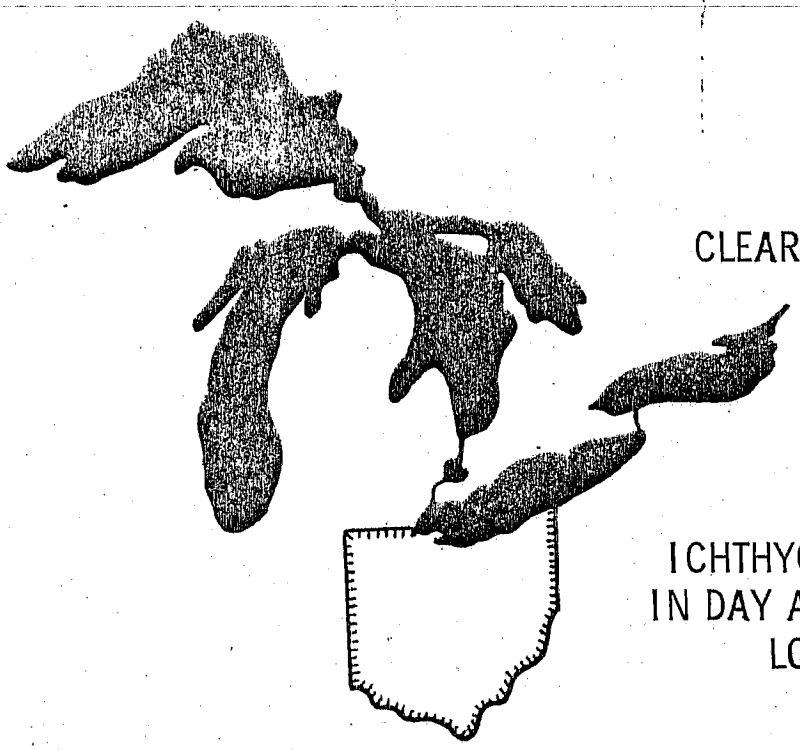

CLEAR TECHNICAL REPORT NO. 81

A COMPARISON OF ICHTHYOPLANKTON CONCENTRATIONS IN DAY AND NIGHT COLLECTIONS FROM LOCUST POINT, LAKE ERIE

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INTRODUCTION

Unit I of the Davis-Besse Nuclear Power Station built by the Toledo Edison Company and the Cleveland Electric Illuminating Company on the south shore of western Lake Erie at Locust Point is currently in the initial phases of commercial operation. This station utilizes water from Lake Erie to replenish cooling tower blow-down and evaporative losses through its hyperbolic cooling tower. In 1974, The Ohio State University's Center for Lake Erie Area Research (CLEAR) initiated ichthyoplankton sampling in the Locust Point area to determine larval fish and egg densities in the vicinity of the intake and discharge of this power station. With a knowledge of these densities, entrainment losses can be estimated simply by multiplying the volume of intake water by the ichthyoplankton concentration per unit volume near the intake structure.

During the 10 September 1976 meeting between The Toledo Edison Company and the U.S. Nuclear Regulatory Commission regarding Unit I Environmental Technical Specifications considerable discussion arose over the issue of night and day ichthyoplankton sampling (Appendix A). The Toledo Edison Company proposed a brief study (Appendix B) to document day/night differences in the ichthyoplankton concentration estimated from field samples. CLEAR performed this task on 13 and 25 June 1977.

OBJECTIVE

The objective of this study was to determine if there are any significant differences in the ichthyoplankton concentration in samples collected from Lake Erie during the day versus those collected during the night in the vicinity of the site of the Davis-Besse Nuclear Power Station.

PROCEDURES

Ichthyoplankton samples were collected at least four hours before sunset (day samples) and two hours after sunset (night samples) on two occasions during the summer of 1977, June 13 and 25, from the surface and bottom of four sampling stations in the vicinity of the Davis-Besse Nuclear Power Station. Stations 8 and 13 were located over the intake and discharge areas, respectively, while stations 3 and 29 served as controls on either side of the site (Figure 1). Two 5-minute circular tows (3 to 4 knots/hr) with a 0.75-meter heavy-duty oceanographic plankton net (No. 00, 0.75 mm mesh) were completed at the surface and bottom of each sampling station on each date and time. The net was equipped with a flow meter to allow determination of the volume of water filtered. Samples were labeled, preserved in 5% formalin, and taken to the laboratory for sorting, identification, and enumeration. All specimens

