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AUG 24 1972

Docket No. 50-247

Daniel R. Muller, Assistant Director, Environmental Projects, L
THRU: George C. Knighton, Chief, Projects Branch #1, L

MEETING ON THE FINAL ENVIRONMENTAL STATEMENT FOR CONSOLIDATED EDISON'S INDIAN POINT UNIT NO. 2 WITH ORNL

On August 9, 1972, a meeting was held at the Bethesda AEC Headquarters with ORNL management and team members and the AEC management to discuss the status of the preparation of the FES for Indian Point Unit No. 2 and the conclusions reached particularly in regards to a technical position on the present once-through cooling system versus an alternate closed-cycle cooling system. A schedule was made for the completion of the ORNL contribution to the FES on August 18 or 21.

Conclusions of the Meeting

1. The major environmental impacts of concern are: (a) excessive thermal discharges obtained through assessment of the thermal models and the hydraulics of river flow, and (b) the ecological damage primarily from fish impingement of screenable biota and entrainment of nonscreenable biota from the once-through cooling system.

2. Other impacts such as from radioactivity releases and chemical discharges are not of any significance. This includes aesthetics with the plant as is. However, if natural draft cooling towers are considered as an alternative, then aesthetics would be of greater significance. Chemical treatment of blowdown to reduce the impact on biota is also feasible if cooling towers are used.

3. Assessment of the mathematical modeling of thermal discharges indicates that Con Ed's models are inaccurate; the 90°F New York State thermal criteria will not be exceeded by the thermal discharges from Unit No. 2; no thermal block for fish migrations for half the width of the Hudson River will occur; but at certain times of the year, the full surface width of the river for a few feet thick of water will be raised above 4°F isotherm. Thus, one out of the three New York State thermal criteria will not be in compliance with the State regulations. Additional data of flow rates, particularly fresh water flow, and the hydraulics of the estuary are needed in order to improve the thermal models for use in predicting the extent and magnitude of

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the thermal plume during varying fresh water flows in the Hudson River and cooling water flows through the once-through condenser system under tidal influences.

4. Assessment of the potential ecological damage shows that a revised higher estimate of 35 to 50% of the fish eggs and larvae of striped bass passing the Indian Point Plant will be killed compared with the 25% value presented in DES. This is considered to be an unacceptable damage to the ecosystem over the long-term operation of the Plant. Species of a very valuable fishery in the Hudson other than the striped bass have not been evaluated but it is expected that the damage will also be severe.

5. Of the viable alternatives which the applicant has presented in its cost-benefit analysis, the natural-draft cooling tower appears to be the recommended alternate to the once-through cooling system. The incremental present value costs amount to $136 million for this alternative cooling system.

6. Two approaches to be taken as to the recommended conclusions of this plant operation were discussed.

   a. The first is that essentially stated in the DES in which the applicant would prepare a detailed design study of a closed-cycle cooling system in a 15-month period, along with a detailed monitoring study both of which would be evaluated by the AEC before a particular alternate cooling system would be recommended.

   b. The second is to decide now on having the applicant design and install cooling towers before any further evaluation of a particular cooling tower system or results of the monitoring program had been made.

7. In regards to schedules, ORNL will send to the AEC the summary and conclusions as a separate section by the weekend of August 12 for AEC management review and its contribution to the FES by August 18 or 21 for AEC review.

A detailed summary of the meeting is attached.

/S/

M. J. Oestmann
Project Manager - Indian Point
Unit No. 2

Enclosures:
1. Details of Meeting Summary
2. List of Attendees

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SUMMARY OF THE MEETING WITH ORNL ON THE
PREPARATION OF THE FES

August 9, 1972

1. Technical Status of FES

ORNL management and team members presented details of the environmental impacts of major and minor importance from operation of Indian Point Unit No. 2. No problems appear to exist regarding the radiological impact or residual chlorine impacts since in each case the discharges can be carefully limited and controlled. Aesthetics would only be of importance if natural-draft cooling towers were selected as an alternate to the once-through cooling system.

Of major significance are the thermal discharges associated with the hydraulics of the estuary and the ecological damage from impingement of fish on the intake screens and the entrainment of biota, primarily striped bass, in the once-through cooling system.

a. Thermal Modeling

F. Culler of ORNL management summarized the assessment of the modeling of thermal discharges. Later on in the meeting M. Siman-Tov, hydrologist at ORNL, reviewed the major points on hydraulics of river flow and the mathematical models used to predict the thermal plume behavior. Mr. Culler discussed the present submerged discharge structure which had been changed from 18 feet to 12 feet below the mean water level to enhance mixing and dilution of the jets and to limit interference from the bottom of the river in mixing of the thermal discharges with cooler river water. However, Con Ed's models based on those presented in the original ER, SER, and in the hearing testimony of April 5, 1972 are considered by ORNL to be inaccurate. Siman-Tov discussed these inadequacies which are detailed in the DES and the FES. Even so, ORNL has shown that the thermal discharges will be able to meet two out of the three NYS thermal criteria; namely, the 90°F surface temperature criteria, and the criteria related to the fact that no thermal block over half the river vertical cross section will occur to prevent fish migration up and down the river. The third criteria, the 4°F, the maximum temperature rise above ambient conditions, will not be met during certain times of the year, particularly during the summertime. During this time the full river width a few feet thick will be raised a few degrees above ambient. The NYS thermal criteria have not been accepted by EPA.

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The hydraulics of the river of the partially mixed estuary are quite complicated. The river is a partially mixed two-layer flow nine months out of the year. The Prichard model is used in which the relative salinity values of the upper and lower layers in the river are applied to describe the hydraulics of the river flow. Additional data on the river hydraulics, particularly the fresh water flow and the depth of the two-layer flow, should be obtained in the monitoring of Plant operation. From such information the river modeling should be improved.

