UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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In the Matter of

CONSOLIDATED EDISON COMPANY
OF NEW YORK, INC.

Docket No. 50-286

(Indian Point Station,
Unit No. 3)

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STATEMENT OF THE ATTORNEY GENERAL OF THE STATE OF NEW YORK IN SUPPORT OF THE STIPULATION

Introduction

The stipulation signed by all parties to this proceeding and submitted to this Commission for approval follows the decision of the Commission in the Indian Point II proceeding, which required the installation of cooling towers to eliminate the ecological impacts produced by the operation of the power plant. The Attorney General of the State of New York ("Attorney General") concurs in the conclusion of the Regulatory Staff in its Final Environmental Impact Statement that our present knowledge of the plant's discharge and its effect on the Hudson River biota require the installation of closed cycle cooling systems at Indian Point.

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Following the Indian Point II decision, the stipulation also provides that applicant, Consolidated Edison Company of New York, Inc. ("Con Edison") may petition the

Commission at some future date for permission to operate its Indian Point III facility with once-through cooling, based on the results of the ongoing fishery investigations of the Hudson River.

However, the Attorney General's acceptance of the stipulation should not be construed in any way as an endorsement of Con Edison's present study program. This program contains serious flaws which, if uncorrected, will, render subsequent conclusions unreliable.

In order to place the Attorney General's criticisms of the study program on record at this time, and to permit the Commission to take such steps as it deems necessary in order to forestall wasted effort and future dispute, the following comments have been prepared.

Overview

As a result of his participation in a number of proceedings involving Con Edison's use of the Hudson River for the operation of its power plants, the Attorney General has achieved considerable familiarity with much of the past work done on the Hudson and with the study program presently being conducted by a number of contractors, notably Texas Instruments, Inc., Lawler, Matusky & Skelly (previously Quirk, Lawler, & Matusky) and New York University, on Con Edison's behalf. As a result of his examination of these studies, both his staff and by independent consultants knowledgeable in the field, the Attorney General has concluded that the

sampling techniques presently in use are far too crude and inaccurate for the sophisticated data analysis being conducted by the various consultants. Forced by the need to make management decisions and to present conclusive results to administrative agencies, Con Edison and its consultants have made extensive use of basically qualitative data to produce quantitative results in what can only be described as a numbers game.

The Hudson River estuarine ecosystem, like most aquatic environments, contains a large number of extremely complex and dynamic factors which do not easily lend themselves to quantitative analysis, given the archaic sampling techniques used by Con Edison's consultants and others before them. As the need for detailed environmental analysis has grown in recent years, the field, particularly in the area of aquatic biology, has come to be dominated by statistically-oriented technicians who have paid all too little attention to the inadequacies of the data arranged before them in impressive computer printouts.

We do not dispute that there is a crying need for additional information concerning our neglected estuarine resources, which provide some of our most productive nursery grounds for several levels of the food web. In general, we applaud efforts to study the Hudson River to develop a better understanding of the limits of the system and the alternative uses to which the River may be safely put.

However, it must be emphasized that the mass studies being undertaken are conducted not acquire more knowledge per se, but to provide the basis for further exploitation of the Hudson by industries with necessarily limited interests. Government agencies, starved for research funds and eager to make use of the data generated by these private organizations, have all too often failed to greet this data with the skepticism that we have found justified.

The Problem

Numerous studies have produced sufficient qualitative data for certain general conclusions to be stated about the issues in this and other proceedings. The Hudson River supports a number of fisheries. Because of its importance and the ease with which it may be used as an indicator species, the striped bass has been the subject of most of the studies relevant to the issues here. While, from a research point of view, the total ecosystem approach is desirable, we agree that study of the striped bass can provide valuable information about the characteristics and capabilities of the river system in its totality.

From these studies, there can be no doubt that the striped bass and other species are concentrated in the lower reaches of the Hudson from Newburgh Bay in the north down to Tappan Zee. With variations from species to species, spawning generally takes place up-river from many of the power plants arrayed along the River, particularly the Indian

downstream past the plants as they grow th ..gh their early life stages. It is beyond dispute that th: Indian Point plants as presently designed withdraw considerable amounts of water from the Hudson, in the process sucking non-screenable organisms into the plants' cooling systems, where significant mortality occurs.

The conflict revolves around five basic issues. (1) What degree of mortality is imposed upon those organisms drawn into the plants? (2) To what degree do the plants such in those organisms which are located in the zone of withdrawal? (3) What is the relative concentration of those organisms found in the zone of withdrawal compared to their concentration in the general area of the plant and the river as a whole? (4) What proportions of the total river population of these organisms ever come within the general area of the plant during their vulnerable life stages? (5) To what extent do these populations display compensatory responses to the reductions caused by the plants?

In order to determine the effect of the operation of the Indian Point facilities on the striped bass and other species, quantitative results must be obtained. This numerical evaluation requires extensive sampling of the river, extrapolations and interpolations from gathered data, projections of laboratory studies to real life situations, determination of advective and convective hydrodynamic factors, and other parameters of equal importance but too numerous to mention.

The heart of the problem, however, is inextricably tied to the on-river sampling program. It is a truism that analyses are only as good as their data bases, but in the push for definitive results, the reliability and accuracy of the sampling data have been taken for granted.

The Sampling Program

With certain minor improvements, the techniques and tools employed by Con Edison's contractors have been used by ichthyoplankton sampling teams for most of this century. It is still accurate to characterize the techniques used by TI, LMS and NYU as dragging a net through the river and then looking inside to see what they have caught. Unfortunately, fish, even in their early juvenile and late larval stages, do not like nets, and not one of Con Edison's consultants has been able to overcome the consequent avoidance problem encountered in their sampling program.

