NUCLEAR REGULATORY COMMISSION

# Regulatory Docket File

IN THE MATTER OF:

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

(Indian Point Station, Unit No. 2)

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Docket No. 50-247
OL No. DPR-26
Extension of Interim Operation Permit

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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| In the matter of:<br><br>CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.<br><br>(Indian Point Station, Unit No. 2) | Docket No. 50-247<br>OL No. DPR-26<br>Extension of Interim Operation Period |

Ceremonial Courtroom
Westchester County Courthouse
White Plains, New York

Wednesday, 8 December 1976

The hearing was convened, pursuant to notice, at 9:00 a.m.

BEFORE:

SAMUEL JENSCH, Esq., Chairman, Atomic Safety and Licensing Board.

R. BEECHER BRIGGS, Member.

FRANKLIN C. DAIBER, Member.

APPEARANCES:

As heretofore noted, except Mr. Shemin.

THORPE/
blt

C O N T E N T S


| Witnesses | Direct | Voir Dire | Cross | Redirect | Recross | Board Exam |
|---|---|---|---|---|---|---|
| Kenneth L. Marcellus) | 392 | 408 | 414 | | | 574 |
| K. Perry Campbell ) | | | 575 | | | 593 |
| Mallory S. May ) | | | | | | |
| John P. Lawler ) | | | | | | |
| James T. McFadden ) | | | | | | |
| John Szelogowski ) | | | | | | |


E X H I B I T S


| No. | For Iden. | In Evi. |
|---|---|---|
| Licensee's OT-3 (Transmittal ltr, Texas Instruments to Con Edison, 12/2/76) | 405 | |
| Licensee's OT-2 | | 407 |
| Licensee's OT-4 (Predation by Bluefish in the Lower Hudson River, Feb. 76) | 521 | 522 |
| Licensee's OT-5 (Hudson River Ecological Study in the Area of Indian Point: Thermal Effects R eport, Sep '76) | 522 | 523 |
| Licensee's OT-6 (Fisheries Survey of the Hudson River, March - Dec '73, Vol 4, REvised Edition, June '76) | 524 | 525 |
| Licensee's OT-7 (Hudson River Ecological Study in Area of Indian Point, 1974 Annual Report) | 526 | 527 |
| Licensee's OT-8 (Final Report of the Synoptic Subpopulation Analysis, Phase 1) | 527 | 528 |
| Licensee's OT-9 (Semiannual Progress Report for Hudson River Ecological Study in Area of Indian Point, Apr '75) | 529 | 530 |
| LIcensee's OT-10 (Feasibility of Culturing and Stocking Hudson River Striped Bass, '74 Annual Report) | 530 | 531 |

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| No. | For Iden. | In Evi. |
|---|---|---|
| Licensee's OT-11 (Indian Point Impingement Study, Nov. '75) | 532 | 533 |
| Licensee's OT-12 (Hudson River Ecosystem Studies, Effects of Entrainment) | 569 | |
| Licensee's No. OT-13 (Hudson River Ecosystem Studies, Addenda to 1973 Report) | 570 | |
| Licensee's No. OT-14 (Mortality of Striped Bass Eggs and Larvae in Nets) | 570 | |
| Licensee's No. OT-15 (Hudson River Ecosystem Studies, Effects of Entrainment, Progress Report for 1973.) | 571 | |
| Licensee's No. OT-16 (Hudson River Ecosystem Studies, Effects of Entrainment, Progress Report for 1974.) | 571 | |
| Licensee's No. OT-17 (Annual and Semiannual Operating Reports, May '74 - Sep '76) | 605 | 607 |

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P R O C E E D I N G S

CHAIRMAN JENSCH: Please come to order.

Will the panel resume the witness stand?

MR. TROSTEN: Yes, sir.

Whereupon,

KENNETH L. MARCELLUS,

K. PERRY CAMPBELL,

MALLORY S. MAY,

JOHN P. LANIER,

and

JAMES T. Mc FADDEN

resumed the stand on behalf of the Applicant and, having been previously duly sworn, were examined and testified further as follows:

CHAIRMAN JENSCH: I believe at the conclusion yesterday we had just identified Licensee's Exhibit OT-2. Did you desire to put forth a little foundation for this document?

I wonder if someone will remove this easel board.

Will you proceed, Licensee?

xxxxx MR. FIDELL: Yes, sir.

DIRECT EXAMINATION

BY MR. FIDELL:

Q Dr. May and Dr. Campbell, referring to Licensee's Exhibit OT-2 for identification, "Report on Relative

blt 2

Contribution of Hudson River Striped Bass to the Atlantic Coastal Fishery," was this prepared under your general direction and supervision?

(Document handed to the witnesses.)

A. (Witness May) Yes, it was.

A. (Witness Campbell) Yes, sir.

Q. Are you familiar with the contents of it?

A. (Witness May) Yes.

Q. Are you also familiar with the means by which the data and analysis in this document were developed?

A. (Witness May) Yes, sir.

A. (Witness Campbell) Yes.

Q. Are the contents true and correct to the best of your knowledge and belief?

A. (Witness May) To the best of my knowledge, yes.

A. (Witness Campbell) Yes, sir.

Q. Thank you very much.

MR. FIDELL: Mr. Chairman, we request that this document be admitted into evidence as Licensee's Exhibit 01-2 and the words "for identification" be deleted.

MS. CHASIS: Mr. Chairman, I'd like to object to the introduction of the accompanying letter. I have no objection to the introduction of the report, but in that letter it's stated that the adjustments have been made and we have absolutely no support for those figures.

blt 3

I think that the exhibit should come in without that letter.

CHAIRMAN JENSCH: I take it the offer doesn't include the letter. It could be removed and the document could be received alone, is that correct?

MR. FIDELL: Yes, sir, we have no objection to withholding the letter.

CHAIRMAN JENSCH: I wonder if I could just first ask a question or two about some of this information? Perhaps it's apparent in the document, but maybe you can help me on this.

How was this prepared? Where were the data procured, from what source? Is this part of the laboratory work over here on the Hudson?

WITNESS MAY: You're talking about the report, Mr. Jensch?

CHAIRMAN JENSCH: Yes.

WITNESS MAY: All right.

The fish were taken from the Hudson River, from the Chesapeake area, and from the Roanoke in 1975 for the spawning stock.

The fish for '74, we took it only from the Chesapeake and the Hudson River. The Roanoke was added. This was for the spawning stock, which was a prior report to this.

blt 4

For the commercial and sports catch from the Atlantic Ocean, they were taken from the strata that are shown or are in there in the figure that lays out the map of the coast; and samples were taken from each one of those areas that are shown.

They were taken on a different time, 2-month intervals. Each area was visited during the 2-month interval, or six periods.

CHAIRMAN JENSCH: Was this done under your supervision and direction?

WITNESS MAY: Yes, under my supervision.

CHAIRMAN JENSCH: What was that direction?

WITNESS MAY: Sir?

CHAIRMAN JENSCH: What direction did you give for the accumulation of data?

WITNESS MAY: Okay.

I am responsible as Technical Director for the program to execute the scope of work that we had to do this job.

CHAIRMAN JENSCH: What did you direct the people to do who collected the data?

WITNESS MAY: What did we direct them to do?

CHAIRMAN JENSCH: Yes.

WITNESS MAY: We directed them to go into the field to obtain the samples, to make the measurements, of course

blt 5

then taking the data from those measurements and so forth to develop the analyses that were used to classify these fish.