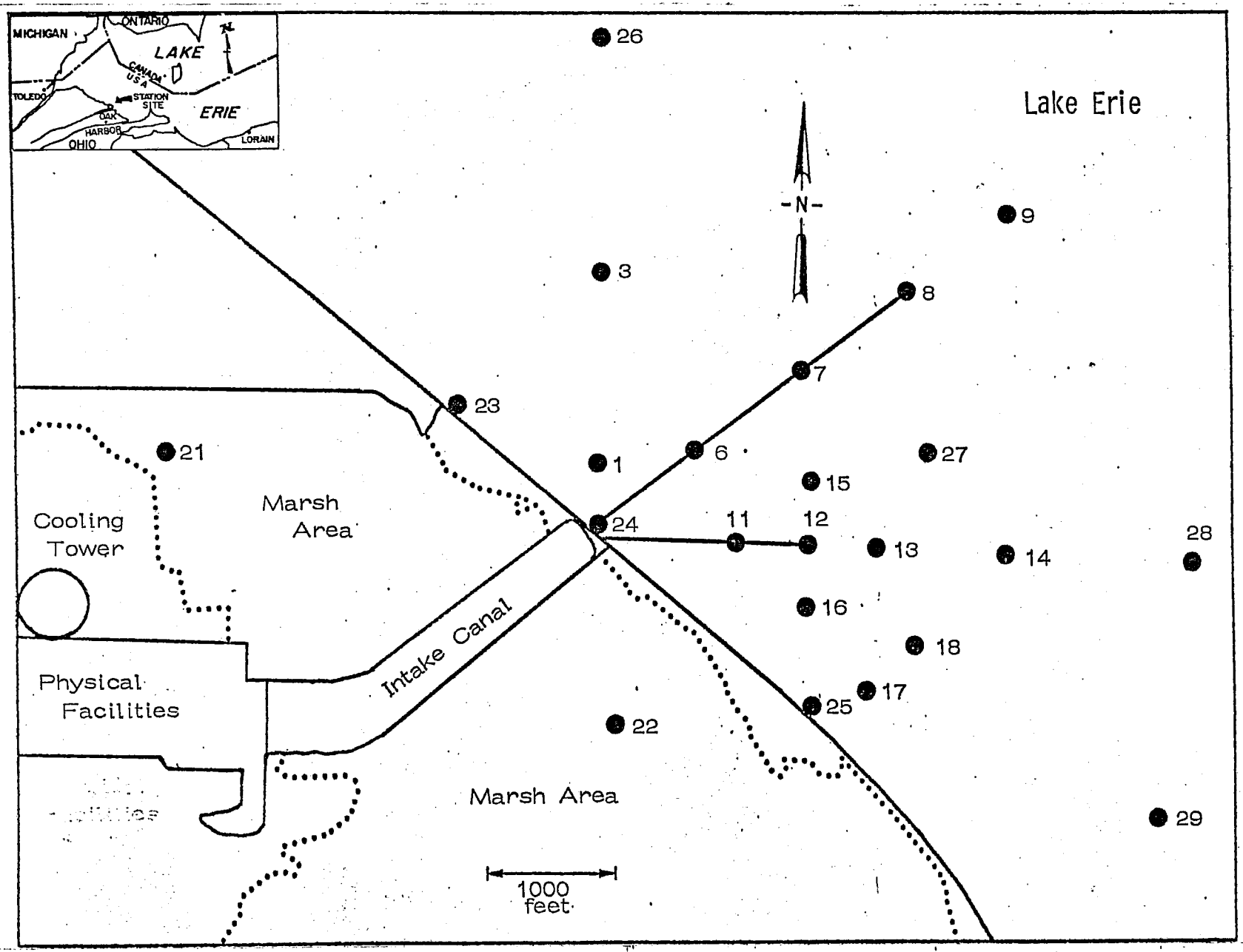

FIGURE 1

SAMPLING STATIONS AT THE DAVIS-BESSE NUCLEAR POWER STATION

were identified to species using taxonomic keys developed by Fish (1932), Norden (1961a and b), and Nelson and Cole (1975). All results were keypunched to allow statistical testing with the Statistical Analysis System (SAS) on an IBM 370 computer. Concentrations were presented as the number of individuals per 100 m^3 of water.