This avoidance, along with other general efficiency problems, derives from a complex of many dynamic factors related to species and life stage characteristics, net size, shape and angle, towing speed, depth of tow, time of day, current velocity and direction, river depth, etc., and results in variations from life stage to life stage, net to net, place to place, speed to speed, etc. The effect of these variations is that no matter how much sampling is done, the data will be of little quantitative value unless detailed and precise standardization is accomplished, minimizing the differences caused by sampling in a living, changing environment.

None of these factors have been given remotely sufficient consideration by Con Edison's contractors, who are long on statistical analysis and short on sampling expertise and experience. For instance, Texas Instruments varied the gear types they used in more than one mode at a time, necessitating complex statistical correlation analyses for which the data base was totally inadequate. QLM (now LMS), on the other hand, set up a valid sampling protocol, but collected far too few organisms (26 striped bass in 288 tows) for the protocol to be of any use. As has been noted by a number of technical advisors to Con Edison in memoranda presented by various intervenors in the Cornwall hydro-electric pumped storage facility pro-ceeding this past fall, there has been a serious lack of over-all project direction by senior personnel which has resulted in the generation of data for data's sake, with little guidance to assure the integrity of the total product.

A good example of the unsolved problems associated with the sampling program is the means by which Texas Instruments determined the volume of water sampled by their nets during each tow. Without accurate volumes, organism concentrations cannot be determined. In order to obtain the volume of water strained, a device known as a digital flowmeter was inserted inside the mouth of the net. The flowmeter consists of a propeller connected to a counter, which permits the sampling team to convert propeller revolutions into volume of

water strained. In their 1973 sampling program, these flowmeters functioned inadequately over 40 percent of the time. We have no information as to whether this problem was solved in 1974.

Similarly, TI's efforts to maintain accurate measurements of the towing speed of the nets also failed. If a net is towed too fast, resistance is created which causes organisms to be forced past the net. If it is towed too slowly, many organisms will escape. Variations between the extremes have a decided effect on the resultant sampling efficiency. Net speed was monitored by an electronic flowmeter above the net which could be read on deck. Unfortunately, according to Texas Instruments these flowmeters did not function properly 60 percent of the time, causing the sampling team to "wing it" by feeling the tension of the tow line, an innovative, but all too crude sampling technique.

Depth measurements were also flawed. While a simple pressure transducer with an on-deck readout could have been used, Texas Instruments measured towing depth with an angle meter, the heaving boat mast as a reference datum, and the length of the tow line fed overboard. No confidence intervals for this obviously variable method have been established, producing yet another unwarranted and unquantified variable in the data.

Another factor governing a sampler's efficiency is the degree of clogging encountered during sampling, from debris or smashed organisms. As the net becomes clogged its efficiency at a given speed diminishes. Con Edison's contractors have attempted to minimize this problem by restricting their tows to five minutes in duration, but this can reduce the total volume of water strained per tow and lower the confidence level of the data. Installation of on-deck read-out devices, which are available, to provide continuous comparison of towing speed and volume strained can eliminate this problem, but Con Edison has not expended the small sums necessary for this procedure.

We are not talking here of insignificant or insoluable problems, for many papers have devoted themselves to these matters. See, for instance, the work of Dr. William Aron, who states (Zooplankton Sampling, Field Techniques p. 99):

> "A second flowmeter, placed in the free stream outside the net, provides an estimate of the speed of the sampler through the water and, combined with the meter in the mouth, an estimate of the sampler's filtration efficiency. This arrangement is useful in determining the maximum length of time a net of a particular mesh size can be towed in a given body of water before it becomes clogged. Clogging reduces the filtration efficiency of a net, which affects meter readings,

> and in turn, estimation of the volume of water filtered. Unusually large differences in the readings between the sampler flow-meter and the free stream meter would suggest clogging, and the inaccurate estimate could be discarded. The necessity for rigid standardization of conditions from tow to tow cannot be over-emphasized. Without the second meter, we can only speculate on the possibility of clogging."

As mentioned previously, standardization is critical, both for intra and inter year data comparison and subsequent analysis. Con Edison's consultants have made rudimentary attempts at converting all the data into comparable values, but the sampling variables outlined previously, many of which could have been avoided in the first instance, have vastly complicated this task and made it all but possible.

The importance of being able to compare data from month to month, year to year and place to place cannot be over-emphasized. In addition to providing the basis for the determination of annual distribution patterns and relative longitudinal and transect concentrations, the data gathered are being used by Con Edison to analyze inter year population changes, in an attempt to measure any compensatory response taking place in the striped bass population. Inasmuch as the effect of compensation in the mathematical model submitted by Con Edison overshadows almost all other biological factors, the

company's plans to attempt a verification of their theoretical assumptions with empirical analysis renders inter year standardization of key importance. Yet the present program is far too crude for such analysis.

Despite past criticisms, Con Edison has made only primeval attempts to produce a matrix table of inter gear, inter mesh, inter speed relations, etc., which would facilitate the comparison of data gathered by their consultants and others from year to year. Such tables also are central to intra year comparison, for as a population of a given species progresses through its early life stages, gear, mesh size, and towing speed are changed, which in turn change the catch efficiency during each life stage. Without adequate basis for quantitative comparison, the analysis planned by Con Edison simply cannot be done. Again we agree with Dr. Aron in "Field Techniques", page 103, who states:

> "It is impossible to exaggerate the importance of rigorous care in standardizing sampling technique to reduce variability imposed by the sampling procedure."