CHAIRMAN JENSCH: I haven't gone through this in great detail, but were there data from -- I believe the term is "sport landing"?

WITNESS MAY: There are data. There are fish that were taken from sports fishermen. There are fish that were taken from commercial catches. Then there are also historical data from 1973 and 1974 from catch records, but those were not used to determine the information to use to classify. They were used to evaluate the contribution to the commercial catch, but the actual raw data that was used were fish that were taken, in the case of the Atlantic fishery, from sports fishermen and from commercial fishermen and, in many instances, taken by TI personnel, also, in terms of they actually caught them.

CHAIRMAN JENSCH: I don't know that I quite understand your term "classify." You say these catch data were not used for the analysis used in classifying. What does that mean?

WITNESS MAY: We want to be able to identify the origin of the fish from known spawning rivers so that we can look at the fish taken from the ocean and say that this fish came from the Hudson, it came from the Chesapeake, or it came

blt 6

from the Roanoke.

In order to do that, we have to determine those characteristics that will allow us to separate the Hudson River, the Chesapeake and the Roanoke fish.

To do that, we have to take the fish from those known areas and evaluate them, measure them, to determine if in fact we can distinguish between those river sources.

This work was initiated in 1974. At that time we concluded that we could separate --

CHAIRMAN JENSCH: What data did you have to conclude that you could separate?

WITNESS MAY: From fish that we actually took from those rivers ourselves, that we went out and collected the fish and made the measurements on them.

CHAIRMAN JENSCH: Is the striped bass from the Chesapeake distinctly different from the striped bass in the Hudson River?

WITNESS MAY: Yes, sir.

CHAIRMAN JENSCH: Because of what?

WITNESS MAY: Because of the combination of measurements that were made on those fish.

CHAIRMAN JENSCH: Measurements of what?

WITNESS MAY: Measurements of such things as the number of scales along the lateral line of the fish, the number of rays in the fins, the ratio of the distance or the

blt 7

1 measurement from the focus of the scale to the first annulus
2 and from the focus to the second annulus, the ratio of the
3 internostral measurement to the snout length, things of this
4 sort were used to be able to determine the fact that these
5 are in fact distinguishable characteristics.
6 It's much like looking at blood type and color of
7 hair for telling people apart in a sense. There are certain
8 characteristics that we're able to use.
9 CHAIRMAN JENSCH: And you say that a Chesapeake
10 striped bass would have a different number of scales and these
11 ratios would be different that you mentioned from a Hudson
12 River striped bass?
13 WITNESS MAY: In the simplest form of that state-
14 ment, yes, sir.
15 CHAIRMAN JENSCH: Is that a well-recognized standard
16 of distinction?
17 WITNESS MAY: It has been used by Silva and Raney,
18 who have done some work with striped bass. Other types of
19 discriminant characters have been used by other people for
20 salmon, for silversides and a number of other fish. It's
21 also true for a number of other organisms.
22 CHAIRMAN JENSCH: This sport landing, as I under-
23 stand the process a fellow goes out in a boat and does some
24 trolling or whatever they do to pick up the striped bass.
25 Do you expect him to turn the data in to you, or do you get

blt 8

the fish? Are you on the dock when they come in and scoop it out? How do you take the fish?

WITNESS MAY: We purchase the fish. NOw, let me make it clear that in the case of fish that we use for determining the characteristics by which we separated the stocks we actually took those fish ourselves. We had to have permits. We worked right in the water with the people.

In the case that we were using someone else's haul seines or using our own in the case of getting the fish from the Atlantic Ocean, we would either be on the beach in some cases with the sports fishermen who would be fishing there or we would have approached the person on the beach.

We assigned our personnel to work a zone during a 2-month period until he got the quota that they were required to get; and so he would develop conversations, communications, with the fishery areas at the shops, fishing tackle shops and this sort of thing, and he would actually go on the beach.

And there would be a sports fisherman there. If he had caught striped bass in our strata, they would purchase it from him and the samples for measurements and so forth would be done.

CHAIRMAN JENSCH: All of this was a salable item or purchasable item, was it?

WITNESS MAY: Yes, sir. Of course, we did some of

blt 9

1 the actual catch if there was not a sport or commercial fishery
2 effort in that particular area.
3 For instance, in I believe it is Stratum 5, we did
4 a good bit of effort there. And in some cases our people may
5 actually, you know, be there at the time the gill nets are
6 run and everything.
7 CHAIRMAN JENSCH: What percentage of data can you
8 so classify, to use your term, came from the sport landing
9 activity data collection?
10 WITNESS MAY: In terms of how many fish did we
11 get?
12 CHAIRMAN JENSCH: No, percentage wise. Is it 10
13 percent of your data that came from sport landing or 16 1/2
14 percent, or what?
15 WITNESS MAY: I do not know the answer to that
16 question. I would have to look that up for you.
17 CHAIRMAN JENSCH: And on these gill nets, you say,
18 or other types of collection activities, would you purchase
19 all of the striped bass from some haul or something like that?
20 WITNESS MAY: In some cases we might purchase the
21 entire catch, or we might purchase a portion of it; but it
22 would be a random portion of it, depending upon what quotas
23 we needed to fill.
24 We have so many hundred fish allocated to each
25 strata; and, of course, if you had taken, for instance,

blt 10

1 seventy-five of your quota and the fisherman had fifty fish,
2 you would not need but twenty-five more.
3 CHAIRMAN JENSCH: This quota determination is
4 something that you derive?
5 WITNESS MAY: In the sample design prior to the
6 execution, we derive that, yes, sir.
7 CHAIRMAN JENSCH: I don't believe I have any
8 other questions.
9 Do you have some?
10 DR. DAIBER: Yes, I do.
11 Dr. May, it's my understanding that the striped
12 bass is a fairly migratory organism, is that correct?
13 WITNESS MAY: Yes, sir.
14 DR. DAIBER: How do you decide or establish whether
15 or not this fish is moving through the area at the time that
16 you are sampling in any one of your zones?
17 WITNESS MAY: Well, these were, of course, not only
18 geographically set up but they were temporally set up, so that
19 we are able to get a handle on the changes of the contribution
20 to a particular region, at least on a temporal basis, to say
21 that during certain times of the year one source river may be
22 contributing relatively greater than another source river.
23 As to be able to say that that fish is on the move,
24 you know, by looking at him, from inferences from the temporal
25 stratification we would be able to say that perhaps in the

b1t11

1 early summer the contributions further north may be greater
2 concentrations from one source than another and in the winter,
3 from looking at the contributions of the southern section,
4 we may be able to say that the contributions are greater
End 1 5 from another source based upon these data.
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BY DR. DAIBER:

Q I'm still having problems with this. If you go in in a particular location, such as the Roanoke or Connecticut River, how do you know that the fish that you catch there are not a mixture from several different sources?

A Are you talking about the spawning stock that we determine the characters from, or are you talking about the fish that we took from the ocean to determine if they were contributed by --

Q Well, then, we need to separate those two out.

A We took the fish used to determine the differences in the source rivers at the time of spawning, from the spawning grounds of these known rivers. We made the assumption that if the fish was in the spawning river on the spawning ground, and they were near-ripe, that they in fact did originate from that river.

These fish --

Q How can you assume -- or you are assuming that these animals have a home range or a home spawning area to which they return?

A Right.

Q How can you assume that?

A Not only can we assume that, but some of the tagging work from Mansouetti (phonetic) in the Chesapeake, where they have actually tagged fish on the spawning grounds, have had returns to those spawning grounds the following year, which

would suggest that.

