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 RECIP. NAME RECIPIENT AFFILIATION
 HICKEY, C.R. Assistant Director for Environmental Technology

SUBJECT: Forwards summaries of impinged fish for Apr & May 1980 in response to NRC request. Also forwards redated data & repts to aid in evaluation of ecological significance of event. Encls available in Central Files only.

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AMERICAN ELECTRIC POWER Service Corporation



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16 September 1980

Mr. Clarence Hickey
Fisheries Biologist
Nuclear Regulatory Commission
Office P234
Washington, D.C. 20555

Dear Mr. Hickey:

In response to your request, I am enclosing the April and May monthly summary of impinged fish at the Donald C. Cook Nuclear Plant (Enclosures 1 & 2). Also enclosed to aid you in evaluating the ecological significance of this event is the following: 1) table of monthly actual weights of impinged fish for the year 1975 through 1979 (Enclosure 3), 2) the Cook Nuclear Plant 316(a) and 316(b) demonstration entitled "Report on the Impact of Cooling Water used at the Donald C. Cook Nuclear Plant" (Enclosure 4), 3) a generic 316(b) study of Lake Michigan entitled "The Lake - Wide Effects of Impingement and Entrainment on the Lake Michigan Fish Populations" (Enclosure 5), 4) an impingement and entrainment impact assessment using the adult equivalent approach titled, "On the Calculation of Production Foregone Due to Entrainment and Impingement of Fishes at the Donald C. Cook Nuclear Plant" (Enclosure 6), 5) a supplemental report, "Supplemental Report Demonstrating Compliance with Section 316(b) of the Clean Water Act" (Enclosures 7a and 7b), and 6) an independent analysis of the Cook Nuclear Plant intake by Argonne National Laboratory titled, "Determination of Compliance with PL 92-500 Section 316(b) for the Donald C. Cook Nuclear Power Plant of the Indiana and Michigan Power Company" (Enclosure 8).

Enclosures 1 & 2 are the monthly impingement summaries for April and May which are in two parts. One part is a typewritten table with three columns: Day, Weight, Volume of Water Pumped". This table is daily totals of all fish impinged at the Cook Nuclear Plant. The second part is a computer printout which shows a species-by-species total number and total weight of fish impinged on every fourth day during the month. These every fourth day dates are indicated by an asterisk on the typewritten table. The last page of the computer printout has two columns titled "Estimated Total for the Month. Number and Weight". These estimated total numbers and total weights by species are obtained by multiplying the average every fourth impingement rate by the total number of days in that month. Note one correction on the April daily weight summary, asterisks should appear by the 26 and 30 April weights. You will note that the estimated monthly impingement using every fourth day data do not always agree closely with the actual weight of impinged fish, particularly note April.

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Enclosure 3 is a summary table showing the actual weights by month of all fish impinged at the Cook Nuclear Plant from 1975 through 1979. This table was included for comparison purposes with the April and May impingement rate.

Enclosure 4 is the initial 316 submittal to the Michigan Water Resources Commission. It is a combined 316(a) and 316(b) demonstration. When this report was prepared only about two years of impingement data were available and the data were for Unit 1 only. Unit 2 did not begin operation until January 1978. Most entrainment data at this time were raw data. Estimated daily entrainment rates were available for phytoplankton, zooplankton, benthos, fish eggs, and fish larvae as numbers of individuals per unit volume. The entrainment impact assessment in this report was made by estimating the lost production of piscivorous fish (salmonids). The assumptions in this conceptual model were that the biomass conversion efficiencies from one trophic level to another were the same as those cited in E. P. Odum's "Fundamentals of Ecology" (1971), and the impact of 2-unit operation was assumed to be that of 1-unit operation times the ratio of 2-unit vs. 1-unit cooling water flow, ie, Unit 1 flow X 2.37. The estimated annual entrainment losses plus the actual annual impingement losses were compared to the sport catch of salmonids from Lake Michigan. The actual and estimated impacts combined comprised 1% of the sport catch. Our consultant concluded, therefore, that the plant impact was not ecologically significant.

Enclosure 5, will help you obtain a perspective of lake-wide fish impingement impacts on the total fish biomass. Since alewives comprise 97% of the fish impinged during April and May 1978, I will use this species as an example of the impact assessment from this enclosure. From this report, during 1975, 17 power plants on Lake Michigan entrained and impinged an alewife biomass equivalent to about 0.064% of the total alewife biomass in Lake Michigan or about 5% of the total commercial catch of alewives for 1974. The Cook Plant's increased impingement rate during April and May 1980 does not significantly change either of these percentages.

Enclosure 6 was submitted to the Michigan DNR because the state personnel did not agree with the Company's initial entrainment impact assessment method. The production foregone calculations were made on alewives, rainbow smelt, spottail shiners, and yellow perch. The estimate of production foregone in the original 316 demonstration was very similar to the estimate in this report. The authors also presented a critical review of the adult equivalent approach to entrainment impact assessment. In their opinion the adult equivalent method has a number of very serious flaws.

Enclosure 7 discusses alternate intake technologies for the Cook Nuclear Plant. Two technologies, namely wedge-wire screened intakes and fine mesh traveling screens, were considered. Additionally, neither of these technologies have been proven to be viable alternatives in this particular application. The largest wedge-wire screened intake presently existing in the United States is on a water intake system which is only a very small fraction of the cooling water flow for the Cook Nuclear Plant. The fine mesh traveling screens appeared to be an attractive alternative based upon cost. However, a system designed

16 September 1980

to safely return fish eggs and larvae to the lake has never been designed or built. The engineering, construction, installation, and operation cost of both of these alternate technologies were too great to warrant their installation at the Cook Nuclear Plant.

Enclosure 8 is a report written by Dr. R. Sharma and Mr. R. Freeman, III, of Argonne National Laboratory, titled "Determination of Compliance with PL 92-500 Section 316(b) for the Donald C. Cook Nuclear Power Plant of the Indiana and Michigan Power Company". This report was funded by the U.S. Fish and Wildlife Service, Region III. The authors of this report concluded that the Cook Nuclear Plant alone probably does not threaten the coho fishery but that all impingement and entrainment combined on the lake may be significant, that fine mesh traveling screens and wedge-wire screened intakes are not proven or demonstrated technologies, and that lake-wide impacts be evaluated and that studies of fine mesh screening technologies be undertaken.

Our consultants at the University of Michigan are in the process of evaluating the ecological significance of impingement and entrainment at the Cook Nuclear Plant. They are giving special consideration to the April and May 1980 impingement event. As I have indicated to you on the phone, they presently hypothesize several conditions existed which caused this unusual event. These conditions are that onshore migrating adult alewives were concentrated shoreward of the thermal bar which was located at approximately the 30 foot depth contour during mid to late April and there appears to be a rather dramatic increase in alewife population density over the previous years, an increase which as yet is unsubstantiated. Also, dead alewives have washed up onto beaches on the northern basin of Lake Michigan this year, an event that has not occurred in approximately 8 to 10 years. Other power plants have experienced unusual large alewife impingement rates during 1980. Their evaluation will be completed with the wrap up of the environmental impact studies required by the Environmental Technical Specification that are shortly coming to a close. The final reports are expected within the next one to two years.

If there are any other questions you have or data which you need to complete your assignment, I will be glad to assist you. My phone number is 452-5721 ext. 6363.

Sincerely,

Alan E. Gaulke
Aquatic Biologist
Environmental Engineering Division

AEG/cb
Enclosures