR TEMPFRATURF DIFFEPENCE(DEG F/100FT) GREATER THAN .8 BUT LESS THAN OR EQUAL TO 2.2

SITE COOK

PERIOD OF RECORD FROM 75050101 TO 76043024

SPEED AND DIRECTION FROM 50FT LEVEL

TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPFED(MPH)	N	NNF	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	0	4	6.6	3.25
3.6 - 7.5	0	0	2	0	4	12	6	3	13	6	6	0	0	0	0	0	52	85.2	5.59
7.6 - 12.5	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	5	8.2	8.43
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	2	0	8	14	8	3	14	6	6	0	0	0	0	0	61	0.0	5.48
PERCENT	0.0	0.0	3.3	0.0	13.1	23.0	13.1	4.9	23.0	9.8	9.8	0.0	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	4.9	0.0	6.7	5.7	6.8	5.4	5.1	6.0	6.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.8

HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF OCTOBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1.9	3.25
3.6 - 7.5	0	0	0	1	5	5	10	8	9	5	0	0	0	0	0	0	43	81.1	5.24
7.6 - 12.5	0	0	0	0	1	5	0	0	0	0	0	3	0	0	0	0	9	17.0	9.26
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	2	6	10	10	8	9	5	0	3	0	0	0	0	53	0.0	5.59
PERCENT	0.0	0.0	0.0	3.8	11.3	18.9	18.9	15.1	17.0	9.4	0.0	5.7	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	3.7	5.7	7.3	5.8	4.8	5.0	6.2	0.0	10.8	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.0
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

74

MONTH OF NOVEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) LESS THAN OR EQUAL TO -1.0
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD (MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5.6	2.70
3.6 - 7.5	0	0	0	0	0	0	0	0	1	3	1	2	0	0	0	0	7	38.9	4.25
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	1	1	0	0	4	0	6	33.3	9.68
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	4	22.2	13.64
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	1	1	3	2	5	0	2	4	0	18	0.0	6.15
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	5.6	16.7	11.1	27.8	0.0	11.1	22.2	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	3.6	4.2	7.2	8.7	0.0	15.3	10.1	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 8.2
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN -1.0 BUT LESS THAN OR EQUAL TO -.9
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD (MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	100.0	9.01
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0	9.01
PERCENT	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 9.0
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF NOVEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.9 BUT LESS THAN OR EQUAL TO -.8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS I
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.8 BUT LESS THAN OR EQUAL TO -.3
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	1	0	0	0	1	0	0	0	1	0	0	2	1	2	0	8	2.4	2.32
3.6 - 7.5	1	0	0	7	15	10	2	3	7	15	9	10	2	1	1	0	83	25.0	6.01
7.6 - 12.5	5	0	5	9	4	8	1	10	5	6	19	14	6	7	10	2	111	33.4	9.62
12.6 - 18.5	11	3	1	0	2	2	0	0	0	0	9	12	26	6	4	2	78	23.5	15.34
18.6 - 24.5	12	4	0	0	0	0	0	0	0	0	0	2	6	0	1	0	25	7.5	20.28
24.6 - 32.5	5	0	0	0	0	0	0	0	0	0	0	0	14	0	0	1	20	6.0	28.63
32.6+	0	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0	7	2.1	35.31
TOTAL	34	8	6	16	21	21	3	13	12	22	37	40	61	15	18	5	332	100.0	9.22
PERCENT	10.2	2.4	1.8	4.8	6.3	6.3	.9	3.9	3.6	6.6	11.1	12.0	18.4	4.5	5.4	1.5	100.0		
AV SPD	17.6	16.2	10.9	7.9	7.6	8.3	8.4	9.3	7.6	6.4	10.0	11.9	20.4	11.6	10.8	15.3			

AVERAGE SPEED FOR THIS TABLE EQUALS 12.6
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF NOVEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.3 BUT LESS THAN OR EQUAL TO .8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	1	1	0	0	2	3	5	3	3	4	3	4	1	30	11.6	2.48
3.6 - 7.5	0	0	1	0	0	1	4	6	6	12	21	21	5	4	2	0	83	32.0	5.26
7.6 - 12.5	0	1	0	0	1	0	11	15	11	8	28	26	2	0	1	0	104	40.2	9.44
12.6 - 18.5	0	1	0	0	2	1	6	6	6	1	8	11	0	0	0	0	42	16.2	14.28
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	2	1	1	4	2	21	29	26	26	60	61	11	7	7	1	259	0.0	6.19
PERCENT	0.0	.8	.4	.4	1.5	.8	8.1	11.2	10.0	10.0	23.2	23.6	4.2	2.7	2.7	.4	100.0		
AV SPD	0.0	13.0	6.5	3.2	10.6	9.7	10.4	9.3	9.4	6.1	8.4	8.7	4.7	4.5	4.8	3.2			

AVERAGE SPEED FOR THIS TABLE EQUALS 8.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN .8 BUT LESS THAN OR EQUAL TO 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	1	0	0	0	2	1	1	2	1	0	1	0	9	13.0	2.83
3.6 - 7.5	0	0	0	0	1	5	6	7	8	11	8	4	2	0	0	0	52	75.4	5.67
7.6 - 12.5	0	0	0	0	0	1	0	1	0	2	2	0	1	0	0	0	7	10.1	8.23
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1.4	13.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	2	6	6	8	10	14	11	7	4	0	1	0	69	0.0	5.20
PERCENT	0.0	0.0	0.0	0.0	2.9	8.7	8.7	11.6	14.5	20.3	15.9	10.1	5.8	0.0	1.4	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	4.5	6.5	5.4	5.9	4.8	6.4	6.4	5.9	4.7	0.0	2.4	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.8
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF NOVEMBER 1975