Of course, there are evidences in other species of fish that also indicate good fishing terms.

Q Did you look at any young of the year to look at these morphometric characteristics that you've mentioned?

A We did not look at -- you're talking about juveniles here?

Q Young of the year.

A No, we did not. We used all older fish.

Q But you still have the possibility of some mixing. Is this possible on the spawning grounds that the spawners, the adults that are actually spawning, could come from several different sources, even though the majority of them might return to their home grounds? Is this correct?

A Yes, right. I would agree that some could. But the point in this is that we have made the hypothesis that you cannot tell the difference in the fish -- and, in fact, when we did the measurements and did the statistical tests, we can separate fish into Chesapeake fish and Hudson fish and the Roanoke here, which would suggest separate gene pools.

A (Witness Campbell). Could I make a comment on this general comment?

Dr. Rainey (phonetic) and his colleagues in the 1950s did study the young of the year striped bass in the Chesapeake and Hudson area, and did find they were able to separate those

juvenile fish as well using the listed characters in the characteristics.

MR. FIDELL: Mr. Chairman, in view of the fact that there was considerable discussion yesterday afternoon concerning this report and the contribution question, we think, upon reflection, it would be helpful to the Board to have the correspondence that was discussed previously. And I would at this point request that our original submission be included as complete. And we would ask that the letter from Mr. Major to Mr. Rodriguez, which is part of this booklet, be included. We feel the proper foundation has been laid for this.

MS. CHASIS: My objection stands.

CHAIRMAN JENSCH: Well, let's first deal with it separately. What we now have as Licensee's OT-2, for the purpose of identification -- we'll take the letter, which is entitled, or bears the wording, Texas Instruments, Incorporated and so forth, P.O. Box 237, Buchanan, New York, dated December 2, 1976, to Mr. Lorenzo Rodriguez of Consolidated Edison Company, and it's signed by John T. Major. Is Mr. Major here?

WITNESS MAY: No, sir.

CHAIRMAN JENSCH: We'll mark this for identification as Licensee's Exhibit OT-3.

(The document referred to was marked Licensee's Exhibit OT-3 for identification.)

CHAIRMAN JENSCH: ANd we'll ask Mr. Major here to tell us what he wrote about. Well, we'll have to give consideration to it.

The question is on the offer of Licensee's OT-2, which is the report. Is there any objection by the regulatory staff?

MR. LEWIS: None.

CHAIRMAN JENSCH: New York State Atomic Energy Office?

MR. KING: No.

CHAIRMAN JENSCH: Hudson River Fisherman's Association

MS. CHASIS: No.

CHAIRMAN JENSCH: Attorney General of the State of New York?

MS. CHASIS: Mr. Chairman, Mr. Shemin had asked me to state for the record, and for your information, that he had to go to court in New York City this morning. He will make every effort to be here this afternoon. He may not be able to be; he may have a hearing.

CHAIRMAN JENSCH: All right.

And the Village of Buchanan?

MR. D'ALVIA: No.

CHAIRMAN JENSCH: All right. Licensee's Exhibit OT-2 is received in evidence.

(The document referred to, previously marked for identification as Licensee's Exhibit OT-2, was received in evidence.)

MR. TROSTEN: Mr. Jensch, may I ask a question, sir? The testimony in this proceeding indicates that Dr. May, Dr. Campbell, are in charge of the Texas Instruments research program. Although the letter was signed by Mr. Major, Dr. May is fully prepared to discuss the letter. I really don't understand, Mr. Chairman, why it's necessary that the person who signed this particular transmittal letter, as an administrative matter, must be here in order to lay a proper foundation for the letter, when we have the person who was responsible for the letter; namely, Dr. Campbell and Dr. May, to testify concerning it's contents.

CHAIRMAN JENSCH: Well, it's just one of those extraordinary rules of evidence that always seem to be borne out from history as being required; and that is, that the person who wrote the letter should come in and identify that. Maybe he doesn't know anything about it, but he can come tell us he knows nothing about it. At least, as long as he signed it, we'll ask that the usual rule of evidence be applied; that the man who wrote it come in and tell us, and lay the foundations. This is old hat for evidence.

What's the next procedure? Do people desire to

1 interrogate on this document, Licensee's OT-2?

2 MS. CHASIS: Yes. The Hudson River Fisherman's

3 Association would like to interrogate on this, and it also has

4 additional cross examination on other areas for the panel.

5 VOIR DIRE

6 BY MS. CHASIS:

7 Q Now, I'd like to follow up Mr. Daiber's questions.

8 It's true, is it not, that Mansouetti, in his

9 paper, with respect to the fact that some of the spawning stock

10 was found to have returned the following year to the Chesa-

11 peake, that one explanation might well be that they had never

12 left the Chesapeake?

13 A (Witness May). THat's correct.

14 Q Now, another point is that, even if the spawner

15 returns to the same river year after year, that does not

16 necessarily indicate that that river is the origin of that

17 spawning stock. Is that correct?

18 In other words, you're making an assumption that

19 merely because they return year after year, that that spawning

20 stock originated in the estuary.

21 A Yes. We acknowledge the fact that we're making that

22 assumption, you know, based upon the similar type mechanics that

23 occur in other fish species also have been demonstrated that

24 the fish spawn in certain streams, and return to those streams.

25 Q What evidence are you relying on in terms of the

striped bass for that proposition?

A. There is no evidence other than what we have made mention of. That particular one, and one other paper that I do not recall at this point, which is very similar to Mansouetti's. I'm not suggesting that it, you know, does anything else.

Yes; the assumption is made that if the fish are there to spawn, they originate there. And the point that I made to Dr. Daiber is that we have been able to distinguish between those populations, which is strong evidence for separate gene pools there, which I think is one of the commonly accepted facts, that there is a sub-population.

Q. Now, Dr. Campbell indicated that juveniles have been found between different spawning areas, have been found and have different characteristics. Did your study attempt to utilize those differential characteristics in drawing conclusions about the origin of a particular oceanic stock?

A. Well, we --

CHAIRMAN JENSCH: Wait a minute. Wait until she finishes the question.

Would you re-read the question, Mr. Reporter?

(The Reporter read the pending question.)

BY MS. CHASIS:

Q. What I was saying was, Dr. Campbell said that juveniles from the Hudson and the Chesapeake had different

1 characteristics. And what I'm asking you is, did you consider
2 using those differential characteristics in order to determine
3 the origin of the oceanic stock specifically?
4 A (Witness May). As Dr. Campbell said --
5 CHAIRMAN JENSCH: Can you first say yes or no, and
6 then explain if you could use those differential characteris-
7 tics?
8 WITNESS MAY: We used one of those that had been
9 used there, the character index that had been selected by
10 Rainey and De Silva.
11 BY MS. CHASIS:
12 Q If you had relied on those entirely, though, then
13 you could have been more certain, could you not, that in fact
14 the characteristics were characteristics of Hudson River-spawned
15 populations?
16 A (Witness May). Our concern is that we were going
17 to --
18 CHAIRMAN JENSCH: Would you be more certain or not?
19 Then you can explain it. Please deal directly with the ques-
20 tion.
21 WITNESS MAY: For juveniles, if we were going to
22 sample juveniles, we would be more certain.
23 BY MS. CHASIS:
24 Q What about for adult fish? Can't you use those same
25 characteristics?

A. The same character, perhaps, if we did use one set of them. But there are possible differences that could be misinterpreted by using a single-year class; when we're going to look at a composite group of fish here, it was necessary to look at the older fish, because those were the fish that we were going to try to identify in the Atlantic fishery, not the babies. They're not caught.