Specific problems in the 1973 TI research effort point up the necessity for independent establishment of technical specifications for data base quality control during sampling. Due to problematic flowmeters, Texas Instruments felt it necessary to substitute the mean of valid readings for "volume strained" measurements which they felt were unreasonable.

This questionable practice would not have been necessary had a quality control plan been in force to govern the acquisition of these data.

One such method to implement quality control would be immediate rejection of the sample on board the boat. If the velocity of the tow varies too much, the net efficiency drops too much, or the flowmeter reading is unreasonable, the sampling team could discard the sample and sample again in the same area. Such costly repetition of effort would encourage careful monitoring of the critical variables in the first place.

The measurement of volume strained is critical to the calculation of organism population distributions. Presentation of raw values for these numbers is key to any analyst's efforts. Unfortunately TI pre-manipulated the raw data by substituting the mean. Through an apparent oversight, no mention of this practice appeared in any of their publications prior to cross-examination of TI personnel during the recent F.P.C. hearings concerning the Storm King hydroelectric project. Beyond the confusion this oversight caused outside analysts, this statistical operation was done without statistical justification. We fear such a manipulation could distort distributions of organisms observed in the river. Substitution of the mean is particularly out of place when adequate sampling gear could be developed in a short time

to obviate the need for the practice altogether. The confusion this practice caused also illustrates the need for early publication of the truly "raw" data base. With the raw data printout in hand, regulatory personnel could have compared the two data bases in early 1974, and thus highlighted TI's oversight sooner. (See Appendix A)

All these problems reduce the confidence decision makers can have in the accuracy of the data. These problems also render questionable the sophisticated computer analysis presented by Con Edison. We therefore concur with the comments of this Commission's staff in the Final Environmental Statement for Indian Point III, pp. V-185 to V-193. There is a tendency on the part of many agencies and individuals to assume that in a study program involving millions of dollars, the important essentials will of course be treated properly. In this statement, we have merely brushed the surface of the inadequacies in Con Edison's sampling program. If these problems remain uncorrected, years from now we may be faced with millions of dollars of data and inexorable pressures to make use of it because we have nothing else upon which to make a judgment.

The Study Program and the Public Interest

Quite apart from the substantive problems suggested here, serious consideration should be given to the means by which Con Edison disseminates its data. At present, though much of the data is collected and placed on computer printouts relatively early in each annual survey, interested parties and public agencies do not receive data tabulations until Con Edison's consultants have completed their extensive analyses and their reports have been approved by Con Edison and released to the public. The proximity of subsequent filing dates and hearings is such that little if any time is left for independent analysis of the data by responsible parties.

It therefore is recommended that, apart from the stipulation, the company should be required to distribute its data in tabulated form as soon as it is available, so that independent analysis by others can proceed concurrently. In addition to permitting other parties and agencies to prepare valuable analyses based on empirical data, it would enable these groups to provide Con Edison with expert suggestions as to avenues of analysis and further research. The printout for 1974 has been available for several months but has not been available to curious regulatory personnel and probably won't be for many months to come, if ever. There is no justification for continuing the secretive, proprietary, legalistic characteristics surrounding Con Edison's studies when the applicant

is subject to the plenary regulatory control of this Commission with respect to the operation of its power plants and the results of the studies are to be used in further Commission proceedings.

We hope that the flowmeter, velocity, efficiency, etc. problems described herein and in the F.E.S. are traceable more to TI's inexperience than to the lax atmosphere surrounding their sampling program. However, additional technical specifications to ameliorate these problems could go far to increase the quality of the product presented to interested agencies such as ours.

CONCLUSION

The Attorney General supports the stipulation, as far as it goes. Cooling towers should be installed at Indian Point III, and the stipulation requires this installation, absent future changes. It also permits Con Edison to return to the Commission for relief, a theoretical principle which we do not oppose.

However, as outlined herein, we have serious and enduring problems with the quality control demonstrated by Con Edison and its consultants. These problems have been only touched upon, for a full examination of them would require exhaustive documentation and analysis. This was done with respect to Con Edison's 1973 Longitudinal River Survey in

the Cornwall proceeding, as a result of which we cannot express any confidence at all in the applicant's ability to produce an impact statement worthy of consideration by this Commission.

We consider this Commission's supervision of Con Edison's Hudson River Studies an issue separate and apart from the instant settlement. Accordinly, we recommend that the Commission undertake whatever steps may be necessary to make certain that future data and analysis presented to it are free from the problems presently plaguing Con Edison's program.