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2.4	3.25
3.6 - 7.5	0	0	0	0	0	2	3	4	14	13	1	1	0	0	0	0	38	92.7	6.01
7.6 - 12.5	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	4.9	8.12
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	2	3	4	15	14	2	1	0	0	0	0	41	0.0	5.96
PERCENT	0.0	0.0	0.0	0.0	0.0	4.9	7.3	9.8	36.6	34.1	4.9	2.4	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	6.1	7.0	5.5	5.6	6.5	6.9	7.3	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 6.1
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF DECEMBER 1976

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) LESS THAN OR EQUAL TO -1.0
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS I
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -1.0 BUT LESS THAN OR EQUAL TO -.9
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	7.1	3.61
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	35.7	16.73
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	35.7	21.19
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	21.4	25.53
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	1	14	0.0	15.06
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.9	7.1	100.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.6	3.6			

AVERAGE SPEED FOR THIS TABLE EQUALS 19.4
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

79

MONTH OF DECEMBER 1976

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.9 BUT LESS THAN OR EQUAL TO -.8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
3.6 - 7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
PERCENT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS I
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION — REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.8 BUT LESS THAN OR EQUAL TO -.3
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	3	0	2	3	11	4	5	6	11	3	1	0	0	0	3	1	53	11.0	2.58
3.6 - 7.5	7	5	5	4	15	9	5	10	12	7	2	3	3	1	3	3	94	19.5	5.18
7.6 - 12.5	23	8	20	20	26	5	10	5	0	4	25	11	19	9	13	4	202	42.0	10.05
12.6 - 18.5	4	7	15	0	6	13	2	0	0	0	1	3	17	16	22	1	107	22.2	15.42
18.6 - 24.5	0	0	0	0	0	1	0	0	0	0	0	0	5	3	10	0	19	4.0	20.11
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	.8	28.40
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	.4	33.98
TOTAL	37	20	42	27	58	32	22	21	23	14	29	17	50	29	51	9	481	100.0	7.19
PERCENT	7.7	4.2	8.7	5.6	12.1	6.7	4.6	4.4	4.8	2.9	6.0	3.5	10.4	6.0	10.6	1.9	100.0		
AV SPD	9.1	11.3	11.4	8.5	8.3	10.3	7.6	5.7	4.2	6.3	9.3	9.6	15.5	14.5	13.9	8.2			

AVERAGE SPEED FOR THIS TABLE EQUALS 10.3
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF DECEMBER 1976

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION   REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN -.3 BUT LESS THAN OR EQUAL TO .8
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	1	4	5	3	5	3	10	6	1	0	0	0	0	0	38	17.5	2.57
3.6 - 7.5	1	1	1	9	20	7	10	13	9	13	6	2	1	0	0	1	94	43.3	5.18
7.6 - 12.5	2	0	0	1	0	0	4	7	4	17	18	4	6	0	1	0	64	29.5	9.65
12.6 - 18.5	0	0	1	0	0	0	2	0	0	0	10	5	1	0	2	0	21	9.7	14.01
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	3	1	3	14	25	10	21	23	23	36	35	11	8	0	3	1	217	0.0	5.29
PERCENT	1.4	.5	1.4	6.5	11.5	4.6	9.7	10.6	10.6	16.6	16.1	5.1	3.7	0.0	1.4	.5	100.0		
AV SPD	7.6	4.9	6.8	4.6	4.6	4.6	6.4	6.7	4.8	7.4	10.2	11.4	9.6	0.0	13.0	4.1			

AVERAGE SPEED FOR THIS TABLE EQUALS 7.1
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION   REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE(DEG F/100FT) GREATER THAN .8 BUT LESS THAN OR EQUAL TO 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	11.8	3.25
3.6 - 7.5	0	0	0	0	0	2	1	2	2	5	0	0	0	0	0	0	12	70.6	5.04
7.6 - 12.5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	11.8	8.12
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	5.9	15.44
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	4	1	2	2	7	0	1	0	0	0	0	17	0.0	5.14
PERCENT	0.0	0.0	0.0	0.0	0.0	23.5	5.9	11.8	11.8	41.2	0.0	5.9	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	7.3	4.1	4.5	4.9	4.8	0.0	15.4	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 5.9
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0

MONTH OF DECEMBER 1976

JOINT FREQUENCY TABLES OF WIND SPEED AND DIRECTION REQUEST NUMBER 607-14
FOR TEMPERATURE DIFFERENCE (DEG F/100FT) GREATER THAN 2.2
SITE COOK
PERIOD OF RECORD FROM 75050101 TO 76043024
SPEED AND DIRECTION FROM 50FT LEVEL
TEMPERATURE DIFFERENCE BETWEEN 180FT AND 30FT

SPEED MEASURED AT 50FT ADJUSTED TO 33FT

WIND DIRECTION

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL	PERCENT	GEO MEAN SPD(MPH)
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
CALM+ - 3.5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	8.3	3.25
3.6 - 7.5	0	0	0	0	0	1	4	3	3	0	0	0	0	0	0	0	11	91.7	4.95
7.6 - 12.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
12.6 - 18.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
18.6 - 24.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
24.6 - 32.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
32.6+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.00
TOTAL	0	0	0	0	0	1	4	3	4	0	0	0	0	0	0	0	12	0.0	4.74
PERCENT	0.0	0.0	0.0	0.0	0.0	8.3	33.3	25.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0		
AV SPD	0.0	0.0	0.0	0.0	0.0	5.7	5.7	5.1	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

AVERAGE SPEED FOR THIS TABLE EQUALS 4.9
HOURS IN ABOVE TABLE WITH VARIABLE DIRECTION = 0