Q. I see.

Now, on page II-2 of this report, you summarize your conclusions concerning the origin of the oceanic samples, and you break it down both by the Atlantic coastal fishery and then by the inner and outer zones. And then, in the last full paragraph, you indicate that biochemical data provided evidence of either of two possibilities; and that, depending on which you chose, those either increased or decreased your estimates by 60 percent during the summer months, but less than 5 percentage points during the average for the year.

Now, is it your assumption, respecting one of these possibilities, which led you to your 7 percent figure?

A. No.

Q. This has nothing to do with that?

A. That's correct.

MS. CHASIS: I have no further questions on this document.

CHAIRMAN JENSCH: New York State Energy Council?

1 MR. KING: None on that document.

2 CHAIRMAN JENSCH: Village of Buchanan?

3 MR. D'ALVIA: No.

4 CHAIRMAN JENSCH: Who are you?

5 MR. D'ALVIA: Mr. Chairman, I'm Raymond D'Alvia.

6 My father represents Buchanan, and he will be here shortly.

7 CHAIRMAN JENSCH: Are you a lawyer?

8 MR. D'ALVIA: Yes.

9 CHAIRMAN JENSCH: All right.

10 Will you give your full name, so that we can get it

11 in the record?

12 MR. D'ALVIA: Raymond A. D'Alvia, South Riverside

13 Avenue, Croton-on-Hudson, New York.

14 CHAIRMAN JENSCH: Thank you, sir.

15 DR. DAIBER: Dr. May, I'd like to pursue this just

16 a little bit further.

17 Did you and your people collect any juveniles for

18 examination commercial and morphometric characteristics from

19 these various river sources?

20 WITNESS MAY: To my knowledge, no.

21

22

23

24

25

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JRB:jrbl

MR. DAIBLER: So that you are making those assumptions based on Rainey, DeSilva and the Mansouetti studies?

WITNESS CAMPBELL: Yes.

MR. DAIBLER: And the inferences that could be drawn from these studies are as to other species?

WITNESS CAMPBELL: Yes.

CHAIRMAN JENSCH: Did you do that?

WITNESS CAMPBELL: We had looked at those characteristics and they are not significantly different from those found by Dr. Rainey in the 1950s; so it appears there has been, I would say, genetic consistency throughout that 20-year time period. However, for the other spawning, we have not done a similar determination.

MR. DAIBLER: So that you are inferring on the basis of that you find the same continuity of gene pool in the other -- Chesapeake or Delaware or Connecticut or Roanoke or wherever it might be?

CHAIRMAN JENSCH: Is that correct, yes or no?

WITNESS CAMPBELL: I think that would be the case, however, we have no hard evidence on that.

CHAIRMAN JENSCH: You do not know?

WITNESS CAMPBELL: We do not know.

CHAIRMAN JENSCH: Reg Staff?

MR. LEWIS: Not on this document, no questioning.

jrb2

MS. CHASIS: May I proceed with cross?

CHAIRMAN JENSCH: Proceed.

CROSS-EXAMINATION

BY MS. CHASIS:

Q Yesterday I asked Con Edison to respond to my listing of new data which they intended to supply in the 1977 report. Have you been able to determine if my list is complete?

A (Dr. Marcellus) As you identified the list, referring to 1975 distribution data, 1975 DAI and NYU factor data, 1975 stocking data, the answer to that is no. There is additional data.

Q What is that additional data?

MR. TROSTEN: We are in the process of culling this, Ms. Chasis; we are starting to prepare a list. We would like to have been able to have it today, but we are still working on it.

BY MS. CHASIS:

Q Can you give me at least an incomplete list, Dr. Marcellus?

A (Dr. Marcellus) Items I can think of offhand -- I do have to check -- one item is the LMS data at other utilities, for example.

Q That's both 74 and 75?

A That would be 75 data; 74 data, also.

jrb3 1 Q Yes.

2 That is all you can think of offhand?

3 A There is information on, studies on the various

4 gears that were used.

5 CHAIRMAN JENSCH: Keep your voice up. We would

6 appreciate getting conversational, but we are all here, and

7 we might as well listen to it.

8 WITNESS MARCELLUS: Okay. I'll repeat what I

9 just said.

10 There is information on gear efficiency studies

11 that was completed, that was conducted in 74 and 75. That

12 is being prepared.

13 MR. TROSTEN: Of course, Ms. Chasis, there is all

14 of this stocking data; there are the data on contribution

15 to the Hudson.

16 My problem is, we have a long list, and we are

17 trying to get a complete answer to your question.

18 MS. CHASIS: You mean this report is not --

19 MR. TROSTEN: This report is part of the informa-

20 tion we have.

21 Your question is, you gave us a list of three

22 items, and your question was: is this all new data that is

23 presented; and we are trying to give you an accurate answer

24 to your question.

25 MS. CHASIS: That was not my question.

jrb4 1 MR. TROSTEN: Sorry.

2 CHAIRMAN JENSCH: You are talking about OT-2?

3 MR. TROSTEN: Yes, sir.

4 MS. CHASIS: What I was referring to was new

5 data which had not been forthcoming to date, but which was

6 to be included in the January 77 report; and I had included

7 the 75 stocking data.

8 MR. TROSTEN: New data? What do you mean by

9 "to date"?

10 MS. CHASIS: Today. Literally today.

11 MR. TROSTEN: Literally that has never been

12 presented before?

13 MS. CHASIS: That's right.

14 MR. TROSTEN: In any context?

15 MS. CHASIS: That's right.

16 MR. TROSTEN: Let us try to contemplate that

17 and get an answer -- never been presented up to the moment?

18 MS. CHASIS: And that would first appear in the

19 January 77 report.

20 MR. TROSTEN: That has never been presented before

21 at any time.

22 MS. CHASIS: Yes.

23 BY MS. CHASIS:

24 Q Now, I am referring to OT-1 and at page 318, it

25 is indicated that the results of the 75 studies are expected

jrb5 1 to be available during mid-summer 1976, from which more
2 considered judgment can be made on the closed cycle cooling.
3 Now what we see is that several sets of the data
4 have not yet been made available, even though we are several
5 months past that time period; and I am wondering exactly why
6 this data is being held up?
7 MR. TROSTEN: Would you repeat the question.
8 CHAIRMAN JENSCH: Refer to page 318, she described
9 some that that will be available in mid-1976; where is it?
10 What's holding it up? Is it going to be in the 77 report?
11 MR. TROSTEN: Dr. Marcellus, have you got the
12 page in front of you?
13 MS. CHASIS: It's at the bottom of the page.
14 WITNESS MARCELLUS: The question is why has
15 this data not been provided, the reports, the results, not
16 been provided to you?
17 The response to that is we have not had time to
18 get all this work written up and completed.
19 BY MS. CHASIS:
20 Q I thought it very interesting that the 74 data
21 or most of the 74 data could be presented in that multi-plant
22 report which came out in 1975?
23 A (Dr. Marcellus) That is not correct.
24 Q Well, that multi-plant report certainly refers to
25 a lot of 74 data, at least collected through September of 74.

jrb6 1 I think the record will show that.

2 A A substantial part of the data in the multi-plant

3 report came from the year 1973; part of the data for 74

4 is included in the report, but certainly not all of the data.

5 Q Much of the data on distribution and abundance

6 is there.

7 MR. TROSTEN: For what year are you referring?

8 MS. CHASIS: For 1974.

9 MR. TROSTEN: 1974 data on distribution and

10 abundance.

