



from the water as it is drawn into the intake. However, as explained below, the largest zooplankton (Mysis relicta) will not be near the intake cones. These organisms are important fish food, and they suffer the highest mortality if they are drawn through the Plant condensers. These large (1 to 2 cm) zooplankters live in cold water much deeper than 15 feet; in Lake Michigan they live in the hypolimnion >100 feet at temperatures between 33°F and 51°F (J. B. Reynolds and G. M. DeGraeve, 15th Conf. on Great Lakes Research, 1972, p. 146-7; FES, Appendix Table C-7; p. II-44,45; Table II-15, p. II-47; p. V-14,15).

The copepod Limnocalanus marcurus is much smaller than Mysis relicta; it falls in the range of 2 to 3 mm. in length. It occurs only in deep, cold lakes such as Great Lakes, Finger Lakes, and Green Lake, Wisconsin. L. marcurus is usually considered a relict marine species. These, like Mysis, are cold water zooplankton not normally distributed in inshore waters. They have not been found in the Kewaunee Plant region (FES, Appendix Table C-7; p. II-44-5; Table II-15, p. II-47; p. V-14 and 15, 19). Thus, in my opinion, neither Mysis nor Limnocalanus will be affected by the operation of the Kewaunee Plant.

The intake entrainment of other plankton, both phytoplankton and zooplankton, is addressed in the FES, p. V-14 and 15. The matter of the

zooplankton species type and distribution in the Kewaunee Plant region is treated in the FES pages II-44,45; in the Appendix C, Table C-7, p. 22, and in pages V-14 and 15.

Some zooplankton organisms are both benthic and planktonic. The amphipod, Pontoporeia affinis, a crustacean (up to 9 mm long), is one of these, and it is present primarily in the cold, deep (≈ 30') waters of Lake Michigan (Pennak, R. W., Ronald Press, 1953; Fresh Water Invertebrates of the U. S.). It is also found to some extent in the Kewaunee intake region, but in very low numbers as mentioned later (FES: p. II-45-II-48).

Some P. affinis will be entrained in the Kewaunee intake. However, since these organisms live primarily in the deeper waters, and are present in the intake area in low numbers, it is my opinion that there will be no effects on the P. affinis population in the Lake, or even in the inshore zone. At Point Beach the density of P. affinis is also extremely low (0-100 organisms/m<sup>2</sup>) compared to that in other areas of the lake. (S. A. Spigarelli and W. Prepejchal, Ann. Rept. of Radiological Physics Div., Argonne Nat'l. Lab., 1971: ANL-7860, Part III, p. 109.)

The intake entrainment of the other plankton that will occur at the Kewaunee Plant is considered in the FES (II-41,45; V-14, 17; Appendix

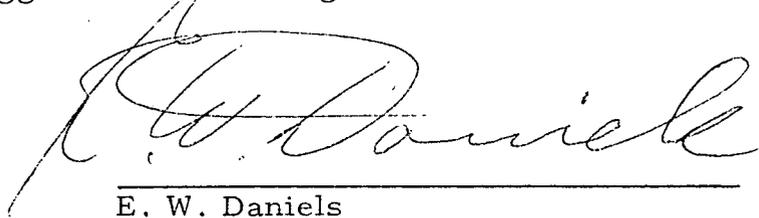
C, Tables C-5 and C-7). Later information has been obtained by Bio-Test Laboratories during 1972 and will be forthcoming from the Applicant. Also; a recent plankton study at Kewaunee, done by the University of Wisconsin-Milwaukee, Department of Botany, for the Applicant has been published (Report No. KNR-3, May, 1972).

Fish eggs and larvae are also included in the category of zooplankton. Fish entrainment is considered in the FES, Section V.2.b. and c. Since fish eggs and larvae are sparse in the region around the Kewaunee Plant, no important effects are anticipated (FES: II-48, II-49; V-16, V-17; V-21 through V-26; V-56 reference 4). The monitoring program is now designed to detect problems, if they occur, in regard to the intake of fish eggs, larvae, juveniles, and adults (FES: V-32, V-33; V-56 reference 4; Section 15 of the present testimony). The air bubble screen at the intake, and the low intake velocity are designed to prevent intake of juvenile and adult fish. (FES: V-16, V-17)

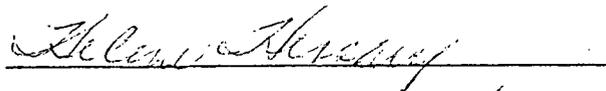
In conclusion, it is my opinion, as written in the FES (V-14, 15), that the Kewaunee intake entrainment and condenser passage will not cause damage of any importance to the phytoplankton. The largest zooplankton, Mysis relicta, will not be taken in because of its ecological niche, and thus not affected. Limnocalanus marcurus is also a deep, cold water

crustacean and it has not been found in the Kewaunee region. Some Pontoporeia affinis amphipods, which are both benthic and planktonic organisms, will be taken into the intake and probably a high percentage of those will be killed by the traumatic and thermal shocks of pump and condenser passage. However, as in the Point Beach area, very low numbers are present compared to other areas of the lake. The populations of other invertebrate zooplankton will not, in my opinion, be affected by loss or damage to any of those drawn through the condensers.

Any fish eggs that are drawn into the intake will most likely be alewife or smelt, and these are ubiquitous in the Lake Michigan inshore zone during spawning times in the spring. No effects on the population of these fish are likely to occur as a result of the passage of relatively low percentage of their eggs or larvae through the Kewaunee condensers.

  
E. W. Daniels

Subscribed to and sworn before  
me this 2nd day of February, 1973



My Commission expires 7/1/74