RESULTS

Eleven species were collected during the study (Table 1). All eleven were present on 13 June while only six were captured on 25 June. All eleven were also present in night samples while only 7 appeared in day collections. Gizzard shad was always the dominant species constituting 84% of the mean larval concentration during the day and 93% of the night concentration. The three most abundant species were gizzard shad, emerald shiners, and white bass, respectively. Together they constituted 96% of the mean larval concentration during the day and night, and all three were significantly (0.05 level) more abundant in the night samples.

The total number of larvae sampled at any one station did not show a highly significant day/night difference on either date (Table 2). However, when surface values from all stations, bottom values from all stations, and surface and bottom values from all stations were averaged, the concentrations observed at night were always significantly larger (0.05 level) than the corresponding day values. Night concentrations from surface samples, bottom samples, and all samples combined were 9.0, 14.1 and 13.1 times larger, respectively, than the corresponding day value. The concentration of larval fishes (all species combined) observed during the day was never as large or larger than the corresponding night concentration.

Tables 3-13 present day and night concentrations from each station on both dates for each of the eleven species. No significant (0.05 level) day/night differences were observed for carp, freshwater drum, rainbow smelt, spottail shiner, troutperch, walleye, or yellow perch. Furthermore, although a significantly larger (0.05 level) night concentration was common for surface, bottom, and grand means of emerald shiners, gizzard shad, logperch, and white bass, emerald shiner was the only species to show a significant (0.05 level) day/night difference for a single station and date (Station 29 on June 25). Gizzard shad provided the greatest day/night difference, for when the surface values for the day were averaged on 25 June, the corresponding night average was 207 times larger (Table 6).

DISCUSSION

Results indicated that fish larvae concentrations observed in net samples collected during the night were significantly larger (0.05 level) than the concentration in net samples collected during the day from Lake Erie at Locust Point. This difference was significant for the mean

concentration of larval fishes overall (surface and bottom), the mean concentration at the surface only, the mean concentration at the bottom, and probably would have been significant at each of the four sampling stations if more samples had been collected. However, the night concentration was not significantly larger than the day concentration for each individual species. Although it is possible that some species do not exhibit a significant day/night difference, it is more reasonable to assume that most of the species collected during this study, which did not show a significant day/night concentration difference, did so because they were quite rare during the collection periods. For example, walleye and yellow perch larvae are normally most prominent in May and are quite rare by June. Consequently, a significant day/night difference, if it exists, would be more likely to appear in May for these species. The month of June was selected for these collections because the concentration of larval fishes is generally greatest at this time, and it was this total concentration, rather than the concentrations of individual species, which was to be examined. Consequently, the data presented in Table 2 are the most valuable for determining the real significance of day/night differences.

Although ichthyoplankton movement from the bottom to the surface at night could not be eliminated (and may contribute) as a possible cause for these day/night differences, it is felt that net avoidance was a more probable explanation since bottom to surface ratios for the day and night did not exhibit any trends which would indicate a net larval movement. The bottom to surface ratio for the total larvae concentration observed during the day and night was 5.3 and 4.3, respectively, on 13 June, 3.0 and 7.4, respectively, on 25 June and 4.2 and 6.6, respectively, overall.

Originally, net avoidance was not deemed to be significant due to the high turbidity in the waters along the south shore of western Lake Erie. Much of this contention was based on the fact that day concentrations observed along the south shore of western Lake Erie were similar to Dr. Cole's night concentrations observed along the west shore (north of Monroe) where the water is less turbid (Appendix B). This also led to the conclusion that results from day samples along the south shore were representative of the true larvae concentration and would not differ significantly from night results. However, recent studies by CLEAR for the USEPA indicate that larval concentrations along the south shore are larger than concentrations in the area sampled by Dr. Cole. This finding and the results of the present study make it clear that night collections contain significantly more larvae than day collections.