Dated: New York, New York
March 26, 1975

Respectfully submitted,

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64=Sled
65=Trawl

Appendix A

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ICHTHYOPLANKTON SURVEY

STRIPED BASS CATCH SUMMARY FOR WEEK OF JUNE 25 1973

	RIVER MILE	SITE	TIME	RIVER DEPTH	SAMPLE DEPTH	TO OR DUR.	MESH	EGG	YOLK SAC LARVAE	POST YOLK SAC LARVAE	JUV.	LIF STAGE UNID.	VOLUME	TEMP	DISSOLVED OXYGEN	
1	134	2	932	35	35	2 64	5	10	0	0	0	0	0	S 285		
2	134	2	927	35	35	2 64	5	50	0	0	1	0	0	S 281	23.5	7.7	7.
3	134	2	1014	35	15	2 65	5	55	0	0	0	0	0	745	23.5	6.4	7.
4	134	2	1009	35	24	2 65	5	55	0	0	0	0	0	346	24.0	6.1	7.
5	134	2	1019	35	4	2 65	5	55	0	0	0	0	0	311	23.7	6.0	7.
6	130	2	1121	15	0	2 65	5	55	0	0	0	0	0	597	24.0	5.1	7.
7	130	2	1126	15	0	2 65	5	55	0	0	0	0	0	465	24.5	5.0	7.
8	129	2	1158	35	35	2 64	5	55	0	0	0	0	0	S 2[illegible]			
9	129	2	1140	35	35	2 64	5	50	0	0	0	0	0	S 44[illegible]			
10	129	2	1153	35	35	2 64	5	10	0	0	0	0	0	S 285	24.5	5.7	7.
11	123	2	1327	40	30	4 65	5	55	0	0	0	0	0	465	25.0	5.0	7.
12	116	3	1425	40	12	4 65	5	55	0	0	0	0	0	465			
13	116	3	1420	40	21	4 65	5	55	0	0	0	0	0	156	24.5	6.5	7.
14	116	3	1415	40	30	4 65	5	55	0	0	0	0	0	354	25.0	6.2	7.
15	115	3	1459	26	24	4 64	5	55	0	0	0	0	0	S 285	24.5	6.6	7
16	115	3	1454	26	26	4 64	5	10	0	0	0	0	0	S 285	24.5	6.6	7
17	115	3	1449	26	26	4 64	5	50	0	0	2	0	0	S 196	25.0	6.2	7
18	110	1	1635	30	30	4 64	5	10	0	0	0	0	0	S 285			
19	110	1	1640	30	30	4 64	5	55	0	0	1	0	0	S 244	25.0	7.0	7
20	110	1	1630	30	30	4 64	5	50	0	0	4	0	0	S 231			
21	102	1	1702	30	30	4 65	15	55	0	0	0	0	0	755	25.0	7.0	7
22	98	0	1758	34	25	4 65	10	55	0	0	1	0	0	931	25.0	8.2	7
23	98	2	1753	34	34	4 65	5	55	0	0	0	0	0	269	25.5	8.3	7
24	96	1	1835	24	24	1 64	5	55	0	0	1	0	0	S 285	25.0	8.5	7
25	96	1	1830	24	24	1 64	5	10	0	0	0	0	0	S 285	25.3	8.4	7
26	96	1	1825	24	24	1 64	5	50	0	0	2	0	0	S 285	26.0	8.4	7
27	90	3	1945	42	33	2 65	10	55	0	0	42	0	0	429	25.0	8.6	7
28	90	3	1940	42	42	2 65	5	55	0	0	8	0	0	269	24.0	8.6	7
29	85	2	2042	50	41	2 65	10	55	0	0	23	0	0	931	25.0	8.2	7
30	85	2	2037	50	50	2 65	5	55	0	0	63	0	0	272	25.5	8.2	7
31	80	1	2150	55	55	2 65	5	55	0	0	31	0	0	207	24.5	8.4	7
32	80	1	2200	55	37	2 65	5	55	0	0	0	0	0	465	24.0	8.0	7
33	76	1	2310	50	17	2 65	5	55	0	0	4	0	0	141			
34	76	1	2305	50	26	2 65	5	55	0	0	59	0	0	927	25.0	6.9	7
35	76	1	2300	50	35	2 65	5	55	0	0	9	0	0	492	24.5	6.8	7
36	75	1	15	50	50	2 64	5	50	0	0	13	0	0	S 170	24.5	6.3	7
[illegible]	[illegible]	1	10	50	50	2 64	5	10	0	0	1	0	0	S 262	24.5	6.1	7

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ICHTHYOPLANKTON SURVEY

ATLANTIC TOMCOD CATCH SUMMARY FOR WEEK OF JUNE 25 1973

	RIVER MILE	SITE	TIME	RIVER DEPTH	SAMPLE DEPTH	TO GR	DUR.	MESH	EGG	YOLK SAC LARVAE	POST YOLK SAC LARVAE	JUV.	LIFE STAGE UNID.	VOLUME	TEMP	DISSOLVED OXYGEN	P
1	134	2	932	35	35	2 64	5	10	0	0	0	0	0	285			
2	134	2	927	35	35	2 64	5	50	0	0	0	0	0	281	23.5	7.7	7.4
3	134	2	1014	35	15	2 65	5	55	0	0	0	0	0	745	23.5	6.4	7.4
4	134	2	1009	35	24	2 65	5	55	0	0	0	0	0	349	24.0	6.1	7.2
5	134	2	1019	35	4	2 65	5	55	0	0	0	0	0	311	23.7	6.8	7.4
6	130	2	1121	13	0	2 65	5	55	0	0	0	0	0	597	24.0	5.1	7.2
7	130	2	1126	13	0	2 65	5	55	0	0	0	0	0	465	24.5	5.0	7.2
8	129	2	1150	35	35	2 64	5	55	0	0	0	0	0	265			
9	129	2	1148	35	35	2 64	5	50	0	0	0	0	0	443			
10	129	2	1153	35	35	2 64	5	10	0	0	0	0	0	285	24.5	5.7	7.2
11	123	2	1327	40	30	4 65	5	55	0	0	0	0	0	465	25.0	5.6	7.2
12	116	3	1425	40	12	4 65	5	55	0	0	0	0	0	465			
13	116	3	1420	40	21	4 65	5	55	0	0	0	0	0	156	24.5	6.5	7.
14	116	3	1415	40	30	4 65	5	55	0	0	0	0	0	354	25.0	6.2	7.
15	115	3	1459	26	26	4 64	5	55	0	0	0	0	0	285	24.5	6.6	7.
16	115	3	1454	20	26	4 64	5	10	0	0	0	0	0	283	24.5	6.6	7.
17	115	3	1449	26	26	4 64	5	50	0	0	0	0	0	194	25.0	6.2	7.
18	110	1	1635	30	30	4 64	5	10	0	0	0	0	0	285			
19	110	1	1640	30	30	4 64	5	55	0	0	0	0	0	244	25.0	7.0	7.
20	110	1	1630	30	30	4 64	5	50	0	0	0	0	0	231			
21	108	1	1702	30	30	4 65	15	55	0	0	0	0	0	755	25.0	7.0	7.
22	90	0	1750	24	25	4 65	10	55	0	0	0	0	0	931	25.0	8.2	7.
23	98	2	1753	34	34	4 65	5	55	0	0	0	0	0	269	25.5	8.3	7.
24	96	1	1835	24	24	1 64	5	55	0	0	0	0	0	285	25.0	8.5	7.
25	96	1	1830	24	24	1 64	5	10	0	0	0	0	0	215	25.5	8.4	7.
26	96	1	1825	24	24	1 64	5	50	0	0	0	0	0	265	26.0	8.4	7.
27	90	3	1945	42	33	2 65	10	55	0	0	0	0	0	429	25.0	8.6	7.
28	90	3	1940	42	42	2 65	5	55	0	0	0	0	0	269	24.0	8.6	7.
29	85	2	2042	50	41	2 65	10	55	0	0	0	0	0	931	25.0	8.2	7.
30	85	2	2037	50	50	2 65	5	55	0	0	0	0	0	292	25.5	8.2	7.
31	80	1	2150	55	55	2 65	5	55	0	0	0	0	0	287	24.5	8.4	7.
32	80	1	2200	55	37	2 65	5	55	0	0	0	0	0	465	24.0	8.3	7.
33	76	1	2310	50	17	2 65	5	55	0	0	0	0	0	141			
34	76	1	2305	50	26	2 65	5	55	0	0	0	0	0	927	25.0	6.9	7.
35	76	1	2300	50	35	2 65	5	55	0	0	0	0	0	462	24.5	6.8	7.
36	76	1	15	50	50	2 64	5	50	0	0	0	0	0	170	24.5	6.5	7.
														282	24.5	8.1	7.