Siman-Tov discussed the inadequacies of the applicant's thermal models which were pointed out in the DES. Another subsection of a new independent assessment of thermal models has been prepared by ORNL and will be included in the FES. This subsection was not in the DES. The reassessment of the thermal discharges resulted in a change in position regarding the 90°F surface temperature criteria between that presented in the DES and that in the FES. This criteria will now be met. Furthermore, this new subsection will discuss the transient flow conditions rather than the steady-state conditions Con Ed has presented in its modeling work. The time-dependent temperature distribution model (one-dimensional model) by the applicant does not predict the severe transient conditions during a tidal cycle. ORNL has also done a parameter analysis and sensitivity analysis for thermal discharges. This includes a variation in the fresh river flow from 3,000 to 30,000 cfs. Although a two-layer flow has been presented by the applicant, there is no actual situation in which one can distinguish two distinct flows moving simultaneously in opposite directions. No good model is available to discuss recirculation of effects of thermal discharges.

As a result of the above analysis, it appears that over both the short-term and a long-term, the Indian Point Plant appears to be in the wrong location on the Hudson River.

b. <u>Biological Damage</u>

P. Goodyear from ORNL reviewed the effort on entrainment in which he discussed the vertical migration of the striped bass eggs and larvae in the partially mixed estuary. As stated above, this estuary has both a saline and a fresh water flow upon which is superimposed a tidal cycle. Goodyear discussed the vertical mixing of the salt water with the fresh water and vice versa. The striped base study showed that during the day the fish eggs are

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at the bottom of the river and during the nighttime they migrate up to the top of the river, resulting in a circulatory pattern of movement in any one segment of the river water. The striped bass is a major predator and is of greatest sport value. It spawns at a number of locations in the river, primarily between West Point all the way south to the Bear Mountain Bridge. A nursery area exists at Haverstraw Bay in which the bass live for 2-3 years before migration to the ocean or spawn. Spawning occurs during the months of May and June just north of the site. No direct answer was provided to indicate the proportion of the total population of fish eggs originally spawned that would be entrained by the once-through cooling system. The larvae of less than 1-1/2" in length will be entrained and those greater than 1-1/2" in length will be removed before entrainment occurs. It takes about three weeks for the eggs and larvae after being spawned north of the site to reach the Indian Point site. This is because of the circulatory pattern of movement of the larvae. As a result, the density of fish eggs increases and builds up just at the site location, rather than having the eggs and larvae migrate downstream in the lower salinity zone. Thus, about 35 to 52% of the total larvae population which passes by the site results in entrainment in the once-through cooling system. Over the 6-8 week spawning period in May and June there is very little reduction in susceptibility in being entrained by the once-through cooling system. Con Ed's value on entrainment loss (about 3%) is an order of magnitude lower but is not substantiated based on differences in flow measurements. Con Ed also uses a random distribution of the fish eggs and larvae throughout the entire estuary.

Information available leaves one to suggest that the shallow water depths are important for survival to juvenile fish (1-1/2" to 3" in length). In part, this is because there is a greater abundance of food in the shallow waters and the water is not so turbid for the fish to see the food. Factors which contribute to survival include a feedback mechanism which allows the juvenile fish to continue to grow. Cannibalism is also important in terms of evidence of behavior of striped bass on the West Coast, but this does not appear to be the case for those on the East Coast. Temperature also has an effect on survival. In the wintertime the fish become lethargic and have a tendency to move very slowly upstream. As a result, high fish kills occur on the traveling screens of the intake structure. The assessment above was essentially limited to striped bass. It did not include white perch or other biota. However, the potential ecological damage based on Goodyear's assessment

indicates that a serious impact on a valuable fishery will occur and will affect the fishery reproductive capabilities over the long term (5-6 years) and eventually could lead to extinguishing of the species of striped bass and others.

c. Alternatives

M. Carter reviewed the cooling system alternatives discussed in Chapter XI. They include spray ponds with extensive drift of any salts in the water, mechanical draft cooling towers with a 0.1% drift, and natural draft cooling towers with 0.03% drift. The applicant has selected the natural draft cooling tower as the preferred alternative to the once-through cooling system. However, this natural draft cooling tower would cost an additional $136 million (present value) to build and operate over and above the capital cost and operating cost of the plant itself. The applicant has had difficulties in purchasing power from other utilities because of difficulty in transmitting power across the transmission lines of the New York Power Pool.

2. Conclusions in FES

Based on the above discussion of the significance of the environmental impact of the once-through cooling system of Indian Point Unit No. 2, two approaches can be taken in concluding the operation of this Plant.

a. The first is similar to that presented in the DES in which the applicant will be required to conduct a 15-month detailed design study of the best alternate cooling system concurrent with a detailed monitoring program after which the AEC will evaluate the results before a firm decision is made to select cooling towers.

b. The second is to insist that the applicant conduct a design study with intentions to install cooling towers within a specified time period. However, the present FES has only a very limited discussion of assessment of environmental impact of cooling towers.

3. Schedule

ORNL agreed to submit its summary and conclusions to the AEC by August 11 and then its contribution to the FES by August 18 or 21, depending on the typing and reproduction schedule of ORNL.

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Attendance at Indian Point Unit No. 2
Meeting with ORNL Representatives

AEC	ORNL
A. Giambusso, L	F. Culler
G. Knighton, L	S. Segall
M. J. Oestmann, L	E. Struxness
R. Cleveland, L	W. Yee
B. J. Youngblood, L	C. P. Goodyear
H. Denton, L	C. M. Carter
R. Ballard, L	M. Siman-Tov
M. McCoy, L	D. J. Nelson
W. M. Haythe, OGC	
J. Scinto, OGC	

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