TABLE 1

DAY/NIGHT ICHTHYOPLANKTON CONCENTRATIONS*
AT LOCUST POINT, LAKE ERIE

SPECIES	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Signifi-cance **	Day	Night	Night/Day	Signifi-cance **	Day	Night	Night/Day	Signifi-cance **
Carp	0.0	0.1	-	0.333	0.3	0.2	0.7	0.902	0.1	0.2	2.0	0.873
Emerald Shiner	0.6	1.9	3.2	0.068	6.2	17.4	2.8	0.008	3.4	9.6	2.8	0.014
Freshwater Drum	0.1	0.3	3.0	0.397	1.0	0.4	0.4	0.414	0.6	0.3	0.5	0.558
Gizzard Shad	36.3	142.0	3.9	0.016	16.2	619.2	38.2	0.003	26.6	387.8	14.6	0.001
Logperch	0.2	4.0	20.0	0.058	0.0	0.0	-	-	0.1	2.0	20.0	0.061
Rainbow Smelt	0.0	1.5	-	0.206	0.0	0.0	-	-	0.0	0.8	-	0.201
Spottail Shiner	0.3	0.3	-	0.333	0.1	0.2	2.0	0.660	0.1	0.3	3.0	0.299
Troutperch	0.0	0.1	-	0.333	0.0	0.0	-	-	0.0	0.1	-	0.325
Walleye	0.0	0.1	-	0.333	0.0	0.0	-	-	0.0	0.1	-	0.333
White Bass	0.0	1.4	-	0.051	0.1	2.7	27.0	0.153	0.5	2.0	40.0	0.046
Yellow Perch	0.0	0.9	-	0.225	0.0	0.0	-	-	0.0	0.4	-	0.220
TOTAL	39.5	152.4	3.9	0.015	23.9	679.0	28.4	0.002	31.7	415.7	13.1	0.001

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 2

SUMMARY OF DAY/NIGHT ICHTHYOPLANKTON CONCENTRATIONS*
AT LOCUST POINT, LAKE ERIE

	13 June 1977				25 June 1977				MEAN			
STATION	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	57.4	234.0	4.1	0.299	19.2	561.8	29.3	0.183	38.3	397.9	10.4	0.074
13	16.9	101.6	6.0	0.151	19.9	1,064.7	53.5	0.190	18.4	583.2	31.7	0.141
29	5.4	157.9	29.2	0.152	29.8	513.2	17.2	0.065	17.6	335.5	19.1	0.023
8	78.4	116.2	1.5	0.475	26.9	576.1	21.4	0.078	52.7	346.2	6.6	0.060
Surface Mean	12.5	57.7	4.6	0.029	11.9	161.2	13.5	0.017	12.2	109.5	9.0	0.003
Bottom Mean	66.6	247.2	3.7	0.025	35.9	1,196.7	33.3	0.002	51.3	721.9	14.1	0.001
Grand Mean	39.5	152.4	3.9	0.015	23.9	679.0	28.4	0.002	31.7	415.7	13.1	0.001

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 3

DAY/NIGHT CONCENTRATIONS* OF CARP (*Cyprinus carpio*) LARVAE
AT LOCUST POINT, LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
13	0.0	0.0	-	-	0.7	0.0	0.0	0.391	0.4	0.0	0.0	0.351
29	0.0	0.4	-	0.391	0.0	0.9	-	0.391	0.0	0.7	-	0.218
8	0.0	0.0	-	-	0.4	0.0	0.0	0.391	0.2	0.0	0.0	0.351
Surface Mean	0.0	0.2	-	0.351	0.4	0.5	1.3	0.837	0.2	0.3	1.5	0.623
Bottom Mean	0.0	0.0	-	-	0.2	0.0	0.0	0.351	0.1	0.0	0.0	0.333
Grand Mean	0.0	0.1	-	0.333	0.3	0.2	0.7	0.902	0.1	0.2	2.0	0.873

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 4

DAY/NIGHT CONCENTRATIONS* OF EMERALD SHINER
(Notropis atherinoides) LARVAE AT LOCUST POINT,
LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.4	0.8	2.0	0.647	3.5	22.8	6.5	0.124	1.9	11.8	6.2	0.145
13	0.0	1.0	-	0.391	8.9	9.8	1.1	0.911	4.5	5.4	1.2	0.825
29	1.5	2.1	1.4	0.703	9.5	27.3	2.9	0.013	5.5	14.7	2.7	0.127
8	0.4	3.5	8.8	0.156	3.1	9.6	3.1	0.268	1.8	6.6	3.7	0.116
Surface Mean	0.8	2.5	3.1	0.171	10.6	19.6	1.8	0.119	5.7	11.1	1.9	0.156
Bottom Mean	0.4	1.2	3.0	0.229	1.9	15.1	7.9	0.037	1.1	8.2	7.5	0.038
Grand Mean	0.6	1.9	3.2	0.068	6.2	17.4	2.8	0.008	3.4	9.6	2.8	0.014