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ICHTHYOPLANKTON SURVEY

WHITE PERCH CATCH SUMMARY FOR WEEK OF JUNE 25 1973

RIVER MILE	SITE	TIME	RIVER DEPTH	SAMPLE DEPTH	TO OR DUR.	MESH	EGG	YOLK SAC LARVAE	POST YOLK SAC LARVAE	JUV.	LIFE STAGE UNID.	VOLUME	TEMP	DISSOLVED OXYGEN
1 134	2	932	35	35	2 64	5	10	0	0	0	0	0	285	
2 134	2	927	35	35	2 64	5	50	0	0	0	0	0	221	23.5	7.7
3 134	2	1014	35	15	2 65	5	55	0	8	4	0	0	745	23.5	6.4
4 134	2	1009	35	24	2 65	5	55	0	0	1	0	0	340	24.0	[illegible]
5 134	2	1019	35	4	2 65	5	55	0	3	2	0	0	311	23.7	
6 130	2	1121	15	0	2 65	5	55	0	0	4	0	0	547	24.0	[illegible]
7 130	2	1120	15	0	2 65	5	55	0	0	0	0	0	465	24.5	5.0
8 129	2	1150	35	35	2 64	5	55	0	0	1	0	0	2[illegible]		
9 129	2	1140	35	35	2 64	5	50	0	0	2	0	0	440		
10 129	2	1153	35	35	2 64	5	10	0	0	0	0	0	285	24.5	5.7
11 123	2	1327	40	30	4 65	5	55	0	0	0	0	0	465	25.0	5.6
12 116	3	1425	40	12	4 65	5	55	0	0	0	0	0	465		
13 116	3	1420	40	21	4 65	5	55	0	0	0	0	0	156	24.5	6.5
14 116	3	1415	40	30	4 65	5	55	0	0	1	0	0	354	25.0	6.2
15 115	3	1459	26	26	4 64	5	55	0	0	0	0	0	285	24.5	6.6
16 115	3	1454	26	26	4 64	5	10	0	0	0	0	0	285	24.5	6.6
17 115	3	1449	26	26	4 64	5	50	0	0	0	0	0	194	25.0	6.2
18 110	1	1635	30	30	4 64	5	10	0	0	0	0	0	285		
19 110	1	1640	30	30	4 64	5	55	0	0	1	0	0	244	25.0	7.0
20 110	1	1630	30	30	4 64	5	50	0	0	0	0	0	231		
21 108	1	1702	30	30	4 65	15	55	0	0	0	0	0	755	25.0	7.0
22 98	0	1758	34	23	4 65	10	55	0	0	3	0	0	931	25.0	6.2
23 98	2	1753	34	34	4 65	5	55	0	0	0	0	0	269	25.5	8.3
24 96	1	1835	24	24	1 64	5	55	0	0	2	0	0	285	25.0	8.5
25 96	1	1830	24	24	1 64	5	10	0	0	0	0	0	285	25.3	8.4
26 96	1	1825	24	24	1 64	5	50	0	0	0	0	0	285	26.0	8.4
27 90	3	1945	42	33	2 65	10	55	0	0	0	0	0	429	25.0	8.6
28 90	3	1940	42	42	2 65	5	55	0	0	3	0	0	269	24.0	8.6
29 85	2	2042	50	41	2 65	10	55	0	0	31	0	0	931	25.0	8.2
30 85	2	2037	50	50	2 65	5	55	0	0	102	0	0	292	25.5	8.2
31 80	1	2150	55	55	2 65	5	55	0	0	0	0	0	207	24.5	8.4
32 80	1	2200	55	37	2 65	5	55	0	0	0	0	0	475	24.0	8.0
33 76	1	2310	50	17	2 65	5	55	0	0	2	0	0	141		
34 76	1	2305	50	26	2 65	5	55	0	0	0	0	0	427	25.0	[illegible]
35 76	1	2300	50	35	2 65	5	55	0	0	0	0	0	482	24.5	8.0
[illegible]	[illegible]	[illegible]	50	50	2 64	5	50	0	[illegible]	[illegible]	[illegible]	[illegible]			