11 Do you understand the question, Dr. Marcellus?

12 WITNESS MARCELLUS: Yes.

13 There is an amount of data from 1974, but it's

14 certainly not all the data.

15 But to go to your question on 1975 data, our

16 contractors are under great amount of pressure to compile

17 complete analyses of all this data, and they simply have not

18 been able to get it all done in the timeframe we have been

19 trying to work under relative to the various commitments to

20 regulatory action.

21 BY MS. CHASIS: Yes, I understand.

22 CHAIRMAN JENSCH: Use the language used the other

23 day against the staff: if you had done your work you'd

24 have it out; and everybody would be happy.

25 BY MS. CHASIS:

JRB7 1 Q How much of the 1975 data which is not yet forthcoming relates directly to measure of post-operational impact of Indian Point 2?

MR. TROSTEN: Are you referring to the 1975 data?

MS. CHASIS: Yes, and that can be directed at any of the three involved in the research program, Doctors McFadden, Marcellus or May.

WITNESS MARCELLUS: I prefer to ask Dr. McFadden.

WITNESS MC FADDEN: All of the 1975 data relates directly to post-operational measurement of impact at Indian Point Unit 2, much of it in a unique way. I would cite some of the unique elements in 1975 data:

One would be the data from the Indian Point plume study which has resulted in a complete recasting of our concepts of entrainment mortality, and has resulted in a significant revision of estimates of impact.

MS. CHASIS: Let me interrupt you, Dr. McFadden.

BY MS. CHASIS:

Q I am not asking what studies relate to measurement of plant impact; I'm trying to understand what does that data actually attempt to directly measure the effect of plant operation on?

MR. TROSTEN: What do you mean by "directly measure the effect of plant operation"?

MS. CHASIS: Whether plant withdrawals have

jrb8 1 reduced juvenile abundance.

2 WITNESS MC FADDEN: The answer which I have begun

3 I think directly relates to that question, unless you want

4 to rephrase the question.

5 BY MS. CHASIS:

6 Q As I understand the plume studies, those are

7 experimental; they are not actual measurements in the plant,

8 and they don't depend upon the plant to operate. In other

9 words, those can be performed independent of plant operation.

10 A (Dr. McFadden.) But they are measurements that

11 are essential to measure theimpact of the plant.

12 Q Yes.

13 CHAIRMAN JENSCH: Are they experimental?

14 WITNESS MC FADDEN: They are experimental.

15 BY MS. CHASIS:

16 Q What I am looking for is not, as I indicated,

17 just all studies which are directed towards some kind of

18 measurement of plant impact, but what data actually is being

19 collected to directly reflect -- that could not be collected

20 but for plant operation; it is dependent on plant operation?

21 A (Dr. McFadden) The entire set of data on the 1975

22 ichthyoplankton could not be collected in the sense that they

23 reflect plant impact except for the operation of the plant

24 during 1975.

25 The same would be true of the marked recapture

JRB9

population estimate at the end of the summer, which again reflects the operation of the plant.

The same would be true for the measurements of survival in the plant, which reflect that particular year's operational runs.

The same would be true of the beach seine catch unit area, which also reflects the residual population after operation of the plant.

The data on species other than striped bass, the tom cod, for example and the white perch, reflect the operation of the plant during 1975.

It's also true that the plant operation during 1975, the aggregate of power production units on the estuary operated at a different levels than in 74; so the 75 measurements are unique in that respect.

MR. TROSTEN: Ms. Chasis, when you refer to plant operation, incidentally, were you referring to the Indian Point 2 plant, or to all of the plants, because data was collected on all plants?

MS. CHASIS: I am referring to Indian Point 2.

MR. TROSTEN: You understand data were collected on all plants during 1975?

MS. CHASIS: Yes.

BY MS. CHASIS:

Q Now, much of the other data, then, could have been

jrb10 1 collected whether or not the plant was operating, the F factor
2 data, for example?
3 A (Dr. McFadden) The F factor data that measures
4 the ratio of the organisms in the plant intakes to the
5 density of organisms in the nearfield vicinity of the plant
6 cannot be taken except as the plants are operating.
7 Q Do they have to be operating at full power? I
8 mean, can the pumps be running? Or does the plant actually
9 have to be in operation to make that measurement?
10 A Dr. Lawler can answer that question.
11 A (Dr. Lawler) To get the information the pumps
12 have to be running; to make it meaningful the pumps have to
13 be running at a level approximating the level you would
14 be running at some kind of normal operation, not necessarily
15 for power.
16 Q The plant does not have to be producing power?
17 A Right. You don't necessarily have to produce
18 power.
19 MR. LEWIS: Mr. Chairman, I am having trouble
20 hearing everybody.
21 CHAIRMAN JENSCH: If you can -- everybody --
22 please raise your voice.
23 MS. CHASIS: I'll try to speak up.
24 BY MS. CHASIS:
25 Q Stocking data is not related to measuring plant

jrb 11

1 impact, either; is it?

2 MR. TROSTEN: What do you mean by "related"?

3 MS. CHASIS: I think if Dr. McFadden doesn't

4 understand the question he can say so.

5 MR. TROSTEN: Then I object to the question on

6 the grounds it's vague.

7 MS. CHASIS: It is a continuing line of questions

8 about whether or not the plant actually needs to be operated.

9 CHAIRMAN JENSCH: Objection overruled. I think

10 the witness understood. It's in sequence to the previous

11 question.

12 WITNESS MC FADDEN: The plant does not need to

13 be operating in order to measure the relative survival of

14 stock and wild fish.

15 CHAIRMAN JENSCH: When you use the terms "the

16 plant does not need to be operating" are you making a dis-

17 tinction that the pumps at least need to be operating?

18 WITNESS MC FADDEN: Nothing has to be happening

19 at the power plant in order to measure the relative

20 survival of hatchery and wild fish, except for the fact that

21 some of the fish are recaptured as impinged fish on the

22 intake screens; and that is a useful additional source of

23 data.

24 BY MS. CHASIS:

25 Q The data on contribution would not be collected

jrb12

during plant operation, either?

A (Dr. McFadden) That is correct.

Q Now, as I understand it, when the study program was originated the plan had been that both Indian Point Units 2 and 3 would be operating for two years prior to completion of the study program; is that correct?

A (Dr. Marcellus.) That is correct.

Q Now, am I correct, Indian Point 3 did not come on line until 1975?

A Indian Point 3 did not come on line until 1976.

Q So it did not operate at all in 1975, during the 1975 spawning season?

A That is my recollection, no; it did not operate in 75.

Q So that the post-operational data we do have relates only to Indian Point 2 and does not relate to the combined impact of Units 2 and 3?

A That is correct.

CHAIRMAN JENSCH: Does that mean Indian Point 1 was shut down all during this period, too?

WITNESS MARCELLUS: Unit 1 was shut down until 1975, and it shut down until 1976, also.

CHAIRMAN JENSCH: All of 1975.

WITNESS MARCELLUS: To the best of my ability, yes.

CHAIRMAN JENSCH: Thank you.

jrb 13

BY MS. CHASIS:

Q Dr. Marcellus or Dr. McFadden, do you intend to continue studies related to impact of Indian Point 3 on the river?

A (Dr. Marcellus) Studies related to Indian Point Unit 3 are being continued in 1977. This is a requirement of the environmental technical specifications, which is a part of the operating license for Unit 3.

Q And was data also collected for Indian Point 3 in 1976?

