

4.0 ENVIRONMENTAL SURVEILLANCE PROGRAMS

V. ENTRAINMENT [See Figure 5, Item 19]

Objective

The purpose of the entrainment study is (1) to provide information on the types and quantities of plankton, fish eggs and larvae passed through the condenser cooling water system to determine the effect of passage on their survival, and (2) to determine if losses observed from condenser passage will create adverse effects on the existing populations in the receiving water.

Specification

Studies of the magnitude of mortality during passage through the cooling water systems shall be continued through the first year of operation in order to verify that projected thermal, mechanical and chemical effects on phyto-, zoo- and ichthyoplankton based on laboratory and Unit No. 1 studies are valid for Unit No. 2. Phyto-, zoo-, and ichthyoplankton will be collected by either plankton nets or pumps at one intake bay each at Unit No. 1 and Unit No. 2 (Fig. 4-3). Phyto and microzooplankton samples will also be taken at the condenser water boxes corresponding to the intake bays samples, when needed for special studies to distinguish between effects of temperature and chlorination. The types, quantities and survival of the entrained key species of phyto-, zoo-, and ichthyoplankton organisms shall be determined.

Sampling in the river required to determine if losses observed from condenser passage adversely affect existing populations in the Hudson River are provided by Specification 4.1.2.C (1), (2), and (4). The river sampling program contained in Specification 4.1.2.C (1), (2), and (4) will be coordinated with the plant cooling water system sampling program provided in this specification, so that information from the two sampling programs can be correlated. Methods and sample frequencies will be designed to obtain statistically valid conclusions on mortality rates and effects on populations in the river. Specific organism groups to investigate include:

(a) Phytoplankton

At least once every month the viability of phytoplankton subjected to condenser entrainment, will be determined for duplicate samples collected from the intake water at Units Nos. 1 and

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Specification (Continued)

2. Samples will also be taken from appropriate condenser outlet water boxes of Units Nos. 1 and 2 when needed for special studies, such as to distinguish between thermal and chlorination effects. Photosynthetic rate will be used to determine viability at one hour and twenty four hours after collection. Chlorophyll a and species composition and density will also be determined.

(b) Zooplankton, Fish Eggs and Larvae

Microzooplankton will be sampled to determine survival on the same schedule as phytoplankton. Percent survival will be determined by count as soon as possible after collection and 24 hours after collection.

Once per week during the striped bass spawning and larvae season (approximately May 1 - July 15) duplicate samples will be taken from just beneath the surface, at mid-depth and at the bottom at one intake at Unit No. 1, one intake at Unit No. 2;

Samples will be collected every two weeks during the period beginning approximately July 15 through September 30, and once per month if weather permits, during the period November through April.

Analyses for dominant organisms will consist of species composition, abundance, counts of live, stunned and dead ichthyoplankton and macrozooplankton in all samples as soon as possible after collection. Additional analyses will be done 24 hours later in representative samples.

Bases

The biological significance of phyto-, zoo-, and ichthyoplankton being drawn or attracted into the intake canal is being quantitatively determined by measuring spatial and temporal distribution of planktonic organisms, applying these densities to the actual water mass subject to entrainment, comparing these theoretical entrainment values to observed densities of entrained organisms, and finally establishing the immediate and delayed effects of entrainment (passage) of non-screenable

ATTACHMENT C

4.0 ENVIRONMENTAL SURVEILLANCE AND SPECIAL STUDIES

2a(2) Entrainment of OrganismsApplicability

Applies to determining and reporting the types and quantities of organisms entrained in the water passing through the condenser cooling water system and evaluating the losses on the population.

Objective

The purposes of the entrainment study are: (i) to determine the types and quantities of macrozooplankton, and fish eggs and larvae which pass through the condenser cooling water system of Units Nos. 2 and 3; (ii) to determine the effect of passage on their survival; and (iii) to determine for certain fish species if losses observed from condenser passage will create adverse effects on the existing populations in the receiving water.

Specification

A. Entrainment Measurements

Sampling to determine the number of macrozooplankton and ichthyoplankton passing through the CWS of Unit No. 3 shall be conducted for two spawning seasons following initiation of Commercial operation of Unit No. 3. For comparative purposes, sampling shall be conducted at Unit No. 2 during the same time sampling is conducted at Unit No. 3 and shall coincide with striped bass ichthyoplankton sampling at stations 1-7 (Fig. 4.1-1). Collections shall be made with appropriate gear at one intake at Unit No. 3, and at station D-1 (Figure 4.1-2), Mortality shall be determined by reference to data obtained at Unit No. 2.

Macrozooplankton and ichthyoplankton samples shall be taken at the condenser water boxes at Unit No. 2 or 3 corresponding to the intake bay sampled when needed to distinguish between effects of temperature and chlorination. Sampling shall be conducted during the same time stations 1-7 (Figure 4.1-1) are sampled for ichthyoplankton. The entrainment sampling shall be of sufficient intensity so as to produce statistically reliable data. Macrozooplankton and ichthyoplankton shall be identified as to species to the extent practicable. Densities in numbers of organisms per thousand m^3 shall be determined. Comprehensive analyses of number and mortality of macrozooplankton and of striped bass, ichthyoplankton by life stage will be made. Comparisons of the density of the entrainable striped bass life stages passing through the CWS of Units Nos. 2 and 3 with the density of comparable life stages collected at stations 1-7 (Figure 4.1-1) shall be made.

ATTACHMENT D

Environmental Impact and Benefit-Cost
Assessment of Requested Modification

The requested modification to the ETSR for Indian Point Unit Nos. 1 and 2, and the ETSR for Indian Point Unit No. 3 represents a deletion of a biological sampling station within the confines of the common discharge canal. Accordingly there are no beneficial or adverse environmental impacts associated with the requested change.

Further there is a distinct economic benefit of the requested modification in that there is an avoidance of a useless expenditure of technical effort and money to collect data that are not useable in assessing entrainment survival at Unit 3. There are no costs attributable to the requested change since the data to be collected according to the present ETSR would be of no value in assessing entrainment survival. Consequently the benefit-cost ratio of the requested modification is greater than 1, justifying that it be granted.

ATTACHMENT E

Literature Referenced

- New York University, 1973. Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1971 and 1972.
- New York University, 1974. Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1973.
- New York University, 1976a. Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1974.
- New York University, 1976b. Mortality of Striped Bass Eggs and Larvae in Nets. A Special Report to Consolidated Edison Company of New York, Inc., 4 Irving Place, New York, New York 10003