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 5

DAY/NIGHT CONCENTRATIONS* OF FRESHWATER DRUM *(Aplodinotus grunniens)* LARVAE AT LOCUST POINT, LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	0.3	-	0.391	0.4	0.4	0.0	0.991	0.2	0.4	2.0	0.571
13	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
29	0.0	0.7	-	0.182	0.0	0.0	-	-	0.0	0.4	-	0.171
8	0.4	0.0	0.0	0.391	3.7	1.3	0.4	0.385	2.1	0.7	0.3	0.320
Surface Mean	0.0	0.2	-	0.351	0.4	0.9	2.3	0.575	0.2	0.5	2.5	0.442
Bottom Mean	0.2	0.4	2.0	0.681	1.6	0.0	0.0	0.207	0.9	0.2	0.2	0.242
Grand Mean	0.1	0.3	3.0	0.397	1.0	0.4	0.4	0.414	0.6	0.3	0.5	0.558

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 6

DAY/NIGHT CONCENTRATIONS* OF GIZZARD SHAD
(Dorosoma cepedianum) LARVAE AT LOCUST POINT,
LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	57.0	221.6	3.9	0.302	15.0	430.2	28.7	0.191	36.0	337.5	9.4	0.086
13	13.5	87.4	6.5	0.134	10.2	1,054.2	103.4	0.193	12.1	570.8	47.2	0.146
29	3.5	149.6	42.7	0.158	20.3	485.0	23.9	0.074	11.9	317.3	26.7	0.026
8	77.1	109.2	1.4	0.528	19.2	554.5	28.9	0.076	48.2	331.9	6.9	0.059
Surface Mean	11.5	52.8	4.6	0.036	0.6	124.2	207.0	0.026	6.0	90.6	15.1	0.005
Bottom Mean	58.5	231.1	4.0	0.024	31.8	1,175.9	37.0	0.002	45.9	703.5	15.3	0.002
Grand Mean	36.3	142.0	3.9	0.016	16.2	619.2	38.2	0.003	26.6	387.8	14.6	0.001

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 7

DAY/NIGHT CONCENTRATIONS* OF LOGPERCH
(Percina caprodes) LARVAE AT LOCUST POINT,
LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	0.4	-	0.391	0.0	0.0	-	-	0.0	0.2	-	0.351
13	0.0	11.1	-	0.167	0.0	0.0	-	-	0.0	5.5	-	0.159
29	0.4	2.5	6.3	0.380	0.0	0.0	-	-	0.2	1.2	6.0	0.358
8	0.4	1.9	4.8	0.300	0.0	0.0	-	-	0.2	0.9	4.5	0.309
Surface Mean	0.2	0.8	4.0	0.383	0.0	0.0	-	-	0.1	0.4	4.0	0.380
Bottom Mean	0.2	7.1	35.5	0.075	0.0	0.0	-	-	0.1	3.6	36.0	0.081
Grand Mean	0.2	4.0	20.0	0.058	0.0	0.0	-	-	0.1	2.0	20.0	0.061

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 8

DAY/NIGHT CONCENTRATIONS* OF RAINBOW SMELT *(Osmerus mordax)* LARVAE AT LOCUST POINT, LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night / Day	Significance**	Day	Night	Night / Day	Significance**	Day	Night	Night / Day	Significance**
3	0.0	4.6	-	0.391	0.0	0.0	-	-	0.0	2.3	-	0.351
13	0.0	0.3	-	0.391	0.0	0.0	-	-	0.0	0.2	-	0.351
29	0.0	0.4	-	0.391	0.0	0.0	-	-	0.0	0.2	-	0.351
8	0.0	0.8	-	0.391	0.0	0.0	-	-	0.0	0.4	-	0.351
Surface Mean	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Bottom Mean	0.0	3.1	-	0.216	0.0	0.0	-	-	0.0	1.5	-	0.206
Grand Mean	0.0	1.5	-	0.206	0.0	0.0	-	-	0.0	0.8	-	0.201

