

DETAILS OF MEETING WITH INTERVENORS
ON THE INDIAN POINT UNIT NO. 2 - FES.

1. Intervenor's concerns are related to impingement of fish, entrainment of fish eggs and larvae, and cost-benefit analysis (closed-cycle cooling system). They recommended a modified operation of Indian Point Unit No. 2 by scheduling maintenance in the wintertime and June-July during periods of vulnerability of fish to damage by plant operation. They want to consider reduced power operation during these particular months of the year. MacBeth also mentioned a Dr. Gidlund from the Bronx Campus of New York University who has worked on a transport model.
2. MacBeth discussed certain parts of the FES.
 - a. What is the basis for 2-5 million fish killed annually? Goodyear explained that there are problems in estimating any number of fish killed since the number depends on the transport mechanism and hydraulics applied. On page V-30 of the FES, a value of 5-1/2 million over a 6-month period was stated, based on 593 pounds of fish impinged per day. On page V-62, the curves indicate the effects on white perch population in the Hudson over a period of 5 years. White perch are transported more passively than striped bass as indicated by population distribution study in the Bowline report. This is particularly true of young-of-the-year species which are only 1-2 inches long, especially during wintertime. Clark found layers of white perch at 25-30 feet below the surface. The fish are in the middle of the river rather than at the shoals during the wintertime. Echo soundings indicate a high concentration at Indian Point. The catch on intake screens indicate more white perch than striped bass even though in the river, the population distribution is such that striped bass population may be greater than that of white perch. The striped bass are prevented from being impinged because of a gas bladder which holds the bass on the bottom of the river. The bass in the cold wintertime move into deeper water and become bottom oriented. The Raytheon trawl data also show the presence of more young-of-the-year perch at the Indian Point site. Goodyear stated that it was difficult to predict with any degree of accuracy the number of fish to impinged at the Unit No. 2 intake screens compared with those at the Unit No. 1 screens. Goodyear explained more information is needed on a population study, the physical mechanism involved, and the population movements to determine an estimate of population affected by impingement.

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MacBeth wanted to know how the number of fish that are impinged was related to the percentage of entrainment. Goodyear did not do this analysis. MacBeth also was concerned that the 2-5 million fish killed was based on only one set of Con Ed's figures from the October 1971 testimony involving a few short tests. Goodyear estimated this as a sample number to give an order of magnitude of fish mortality. However, this mortality could not go on year after year because of the limitation of the fish population. The Intervenor estimated a 7 million annual fish kill. Goodyear believes that there is no data base available to predict population effects due to impingement.

b. Intervenor questioned Goodyear on the 30-50% entrainment of fish larvae. Goodyear responded that the percentage depends on the fresh water flow. Goodyear stated that it was not possible to determine the range of 30-50% as it affects the total population. The entrainment values are reported in Table A-V-17, p. A-V-85 and depend on range of freshwater flow rates and population distribution. The tables include an 8-week period of reduction of larvae. The growth rate of larvae during the 6-8 week period is highly dependent on the availability of food. Clark estimates that 86% of the fish are vulnerable and 14% are not vulnerable to entrainment. Those entrained are planktonic and are passively transported past the plant. In 1968 at high fresh water flow (18,000 cfs), more larvae had moved faster downstream. In case 5 in Table A-V-17, the percentage retained is low due to fast water flow. The minery population downstream is affected by the contribution of those upstream which depend on flow conditions. The effect of plant operation will result in reduction in future landings of a level of 30-50% (see page V-61). Goodyear has assumed 100% mortality in larvae passing through the plant. MacBeth questioned Goodyear about impingement problems at the Lovett Plant. Goodyear did not know but said that there is a deep water zone in the inshore area at Lovett. The curves on white perch on page V-62 show bumps which, according to Goodyear, reflect changes in population of the young-of-the-year due to natural and man-made influences.

c. Compensatory reserve as shown in the figures on pages V-57 to V-60 was explained by Goodyear. The fish which survive damage serve as those which will reproduce in the future. In Fig. V-12, the graphs show that an increase in commercial landings (1950) in the mid-Atlantic are associated with declines in the Hudson River landings. There is no relationship in Fig. V-12 between the catch in the Hudson and intensity of fishing. Fig. V-12 shows the importance of the reproductive stock. Salinity influences the extent of spawning. Goodyear

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and Clark each discussed the question of where the striped bass in the Atlantic come from - the Hudson River or the Chesapeake Bay. The Delaware River has a low dissolved oxygen content to prevent spawning. Clark has been involved in the debate of the origin of striped bass for over 10 years. According to Goodyear, the Chesapeake Bay contributes only a small part of the overall striped bass population on the Hudson River; apparently, the Hudson River serves as the major source of striped bass along the New York coast. This question opens up a whole new controversy - the origin and management of striped bass, according to Clark.

- d. Bypass flow to protect fish at the intakes is being planned by Con Ed (See page V-30). A discussion followed as to the means to protect fish at the intake screens.
- e. Fish population estimates were made by the use of Carlson and McCann's trawl hauls. Clark estimates that the figures show a small population of 0.5 million fish rather than higher populations. Trawling provides a minimum estimate of population density. When fish are at the bottom, 90% of the fish escape during trawling. Goodyear has used index values. Clark expressed the desire of a good estimate of river population of different species in different age groups.
- f. Intervenors questioned about the possibility of a sinking plume in the wintertime. The diffuser system helps to reduce the sinking plume by increasing turbulence and mixing of hot and cold water. Siman-Tov said that the mixing for dispersion of the plume would be the same for summer and wintertimes. Clark was interested in knowing more about the plume size and shape so as to note effects on fish and also about recirculation effects. E. Raney, Con Ed's consultant, shows in some of his experiments the response of fish to 0.1°F change.
- g. Intervenors mentioned that although the information on striped bass is quite extensive, not much information is available on other species. American Shad fishery is regulated by fishing intensity. Limited information is available on other species.
- h. The time when a closed cycle cooling system is to be installed is of concern to intervenors. They expect that a shorter time less than 5 years should be required. According to Clark, there will be a reduction in biota during the first few years of plant operation. A negative correlation between the catch and fishing intensity occurs, i.e., when there is a high

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fishing intensity, a low survival rate occurs. These results are shown in Fig. V-15.

- i. The Intervenors also asked questions regarding Fig. V-11 on the distribution of striped bass larvae in field studies and computer model estimates. The computer model shows that for the 5 cases selected, a close correlation exists with field observations. Case 67 is graphed in Fig. V-11 and tabulated on page A-V-87.
- j. The Intervenors questioned about the influence of indirect effects on biological impacts. Goodyear responded that it was difficult enough to describe direct effects accurately, let alone indirect effects. This includes food behavior of fish in competition with other species for the same food. This applies to the competition between striped bass and white perch for Gammarus.
- k. The potential for stocking fish by a hatchery was asked by the Intervenors. The reproduction potential of striped bass involves about 1-2 billion eggs for about 10,000 adults at 10 pounds each (for a total of 100,000 pounds of spawning adults each year).
- l. The Intervenors wondered about the costs for cooling towers as presented by Con Ed in its Cost-Benefit Analysis. The major item is the cost of piping the water from and to the towers. They were concerned with the 5-year period before the closed-cycle cooling system would be put into effect. They wanted to reduce the period to 4 years and to operate at partial power, particularly during June and July as mentioned above.
- m. The Intervenors were preparing a list of contentions. Also they were preparing a statement of areas of cross-examination. They estimate that the cross-examination will be brief.

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