A Yes, some data was collected relative to Unit 3. I am going to have to check that because I do not recall what or how much data was collected relative to entrainment at Indian Point 3.

Q Is there a continuation of the full fledged research program, or is it more narrow studies directed at Unit 3 alone? Could you specify what the 77 studies are that will be carried out?

MR. TROSTEN: I would like to clarify this, Ms. Chasis.

I am not going to object to the question, although I believe I could simply by reference to the technical specifications for the Indian Point 3 facility; but you are asking Dr. Marcellus to tell you what's in the Indian Point 3 tests?

jrbl4

1 MS. CHASIS: Yes, and anything else Con Edison
2 is doing.
3 MS. LEWIS: I lost your question.
4 MS. CHASIS: What I am asking is this: I under-
5 stand there are going to be additional studies conducted
6 in order to measure the impact of Indian Point 3. I am asking
7 whether those studies are --
8 CHAIRMAN JENSCH: I think that's a different
9 question.
10 I think the licensee's statement about what is
11 in a license should be shown from the license. I think
12 recollections might be somewhat incorrect and should not
13 be used if the document itself is available.
14 Proceed.
15 WITNESS MARCELLUS: We will follow the technical
16 specifications in our study program; that will include
17 entrainment studies at Unit No. 3, as well as the studies
18 at Unit No. 2, as part of the specifications.
19 We will do impingement monitoring at Unit No. 3
20 as well as at Unit No. 2. We will conduct river survey
21 work, which is also in the technical specifications.
22 BY MS. CHASIS:
23 Q So that the research program --
24 MR. TROSTEN: I'm sorry, the technical specifica-
25 tions requires that this be done.

jrbl5

MS. CHASIS: My question is not inconsistent.

MR. TROSTEN: I simply ask you to refer to the Indian Point 3 specifications.

CHAIRMAN JENSCH: I understood her question to be since Indian Point 3 is on the line now?

WITNESS MARCELLUS: Yes, it is, unless it's not operating today. As far as I know it is operating.

CHAIRMAN JENSCH: In those periods of shutdown, termination of operation, the tech specs and the R&D program may not be carried out due to the fact it's closed down. The question is asking, bearing all those matters in mind, what kind of R&D would be carried out?

BY MS. CHASIS:

Q Referring to the testimony on page 5, there is a reference to the Raytheon study which was utilized subsequently in the testimony, and it indicates that the sampling was conducted with that study was limited to between the Haverstraw area and the Bear Mountain Bridge.

Do you know roughly what river miles were involved there? You've got Mile 47 for Bear Mountain Bridge. What is the mile point for Haverstraw Bay?

A (Dr. Marcullus) About mile .45, I believe -- is that incorrect?

I did identify Haverstraw Bay as Mile .32, I think, on line 4 on this page.

jrb16

Q I'm sorry.

So we are talking about that study having sampled a 15 mile stretch of the river, is that correct?

A That's correct.

Q And yet that study is one of several which is used to estimate relative abundance of juveniles in the river, is that correct?

A (Chorus of "Yes".)

Q I guess my question really is: how can you find that data reliable when the relative abundance was drawn from such a small stretch of the Hudson River?

A (Dr. McFadden) A 15-mile stretch of the river is a significant, very significant, stretch of river; and it is a reliable basis for an index of relative abundance from year-to-year.

It is possible to verify that by comparing for those years where you have both the 15-mile segment and the larger segment, by comparing the two indices; and they will follow similar trends.

Q Well, distribution of abundance vary, particularly in the period in which the sampling occurred up and down the river, so that unless you've actually done sampling at other points in the river, you can't know whether the abundance measurements in that 15-mile stretch are representative or not?

jrb 17

A No.

My answer to your last question indicated that by comparing the 15-mile index with the index based on a broader reach of the river in those other years, when you have both, can be used to show the validity of the 15-mile index.

Q But unless you have actually looked at that for that year, you really can't be sure; can you?

A No, you can be sure, because you can determine the degree to which the 15-mile index is correlated with the index based on the broader set of data.

You can establish that 15-mile index is a reliable measure of what happens on a broader scale; it is not a perfect fit.

Q I would think not.

CHAIRMAN JENSCH: While there is a pause, what are the causes of variation that might be in this 15-mile stretch, compared with the broad -- to use your term -- how far does the broad stretch include?

WITNESS CAMPBELL: For our river-long survey it runs from River Mile 12 to River Mile 153, and that would constitute a broad stretch of the river.

Also I would point out that we are aware of this as a potential problem, and have investigated the relationship between this 15-mile region and what we would determine from

jrb 18

the river-long survey. And we have found that this 15-mile area gives you a -- since more of the fish tend to be concentrated in the lower river than in the upper river, it tends to give you a slight overestimate; and we have figured an average correction factor for that type of overestimate. I don't recall what that is right at the moment.

CHAIRMAN JENSCH: My question was: what would be causes to lend some doubt as to the validity of the 15-mile stretch. Now, 153 miles -- that must be Albany, isn't it?

WITNESS CAMPBELL: Yes, sir.

CHAIRMAN JENSCH: Now, if you took, say, instead of going from wherever it is, 12 up to 29, or whatever it is, if you go up to Mile 40, how far does the spawning activity generally go in some relative abundance?

WITNESS CAMPBELL: Okay.

For spawning activity it's not quite the same as this data. It's a different sort of thing.

CHAIRMAN JENSCH: Yes.

WITNESS CAMPBELL: Spawning activity for striped bass covers a great deal of the river, and we certainly have it as far north as the Kingston area.

CHAIRMAN JENSCH: To get back to the abundance area, is not there a general range wherein you have, say,

jrb19

the greater amount of abundance?

WITNESS CAMPBELL: For striped bass juveniles, I would venture a guess that between River Miles, let's say, 25 and 37, that that would have the bulk of the population.

CHAIRMAN JENSCH: Now as I understand Dr. McFadden, he said in a review of a broader stretch he feels you could rely on this 15-mile stretch as a good index?

WITNESS CAMPBELL: We've correlated that.

CHAIRMAN JENSCH: My question is: what would be the cause of the variation in this 15 mile stretch in contrast to this larger stretch, that is, year-by-year would there be some differences in this 15-mile stretch?

WITNESS MC FADDEN: In some years, a few more fish might be located outside of the 15-mile stretch, and in other years a few less; so there would be some variation in the relative abundance of striped bass between the 15-mile stretch and the outer, broader, stretch; some slight variations from year-to-year due to both the choice of spawning sites in the river by the fish, and perhaps subsequent migratory activities of the young.

CHAIRMAN JENSCH: What margin of error do you feel the 15-mile stretch has?

WITNESS CAMPBELL: We don't know with precision right now what that margin of error might be.

jrb 20

CHAIRMAN JENSCH: You reckon there could be a margin of error?

WITNESS CAMPBELL: Yes, we are attempting to get that, sir.

CHAIRMAN JENSCH: I think the question is this: when you select a particular year for the 15-mile stretch, and you don't know what the amount of error therein is, the Hudson River Fishermen people are saying, really, the 15-mile stretch for one year is not an adequate basis because of these fluctuations where abundance may vary; you recognize that; do you not?

WITNESS CAMPBELL: Yes, sir, and that is why we have attempted to make our correction on the most extensive piece of river water data that we have available to us, so we can get an averaging of these types of fluctuations that occur from year to year.

CHAIRMAN JENSCH: We understand what you have said.

The only point is, I think the question is: when you select one year for a 15-mile stretch, and you don't know what the amount of error is, then she questions whether you have a reliable data base.