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CLUPEIDS

ICHTHYOPLANKTON SURVEY
CATCH SUMMARY FOR WEEK OF JUNE 25 1973

RIVER MILE	SITE	TIME	RIVER DEPTH	SAMPLE DEPTH	TO GR	DUR.	MESH	EGG	YOLK SAC LARVAE	POST YOLK SAC LARVAE	JUV.	LIFE STAGE UNID.	VOLUME	TEMP	DISSOLVED OXYGEN
134	2	932	35	35	2	64	5	10	0	0	0	0	[illegible]		
134	2	927	33	33	2	64	5	50	0	0	0	0	9	241	23.5	7.7
134	2	1014	35	15	2	65	5	55	0	0	0	0	118	745	23.5	6.4
134	2	1009	35	24	2	65	5	55	0	0	0	0	3	364	24.0	6.1
134	2	1019	35	4	2	65	5	55	0	0	0	0	253	311	23.7	6.8
130	2	1121	15	0	2	65	5	55	0	0	0	0	1600	597	24.0	5.1
129	2	1126	15	0	2	65	5	55	0	0	0	0	1224	465	24.5	5.0
129	2	1150	35	35	2	64	5	55	0	0	0	0	4	[illegible]		
129	2	1148	35	35	2	64	5	50	0	0	0	0	14	443		
129	2	1153	35	35	2	44	5	10	0	0	0	0	30	285	24.5	5.7
123	2	1327	40	30	4	65	5	55	0	0	0	0	190	465	25.0	5.0
116	3	1425	40	12	4	65	5	55	0	0	0	0	1	465		
116	3	1420	40	21	4	65	5	55	0	0	0	0	976	156	24.5	6.5
116	3	1415	40	00	4	65	5	55	0	0	0	0	106	354	25.0	6.2
115	3	1459	26	26	4	64	5	55	0	0	0	0	4	283	24.5	6.6
115	3	1454	26	26	4	64	5	10	0	0	0	0	40	285	24.5	6.6
115	3	1449	26	26	4	64	5	50	0	0	0	0	21	194	25.0	6.2
110	1	1635	30	30	4	64	5	10	0	0	0	0	0	[illegible]		
110	1	1640	30	30	4	64	5	55	0	0	0	0	39	[illegible]	25.0	7.0
110	1	1630	30	30	4	64	5	50	0	0	0	0	24	201		
106	1	1702	30	30	4	65	15	55	0	0	0	0	86	755	25.0	7.0
98	0	1758	34	25	4	65	10	55	0	0	500	0	0	931	25.0	8.2
98	2	1753	34	34	4	65	5	55	0	0	0	0	157	269	25.5	8.3
96	1	1035	24	24	1	64	5	55	0	0	0	0	114	285	25.0	8.5
96	1	1030	24	24	1	64	5	10	0	0	96	0	0	285	25.3	8.4
96	1	1025	24	24	1	64	5	50	1	0	25	0	0	285	26.0	8.4
90	3	1945	42	33	2	65	10	55	0	0	238	0	0	429	25.0	8.6
90	3	1940	42	42	2	65	5	55	0	0	0	0	154	269	24.0	8.6
85	2	2042	50	41	2	65	10	55	0	0	0	0	464	931	25.0	8.2
85	2	2037	50	50	2	65	5	55	0	0	0	0	350	292	25.5	8.2
80	1	2150	55	55	2	65	5	55	0	0	0	0	54	797	24.5	8.4
80	1	2200	55	37	2	65	5	55	0	0	0	0	0	[illegible]	24.0	8.0
76	1	2310	50	17	2	65	5	55	0	0	0	0	13	141		
76	1	2305	50	26	2	65	5	55	0	0	190	0	0	927	25.0	6.9
76	1	2300	50	35	2	65	5	55	0	0	0	0	38	552	24.5	6.6
75	1	15	50	50	2	64	5	50	0	0	0	0	[illegible]	[illegible]		

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OTHER SPECIES CAUGHT WEEK OF JUNE 25 1973

NUMBER	RIVER MILE	GEAR	RIVER DEPTH	SAMPLE DEPTH	SPECIES CODE	E	YSL	PYSL	J	UNID
2	134	64	35	35	10	0	0	0	0	2
3	134	65	35	15	33	0	0	1	0	0
4	134	65	35	24	33	0	0	2	0	0
7	130	65	15	0	10	0	0	0	0	0
8	129	64	35	35	33	0	0	1	0	0
9	129	64	35	35	10	0	0	0	1	0
					14	0	2	0	0	0
					33	0	33	2	0	0
10	129	64	35	35	33	0	0	1	0	0
11	123	65	40	30	33	0	0	0	0	0
16	116	65	40	30	14	0	0	1	0	0
					33	0	2	0	0	0
17	115	64	26	26	11	1	0	0	0	0
					60	0	0	2	0	0
					99	1	0	0	0	0
19	110	64	30	30	33	0	0	1	0	0
22	98	65	34	25	33	0	0	0	0	12
23	98	65	34	34	33	0	5	4	6	0
26	96	64	24	24	33	0	0	0	0	6
28	96	65	42	42	14	0	4	1	0	0
					33	0	0	1	0	0
29	92	65	50	41	33	0	0	[illegible]		