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 9

DAY/NIGHT CONCENTRATIONS* OF SPOTTAIL SHINER *(Notropis hudsonius)* LARVAE AT LOCUST POINT, LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	0.0	-	-	0.0	1.0	-	0.391	0.0	0.5	-	0.351
13	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
29	0.0	1.2	-	0.391	0.0	0.0	-	-	0.0	0.6	-	0.351
8	0.0	0.0	-	-	0.5	0.0	0.0	0.391	0.2	0.0	0.0	0.351
Surface Mean	0.0	0.6	-	0.351	0.0	0.5	-	0.351	0.0	0.5	-	0.166
Bottom Mean	0.0	0.0	-	-	0.2	0.0	0.0	0.351	0.1	0.0	0.0	0.333
Grand Mean	0.0	0.3	-	0.333	0.1	0.2	2.0	0.660	0.1	0.3	3.0	0.299

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 10

DAY/NIGHT CONCENTRATIONS* OF TROUTPERCH
(Percopsis omiscomaycus) LARVAE AT LOCUST POINT,
LAKE ERIE

	13 June 1977				25 June 1977				MEAN			
STATION	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
13	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
29	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
8	0.0	0.4	-	0.391	0.0	0.0	-	-	0.0	0.2	-	0.351
Surface Mean	0.0	0.2	-	0.351	0.0	0.0	-	-	0.0	0.1	-	0.333
Bottom Mean	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Grand Mean	0.0	0.1	-	0.333	0.0	0.0	-	-	0.0	0.1	-	0.325

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 11

DAY/NIGHT CONCENTRATIONS* OF WALLEYE *(Stizostedion v. vitreum)* LARVAE AT LOCUST POINT, LAKE ERIE

	13 June 1977				25 June 1977				MEAN			
STATION	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	0.4	-	0.391	0.0	0.0	-	-	0.0	0.2	-	0.351
13	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
29	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
8	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Surface Mean	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Bottom Mean	0.0	0.2	-	0.351	0.0	0.0	-	-	0.0	0.1	-	0.333
Grand Mean	0.0	0.1	-	0.333	0.0	0.0	-	-	0.0	0.05	-	0.325

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 12

DAY/NIGHT CONCENTRATIONS* OF WHITE BASS *(Morone chrysops)* LARVAE AT LOCUST POINT, LAKE ERIE

	13 June 1977				25 June 1977				MEAN			
STATION	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	2.3	-	0.391	0.4	0.0	0.0	0.391	0.2	1.2	6.0	0.436
13	0.0	1.8	-	0.275	0.0	0.7	-	0.391	0.0	1.2	-	0.133
29	0.0	1.1	-	0.217	0.0	0.0	-	-	0.0	0.5	-	0.198
8	0.0	0.4	-	0.391	0.0	8.5	-	0.178	0.0	4.9	-	0.154
Surface Mean	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Bottom Mean	0.0	2.8	-	0.044	0.2	5.0	25.0	0.156	0.1	4.0	40.0	0.037
Grand Mean	0.0	1.4	-	0.051	0.1	2.7	27.0	0.153	0.05	2.0	40.0	0.040

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

TABLE 13

DAY/NIGHT CONCENTRATIONS* OF YELLOW PERCH *(Perca flavescens)* LARVAE AT LOCUST POINT, LAKE ERIE

STATION	13 June 1977				25 June 1977				MEAN			
	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**	Day	Night	Night/Day	Significance**
3	0.0	3.5	-	0.264	0.0	0.0	-	-	0.0	1.8	-	0.237
13	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
29	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
8	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	-
Surface Mean	0.0	0.4	-	0.351	0.0	0.0	-	-	0.0	0.2	-	0.333
Bottom Mean	0.0	1.4	-	0.351	0.0	0.0	-	-	0.0	0.7	-	0.333
Grand Mean	0.0	0.9	-	0.225	0.0	0.0	-	-	0.0	0.4	-	0.220

* Number/100 cubic meters

** The probability of a Day/Night difference this large or larger occurring by chance alone. A value of 0.05 or less is generally considered significant (T Test).