You recognize you could have an error, is that correct?

WITNESS CAMPBELL: Yes, sir. And we have done

jrb 21

this for all years on essentially the 15-mile basis, as well as on the riverwide basis, correlated; they are significantly positively related.

CHAIRMAN JENSCH: Excuse me.

MS. CHASIS: Thank you.

BY MS. CHASIS:

Q Now, turning to page 13 of the testimony it is stated that the linear regression analysis suggested relative juvenile abundance exhibits a positive association with freshwater flow, and that it is unrelated to power plant withdrawal.

I would like to draw your attention to your own exhibit, OT-1, in this proceeding, this is Volume 1, of Supplement 2, page 2-4 --

MR. DAIBLER: What page?

MS. CHASIS: 2-4.

BY MS. CHASIS:

Q I draw your attention to the first full paragraph on that page which states an abundance of juvenile striped bass was variable from 1965 to 1974, and was not strongly controlled by the physical and biotic factors examined.

It goes on to say that there was no significant relationship between year-class strength and maximum daily withdrawal of water by power plants.

jrb22

1 As far as I can tell, that statement contradicts
2 what is contained in this testimony; is there any explanation?
3 A (Dr. Campbell) Just a moment, please.
4 A positive association?
5 Q A negative association.
6 A I'm sorry, I don't see any reference to a negative
7 association.
8 Q The full paragraph, page 13, last sentence,
9 "Abundance was found to be unrelated to combined power
10 plant water withdrawal from 1965 through 1974".
11 A Unrelated; that's not a negative relationship;
12 it's a no-relationship.
13 Q I see.
14 This paragraph also seems to contradict, though,
15 your correlation, your positive correlation between freshwater
16 flow and juvenile abundance.
17 A As I recall the significance level for that
18 correlation was approximately at the 6 percent level,
19 rather than the 5 percent level; and that may have to do
20 with the difference --
21 Q I don't understand what you are saying.
22 A The idea there would be if I say there is a
23 positive relationship of freshwater flow based on this
24 linear relationship, that I would be wrong in making that
25 statement only about 6 percent of the time, given this

jrb23 1 set of data, rather than the traditional 5 percent of
2 the time.
3 This is always a kind of a judgment in terms
4 of statistical significance.
5 Q What I find contradictory is the direct language
6 contained in this paragraph, which indicates abundance was
7 not strongly controlled by the physical and biotic factors
8 examined.
9 A Yes.
10 This one says, "These analyses suggested that
11 juvenile abundance was positively associated with freshwater
12 flow during April." That would be true. When you have a
13 probability level of around 6 percent, which is very close
14 to the traditional 5 percent level of significance, that this
15 is a suggestive probability level for that being in fact
16 a true relationship.
17 In fact, many times for ecological types of data a
18 10 percent significance level is often used.
19 Q The suggestion is made, but you do not feel the
20 statement is contradictory to what is contained in here?
21 A No. I think they both are not contradictory.
22 Q You are not refuting what you said earlier?
23 A No, we are not.
24 Q And you are saying that there was no observed
25 relationship between power plant withdrawals and juvenile

jrb24

abundance; is that right?

A We found no relationship between power plant withdrawal and juvenile abundance.

Q You didn't find a negative?

A No negative, no positive.

MR. DAIBLER: Now, in Volume 1, Supplement No. 2, on page 2-4, there is a sentence that reads as follows: "There was no significant relationship between year-class strength and maximum daily withdrawal of water by power plants, water temperature, or net freshwater flow in March, April, May, June, or July."

WITNESS CAMPBELL: Yes, sir.

MR. DAIBLER: Well --

WITNESS CAMPBELL: Those are all at the 5 percent level.

MR. DAIBLER: Yet you say in your December 7 testimony that there is a positive association between juvenile abundance and freshwater flow during April.

WITNESS CAMPBELL: Yes, sir.

The association was positive and it would only be significant, as I recall, at the 6 percent level.

MR. DAIBLER: Does that make a difference, between 5 percent and 6 percent? Is there a world of difference between 5 and 6 percent?

WITNESS CAMPBELL: No, sir, there isn't a world

jrb25

of difference between 5 and 6 percent; and it has to do with a difference in statistical approach. And this is the Type-1 error, the probability of making that Type-1 error, that is, saying there is a difference -- there is a relationship, when in fact there is not one; it's the decision-maker's choice whether he is going to use that 10 percent level or 6 percent level or 5 percent level; there is not that world of difference between 5 and 6 percent.

MR. DAIBLER: Perhaps it would have helped if you had in both your December 7 testimony and in this Supplement No. 2, if those levels of difference had been identified.

WITNESS CAMPBELL: I think in the main body of the text they are; the actual correlations and the levels of significance.

BY MS. CHASIS:

Q But you adhere to both statements?

A (Dr. Campbell) Pardon?

Q You adhere to both statements, and you do not deny in any way what was included in the multi-plant report?

A With respect to this type of analysis, these statements are true and correct.

Q As the statements in OT-1, Supplement 2, Volume 1 are also correct?

A Yes, ma'am. This has to do with the, in the

jrb26

1 context of simple linear regression, this is true.

2 Q Now, when you said you attempted to see if there

3 is any relationship to power plant withdrawals, my understand-

4 ing is from subsequent statements in your testimony that

5 you took -- I think it is on page -- somewhere subsequently,

6 you say you relied on maximum water withdrawals from various

7 plants.

8 What kind of examination was made of actual

9 operating levels and water withdrawals at those plants?

10 A For the full skein of years that were used in

11 this analysis we do not have that data available to us.

12 So we used this as an index for those plants -- we knew which

13 plants had been operating and we used their potential

14 withdrawal capacity as the index of power plant operation.

15 Q So even if they hadn't been operating, even if

16 they'd been operating at 50 percent levels, or not operating

17 at all, you still used the maximum potential?

18 A Yes, ma'am. That is the index.

19 Q Do you have the data available to you now, and

20 are you going to include it in your January 77 report?

21 A No, I don't believe we have that data available

22 to us as yet, and it is not planned for inclusion in the

23 1977 report, January report.

24 Q How many years of data collection has there been

25 on cannibalism? Does that date back to 65, or is that the

jrb27

1 more recent TI study?

2 A I believe that's only the more recent TI studies.

3 I recall a -- I recall one additional study on food habits

4 of striped bass in the Hudson. I don't believe they

5 reported cannibalism. This was for the larval populations,

6 I believe.

7 Q Do you know which study that was?

8 A I believe this was by Mr. Crutzer (spelling

9 phonetic), in terms of actual food habit studies.

10 I believe there was one additional study by

11 Mr. Crutzer involving the planktonic larvae food habits;

12 I don't have total recall on that study right now; but I

13 believe the evidence for cannibalism in food habit studies

14 has come from the TI studies.

15 Q So it's 73, 74, 75?

16 A Some of that data may be from 1972; I am not

17 sure, I don't recall; but I believe it's pretty much 73, 74,

18 75 data.

