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## Item B-41: Impacts on Fisheries

### DESCRIPTION

This NUREG-0471<sup>1</sup> task involves studies related to the impacts of power plant operation on fishery resources. Possible studies to be undertaken are described below:

(1) In recent years, an attempt has been made at a number of facilities to evaluate the effects of plant operation on fishery resources using advanced modeling techniques. This approach has resulted in the expenditure of

a considerable amount of money by utilities to collect quantitative data on populations of individual species. We have developed methodologies that provide for fairly good estimates on impingement and entrainment losses; however, the modeling efforts have not been successful in assessing the significance of plant operation on the fish populations in surrounding waterbodies. As an alternative to advanced modeling, this study would evaluate the kinds of data that could be collected in routine far-field monitoring programs on aspects of fish populations other than numerical estimates of population size and attempt to relate these characteristics to the losses sustained by impingement and entrainment. Such characteristics as size and age distribution, growth rates, condition factor, incidence of abnormalities and fish parasites, gut analysis, as well as other standard techniques used in applied fishery management would be examined. This could provide an effective alternative to the analytical modeling techniques now employed with doubtful reliability.

(2) Observations of large impingement losses of threadfin shad (**DorosomaPetenense**) at nuclear plants are associated with periods of low water temperature which puts the threadfin shad in a stressed or perhaps dying condition. It has been espoused that the power plants are harvesting threadfin shad which would have otherwise succumbed to natural mortality and thus does not adversely impact the population. However, quantitative evidence in support of this supposition is lacking and the potential impacts to the reservoir fish community due to removal of viable but debilitated forage have not been determined to a degree of confidence such that the loss can be declared insignificant. The information available is inconsistent and does not reconcile conflicting data and/or expert opinions concerning the significance of threadfin shad losses. To supplement available information, a combination of laboratory and field investigations is required.

Extension impingement surveillance monitoring are being required at many of these plants due chiefly to the high levels of threadfin shad impingement. If it can be confirmed that the impacts are not significant to the shad population, then the ETS requirements for long-term studies of secondary effects on the sport and commercial species due to impingement could be lessened or completely dropped. Concomitant with this action would be a reduction in cost of the licensees' monitoring program.

An ultimate goal is to use the study results as a basis for a staff position paper which can be referenced in future case work. The format of the final report should be compatible with this potential use of the study results. Although we cannot estimate the number of new cases wherein threadfin shad impingement may be of concern, the projection of power need for the TVA system alone suggests numerous possibilities. Thus, a reduction of staff effort in the environmental impact assessment for new cases could be achieved via a generic staff position on the matter.

(3) Sources of entrainment mortality during passage through condenser:

(a) Field Studies. During assessment of significance of environmental impact of condenser cooling systems on entrained organisms, it is customary to assume 100% mortality because of our lack of knowledge of actual effects. This conservative approach may overestimate the predicted impact of facility

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<sup>1</sup> NUREG-0471, "Generic Task Problem Descriptions (Categories B, C, and D)," U.S. Nuclear Regulatory Commission, June 1978.

operation. Design

modifications, such as addition of cooling towers, may be required to mitigate predicted impacts. In some cases, the effects of entrainment may be predicted to be so significant as to compromise the suitability of the site.

Certain facilities, such as Brunswick and Indian Point, are contesting the need for cooling system modifications on the basis that the impacts of entrainment will not be as great as predicted in the EIS. This study would provide needed information concerning the mortality of certain selected organisms during passage through a simulated condenser system under controlled conditions and thus provide improved validity to EIS predictions. Further, it will identify and quantify the sources of mortality as to biocide, changes in hydrostatic pressure during passage, temperature shocks, and/or mechanical damage.

(b) Laboratory Studies. This study would differ from the field study in that it would be performed at a facility still under construction by ORNL. The laboratory facility would be larger than the one in New York and would not

be portable. It would have the additional capability of identifying and quantifying the effects of pump passage in addition to the parameter identified earlier.

(4) The potential for entrainment and impingement is a continuing concern with conventional shoreline and approach canal cooling system intakes. Submerged pipe intakes, particularly of the perforated pipe design, suggest an attractive alternative for minimizing these potential ecological impacts; however, insufficient knowledge is presently available on whether there is generic applicability of such a system. This activity would review the literature and operating experience at facilities equipped with submerged pipe intake systems. Some degree of conceptual evaluation may also be required due to paucity of data for large capacity systems of this type. Desired results would include determination of generic applicability to varying habitats and of trade-offs in potential impacts from one to another trophic level, species, or lifestage.

(5) The process of assessing and predicting potential impacts on aquatic systems from the construction and operation of nuclear generating stations places considerable emphasis on fish populations of the primary water source used for plant cooling. When an analysis reveals a potentially significant adverse impact on fish

populations, the NRC staff must address measures that can mitigate this adverse impact. Two measures which have potential for mitigating adverse impacts on fish populations are replacement using a fish hatchery and habitat restoration to increase natural fish reproduction. Mitigation of an adverse impact, however, is not at this time considered a feasible alternative by the EPA. An ecological evaluation of these two mitigation measures will provide a basis for a staff position and a useful reference document for future NRC impact statements.

## CONCLUSION

This Environmental issue is addressed in environmental impact statements on a case-by-case basis.<sup>2</sup> Thus, this item has been dropped from further consideration.

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<sup>2</sup> Memorandum for T. Speis from J. Funches, "Prioritization of Generic Issues—Environmental and Licensing Improvements," February 24, 1983. [8303090540]