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DATES FOR ABOVE SAMPLES BY NUMBER FOR WEEK OF JUNE 25 1973

NO.	MON DAY	NO.	MON DAY	NO.	MON DAY	NO.	MON DAY	NO.	MON DAY	NO.	MON DAY	NO.	MON DA
1	6-26	46	6-27										
2	6-26	47	6-27										
3	6-26	48	6-27										
4	6-26	49	6-27										
5	6-26	50	6-27										
	6-26	51	6-27										
	6-26	52	6-27										
	6-26	53	6-27										
	6-26	54	6-27										
	6-26	55	6-27										
	6-26	56	6-27										
	6-26	57	6-27										
	6-26	58	6-27										
	6-26	59	6-27										
	6-26	60	6-27										
	6-26	61	6-27										
	6-26	62	6-27										
	6-26	63	6-27										
	6-26	64	6-27										
	6-26	65	6-27										
	6-26	66	6-27										
	6-26	67	6-27										
	6-26	68	6-27										
	6-26	69	6-27										
	6-26	70	6-27										
	6-26	71	6-27										
	6-26	72	6-27										
	6-26	73	6-27										
	6-26	74	6-27										
	6-26	75	6-27										
	6-26	76	6-27										
	6-26	77	6-27										
	6-26	78	6-27										
	6-26	79	6-27										

Volume of sample;

The volume of sample "i" was calculated as the difference of the final flowmeter reading and the initial flowmeter reading corrected to metric units (Meters) and multiplied by the area of the sampling gear (A_g)

Thus:

$$v_i = .0272\ (\Delta f_i)\ A_g$$

		Gear	A_g
½m	hopp	60	$.1963m^2$
18"	collar	61	$.1641m^2$
1m	hoop	62	$.78525m^2$
3' x 3'	square	63	$.8361m^2$
1m	Tucker	~~64~~ 65	$1m^2$
	Sled	~~65~~ 64	$1m^2$
2m	Tucker	66	$4m^2$

Before calculation of densities low values and high values of the v_i were deleted as these values usually represent malfunctions of the flowmeter. The deleted values were replaced by the average for the respective gears for the river run.

The proceedure is defined as follows:

Let k_1, k_2, k_3 ... k_n be the samples taken by a given gear in a river run.

Let D_i be the duration of the tow in minutes for sample "i" and

$$v_i = .0272\ (\Delta f_i)\ (D_i/5)$$

The n samples are broken into two groups of samples:

(1) k'_1, k'_2, ... k'_l where $k'_i \in \{k_i : 100 \le r_{k_i} \le 1000\}$

(2) k^o_1, k^o_2, ... k^o_m where $k^o_i \in \{k_i : r_{k_i} < 100$ or $r_{k_i} > 1000\}$ and

Then

$$\bar{V} = \sum_{i=k'_1}^{k'_l} v_i$$

and the volumes of the " m " samples in set (2) are replaced by.

$$V_{ki}^{\circ} = \frac{\bar{V} \cdot D_{ki}^{\circ}}{5}$$

Note: volumes corrected in this manner are used in all the density and number calculations for each species and life stage.

ICHTHYOPLANKTON VOLUMES WEEK OF JUNE 25 1973

NBR	DR	GR	O.V.	N.V.	AVG
1	5	64	0.	285.69	*
2	5	64	281.14	281.14	
3	5	65	745.17	745.17	
4	5	65	349.63	349.63	
5	5	65	311.71	311.71	
6	5	65	597.01	597.01	
7	5	65	20.48	465.58	*
8	5	64	36.80	285.69	*
9	5	64	443.36	443.36	
10	5	64	42.79	285.69	*
11	5	65	0.	465.58	*
12	5	65	.08	465.58	*
13	5	65	156.32	156.32	
14	5	65	354.74	354.74	
15	5	64	38.00	285.69	*
16	5	64	1.82	285.69	*
17	5	64	194.59	194.59	
18	5	64	.03	285.69	*
19	5	64	244.77	244.77	
20	5	64	231.88	231.88	
21	15	65	755.67	755.67	
22	10	65	15.37	931.16	*
23	5	65	269.20	269.20	
24	5	64	58.34	285.69	*
25	5	64	11.86	285.69	*
26	5	64	21.32	285.69	*
27	10	65	429.81	429.81	
28	5	65	269.36	269.36	
29	10	65	27.15	931.16	*
30	5	65	292.10	292.10	
31	5	65	287.12	287.12	
32	5	65	.24	465.58	*
33	5	65	141.44	141.44	
34	5	65	927.68	927.68	
35	5	65	482.01	482.01	
36	5	64	170.60	170.60	
37	5	64	282.96	282.96	
38	5	64	119.76	119.76	
39	5	64	0.	285.69	*
40	5	64	0.	285.69	*
41	5	64	0.	285.69	*
42	5	65	161.11	161.11	
43	5	65	788.34	788.34	
44	5	65	678.29	678.29	
45	5	65	482.37	482.37	
46	5	64	150.99	150.99	
47	5	64	67.02	285.69	*
48	5	64	519.98	519.98	
49	5	65	447.68	447.68	
50	3	64	2864.87	171.42	*
51	2	64	13.90	114.28	*
52	2	64	6.94	114.28	*
53	2	65	191.35	191.35	
54	2	65	140.46	140.46	
55	2	65	291.09	291.09	
56	2	64	116.44	116.44	
57	2	64	2375.78	114.28	*
58	2	64	88.89	88.89	
59	2	65	3281.79	186.23	*
60	2	65	3.56	186.23	*
61	2	65	730.21	186.23	*
62	5	64	241.62	241.62	
63	10	64	512.96	512.96	
64	5	65	1146.04	465.58	*
65	5	65	500.92	500.92	
66	5	65	875.30	875.30	
67	10	64	337.63	337.63	
68	5	64	470.29	470.29	
69	5	65	.24	465.58	*
70	5	65	470.34	470.34	
71	5	65	913.40	913.40	
72	10	64	344.38	344.38	
73	5	64	267.24	267.24	
74	5	64	466.15	466.15	
75	5	64	320.66	320.66	
76	5	64	99.69	285.69	*
77	5	65	500.92	500.92	
78	5	64	112.04	112.04	
79	5	64	656.39	656.39	