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APPENDIX

A

TOLEDO EDISON

LOWELL E. ROE
Vice President
Facilities Development
(419) 259-5242

File: 0017 & 0221

Docket No. 50-346

December 10, 1976

Serial No. 166

Director of Nuclear Regulation
Attn: Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
United States Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

During our September 10, 1976 meeting with the Staff in your Rockville offices, regarding the Davis-Besse Nuclear Power Station Unit 1 Environmental Technical Specifications, there was considerable discussion between Toledo Edison and the Staff over the necessity of incorporating nighttime ichthyoplankton sampling into our operational aquatic monitoring program. The result of this discussion, as reflected in Item No. 5 of your meeting notes dated October 8, 1976, was that we agreed to submitting a limited special study to compare day and nighttime ichthyoplankton sampling.

We are submitting herewith an Attachment 1 to this letter our Proposed Study to Compare Day and Night Ichthyoplankton Concentrations at the Davis-Besse Nuclear Power Station. We feel that this study will satisfy the commitment we made at our September 10, 1976 meeting.

If you should have any questions concerning this proposed study do not hesitate to contact me or any of my staff.

Yours very truly,

Lowell E. Roe

Attachment

bt d/1

BCC: P. M. Smart, Esq. W. A. Johnson J. D. Lenardson P. P. Anas
G. Charnoff, Esq. J. S. Grant J. G. Evans w/1 D. J. Cafaro
D. H. Hauser E. C. Novak w/1 R. Rosenthal

APPENDIX

B

ATTACHMENT 1

PROPOSED STUDY TO COMPARE

DAY AND NIGHT ICHTHYOPLANKTON CONCENTRATIONS

AT THE DAVIS-BESSE NUCLEAR POWER STATION

Objectives

The objective of this study is to determine if there are any significant differences between day and night ichthyoplankton concentrations, in Lake Erie, in the vicinity of the Davis-Besse Nuclear Power Station site.

Monitoring

This study shall consist of two ichthyoplankton sampling efforts conducted ten days apart or as soon as possible thereafter if weather does not permit sampling at exactly a ten day interval during the month of June, 1977, the anticipated period of peak larval density. Each sampling effort shall consist of two sets of ichthyoplankton samples, one collected at least four hours before sunset and the other collected at least four hours after sunset.

Each set of samples shall consist of duplicate surface and bottom samples collected in the vicinity of the intake crib (Station 8), the area of the thermal plume (Station 13) and two control stations (Station 3 and 29) west and east of the site. These stations are those shown in Figure 3.1-1 of our proposed Davis-Besse Nuclear Power Station, Unit No. 1 Environmental Technical Specifications.

Samples shall be collected by five minute circular tows (3 to 4 knots/hr) at the surface and bottom, using a 0.75 meter diameter oceanography plankton net (No. 00, 0.75mm mesh). Ichthyoplankton shall be counted and identified to the lowest taxonomic level possible.

After collection of this data it shall be statistically analyzed to determine if there is any significant variance between daytime and nighttime ichthyoplankton concentrations in the vicinity of the site.

Bases

In the course of reviewing the proposed Environmental Technical Specifications (ETS) for the Davis-Besse Nuclear Power Station, Unit No. 1 the Staff has expressed a concern that nighttime sampling of ichthyoplankton was necessary. This concern was discussed with the Staff at some length during a meeting between the Toledo Edison Company and NRC Staff in the NRC's Rockville offices, September 10, 1976. At this meeting the Staff stated that based on the research of Dr. Richard Cole of the University of Michigan, in Lake Erie in the vicinity of Monroe, Michigan, that they felt that night ichthyoplankton sampling was necessary. Toledo Edison agreed that there could possibly be some differences between day and night ichthyoplankton concentrations due to: 1. Ichthyoplankton movement at night from the bottom to the surface and, 2. Net avoidance

during daytime sampling. However, Toledo Edison stated that they did not believe these factors would cause a significant difference between day and night ichthyoplankton samples collected at the Davis-Besse site. The basis for this statement was: 1. Ichthyoplankton samples are being collected at the surface and bottom to eliminate vertical variability, 2. Net avoidance is not significant in the turbid waters found along the southern shore of western Lake Erie. Daytime ichthyoplankton monitoring conducted by the Ohio State University, Center for Lake Erie Area Research in the vicinity of Maumee Bay and along the southern shore of Lake Erie, using the same sampling techniques proposed in the Davis-Besse ETS, have yielded ichthyoplankton concentrations comparable to Dr. Cole's nighttime sampling. The above sampling program is proposed to confirm Toledo Edison's contention that daytime sampling is adequate to characterize the ichthyoplankton concentrations in the vicinity of the Davis-Besse site.

dh d/1-2