NBR	DR	GR	O.V.	N.V.	AVG

64		65	
G	B	G	B
22	18	28	11
45%		28.2%	

36.7%

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ICHTHYOPLANKTON VOLUMES TRANSECT MAY 21-MAY 22 1973

NBR	DR	GR	O.V.	N.V.	AVG
1	5	64	744.57	744.57	
2	5	64	299.20	299.20	
3	5	65	610.48	610.48	
4	5	65	485.74	485.74	
5	5	64	306.76	306.76	
6	5	64	730.27	730.27	
7	5	65	567.12	567.12	
8	5	65	521.37	521.37	
9	5	64	757.57	757.57	
10	5	64	377.29	377.29	
11	5	65	452.69	452.69	
12	5	65	515.49	515.49	
13	5	65	547.92	547.92	
14	5	65	426.74	426.74	
15	5	65	576.07	576.07	
16	5	65	467.21	467.21	
17	5	64	728.42	728.42	
18	5	64	261.31	261.31	
19	5	64	499.45	499.45	
20	5	64	279.24	279.24	
21	5	65	1126.08	445.23	*
22	5	65	481.85	481.85	
23	5	65	14.05	445.23	*
24	5	65	644.10	644.10	
25	5	65	591.41	591.41	
26	5	65	542.53	542.53	
27	5	64	181.59	181.59	
28	5	64	313.43	313.43	
29	5	64	321.20	321.20	
30	5	64	313.37	313.37	
31	5	64	34.44	333.07	*
32	5	64	160.48	160.48	
33	5	64	99.52	333.07	*
34	5	64	208.57	208.57	
35	5	64	60.55	333.07	*
36	5	65	333.53	333.53	
37	5	65	257.96	257.96	
38	5	65	232.70	232.70	
39	5	65	619.02	619.02	
40	5	65	1032.69	445.23	*
41	5	65	602.56	602.56	
42	5	65	830.17	830.17	
43	5	65	549.30	549.30	
44	5	65	235.55	235.55	
45	5	65	513.84	513.84	
46	5	65	114.32	114.32	
47	5	65	357.44	357.44	
48	5	65	311.47	311.47	
49	5	65	593.75	593.75	
50	5	65	254.40	254.40	
51	5	64	273.63	273.63	
52	5	64	149.14	149.14	
53	5	64	429.46	429.46	
54	5	64	128.28	128.28	
55	5	64	424.27	424.27	
56	5	64	328.09	328.09	
57	5	64	314.79	314.79	
58	5	64	128.19	128.19	
59	5	65	274.75	274.75	
60	5	65	359.96	359.96	
61	5	65	798.56	798.56	
62	5	65	384.77	384.77	
63	5	65	693.00	693.00	
64	5	65	329.83	329.83	
65	5	65	1011.13	445.23	*
66	5	65	598.51	598.51	
67	5	65	92.34	445.23	*
68	5	65	824.73	824.73	
69	5	65	527.82	527.82	
70	5	65	173.10	173.10	
71	5	65	658.38	658.38	
72	5	65	308.20	308.20	
73	5	65	793.07	793.07	
74	5	65	331.00	331.00	
75	5	64	392.12	392.12	
76	5	64	1118.57	333.07	*
77	5	65	462.92	462.92	
78	5	65	260.88	260.88	
79	5	64	280.46	280.46	
80	5	64	0.	333.07	*
81	5	65	648.45	648.45	
82	5	65	232.48	232.48	
83	5	64	385.26	385.26	
84	5	64	170.98	170.98	
85	5	65	234.33	234.33	
86	5	65	448.28	448.28	
87	5	65	165.89	165.89	
88	5	65	292.62	292.62	
89	5	65	157.76	157.76	
90	5	65	399.73	399.73	
91	5	64	123.24	123.24	
92	5	64	209.71	209.71	
93	5	65	307.44	307.44	
94	5	65	.68	445.23	*
95	5	65	316.64	316.64	
96	5	65	42.81	445.23	*
97	5	64	230.38	230.38	
98	5	64	207.62	207.62	
99	5	65	345.82	345.82	
100	5	65	367.09	367.09	

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
CONSOLIDATED EDISON COMPANY	)	
OF NEW YORK, INC.	)	Docket No. 50-286
(Indian Point Station,	)	
Unit No. 3)	)	

CERTIFICATE OF SERVICE

I hereby certify that I have this 26th day of March, 1975, served the foregoing document entitled "STATEMENT OF THE ATTORNEY GENERAL OF THE STATE OF NEW YORK IN SUPPORT OF THE STIPULATION" by mailing copies thereof first class, postage prepaid, and properly addressed to the following persons:

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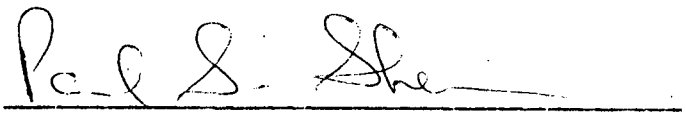
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