19 Q Three years of data.

20 By the way I just noticed this, that in the multi-

21 plant report that in 1974, when Indian Point 2 came on

22 line --

23 CHAIRMAN JENSCH: Keep your voice up.

24 BY MS. CHASIS:

25 Q In 1974 when Indian Point 2 came on line

jrb28

1 juvenile abundance was about 25 percent of the abundance of
2 the previous year.
3 MR. TROSTEN: Indian Point 2 came on line in 73,
4 Ms. Chasis.
5 MS. CHASIS: When did full power operation come in?
6 MR. TROSTEN: I don't know the answer as to when
7 full power operation began.
8 MS. CHASIS: The license wasn't issued until
9 September 23.
10 MR. TROSTEN: Correct.
11 MS. CHASIS: So it could not have been until
12 after that.
13 MR. TROSTEN: No, it came on line in 1973.
14 CHAIRMAN JENSCH: I guess it means -- what you
15 mean by "on line". She's talking full power; you could be
16 talking about a greater abundance of power than you had
17 before.
18 WITNESS CAMPBELL: Do you have a question on that,
19 Ms. Chasis?
20 CHAIRMAN JENSCH: She was starting to.
21 MS. CHASIS: I made that observation from the
22 multi-plant report.
23 BY MS. CHASIS:
24 Q Have you any comment on it?
25 A (Dr. Campbell) I think our comment is similar to

jrb 29 1 the NRC Staff's response to the comment on that same point,
2 that they made in their FES relative to these proceedings.
3 And that is that we find a large variation in year-class
4 strength within the Hudson River, so that I do not see any
5 direct association of that with power plant operations.
6 73 was one of our very large year-class variations.
7 Q So the natural fluctuations are so great you
8 can't necessarily look at that one year and say power plant
9 impact or no power plant impact?
10 A Yes, that's right. 73 was a very strong year
11 flux.
12 Q I was talking about 74?
13 A Yes, but comparing it to 73; and that was one of
14 the very strong year-classes in the entire skein of years.
15 A (Dr. McFadden) If you were to compare 74 with
16 72 or 71 you would see that there is not much difference;
17 and that type of pre- versus post-operational comparison
18 does not suggest any direct effect of the plant reflected
19 in the 73 to 74 difference.
20 There is a prior year --I forget which year it
21 is -- which is another peak year-class.
22 Q 69?
23 A Yuh.
24 Q Does it suggest that there is an effect from the
25 plant?

jrb 30

A No. That in itself does not suggest that there is no plant effect.

Q By the way, in the testimony in the Indian Point 2 license proceedings and the proposed findings of fact submitted in that proceeding, Con Edison indicated that by April of 1976 it would be able to predict or to assess whether or not there had been 25 percent reduction of population with 95 percent confidence.

Now -- and below that estimation that there would be associated lower confidence levels.

MR. TROSTEN: Ms. Chasis, do you have a copy of the findings of fact that were submitted?

MS. CHASIS: I don't have them with me.

MR. TROSTEN: I believe we do have a copy here and I would request that you refer specifically to this before you pose a question.

MS. CHASIS: Let me --

CHAIRMAN JENSCH: Let me first ask the panel if there is a recollection such a prediction was made.

MR. TROSTEN: I would prefer we refer to the record of the proceeding rather than have the panel recollect something from four years ago.

CHAIRMAN JENSCH: I think if they recall it we could go ahead. I think when there is a reference to a document --

jrb31

MR. TROSTEN: Mr. Chairman, may we take a recess while we get the document?

CHAIRMAN JENSCH: If you have it, there may be other ways of getting the same information.

Does anybody recall that promise that was just stated, that back in 1972 or 73 it was predicted that by April 76 you could determine whether there would be a 25 percent reduction in juvenile survival or whatever?

MR. TROSTEN: Mr. Chairman, we are looking for the document.

I will ask Dr. McFadden whether he recalls what was said on the document -- we have it here.

It would be a little easier to look at it.

END TAKE 3
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Begin 4

MR. TROSTEN: If you'll bear with me a moment, I'll find the right page.

Mr. Chairman, I'm showing Dr. McFadden page 233 of the findings and conclusions, proposed findings and conclusions, which were submitted by the Applicant for the Indian Point 2 operating license proceeding.

If it would be helpful, I can read this into the record. It's just a paragraph.

CHAIRMAN JENSCH: Show it to Ms. Chasis and ask her if that's the one she was referring to.

MR. TROSTEN: Certainly.

(Document handed to Ms. Chasis.)

MS. CHASIS: Yes, that's what I was referring to.

CHAIRMAN JENSCH: All right.

If you would, read it into the record, Mr. Trosten:

MR. TROSTEN: Proposed Finding 019 reads as follows:

"It is likely that the most precise population estimates will be obtained for the younger age groups of fish. On the basis of presently available information, Applicant anticipates being able to demonstrate conclusively by April 19, 1976, whether a 25 percent reduction in abundance of age group zero striped bass and white perch present in

blt 2

areas of the Hudson River adjacent to Indian Point has occurred as a result of Indian Point Unit No. 2 operations. A 95 percent confidence level will require not less than this amount of time in order to make such a determination, however, in view of the presently planned startup schedule for Indian Point Unit No. 2."

This testimony was offered in 1973.

Dr. McFadden, I show this to you.

(Document handed to the witness.)

CHAIRMAN JENSCH: Will you proceed, please?

BY MS. CHASIS:

Q First of all, Dr. McFadden, has that determination been made, and where is it presented?

A (Witness McFadden) WE have not examined the data to see whether this specific criteria decision has been fulfilled.

Q Do you intend to examine it and include it in your January 1977 report?

A I had not planned to do that.

MR. BRIGGS: Could I ask, in the absence of such an examination, do you have -- are you able to say now whether you believe it has been fulfilled, whether you can make that determination?

WITNESS McFADDEN: WE can make the determination

blt 3

for a specific population estimate. That is, we can determine whether a particular technique of estimating the size of the population gives us an estimate with that state of precision, plus or minus 25 percent, at the 95 percent confidence level.

What I am sure about our ability to do is to determine whether a composite of several different techniques of population estimation meets that level of precision for reasons of statistical methodology.

CHAIRMAN JENSCH: Proceed.

BY MS. CHASIS:

Q Page 2-25 in OT-1, in the second full paragraph, second sentence, it is stated that:

"The reduction in age-group 0 fish, if truly severe, would be readily detected by the research program."

MR. LEWIS: What is the page you're referring to?

MS. CHASIS: Page 2-25, OT-1, the Environmental Report.

MR. LEWIS: Thank you.

BY MS. CHASIS:

Q I'd like to know what "truly severe" means. How do you define "truly severe"?

A (Witness McFadden) "Truly severe" was defined in terms of the Staff's proposition that the reduction would

blt 4

be of the order of 30 to 50 percent due to entrainment alone. Since impingement mortality was also operative, one would have to conclude that the Staff was postulating reductions of some order greater than 30 to 50 percent.

Q. I'm now turning to page 13 of the December 7 testimony. In that last paragraph, which begins at the bottom of the page, you state that by applying latent root multiple linear regression abundance was not related to power plant water withdrawal.

You assume, do you not, or there is an assumption, that all variables tested bear a linear relationship? Is that correct? And that is the only relationship you were measuring for?

A. (Witness Campbell) Yes, ma'am. This is a linear multiple layer regression technique. That is an assumption of the model.

However, some non-linear significant factors can still be detected in a linear model.

Q. But not all?

A. Not all.

Q. Was there any testing for non-linear relationships between the variables?

A. We have not done a non-linear multiple regression.

Q. Do you intend to do that and report on it in the

blt 5

1 the January 1977 report?

2 A. No, we do not.

3 MR. LEWIS: I'm sorry. What was the answer to

4 that?

5 CHAIRMAN JENSCH: No.

6 WITNESS CAMPBELL: The last answer was no.

7 BY MS. CHASIS:

8 Q. Even if the relationship is non-linear, am I

9 correct that the effect can still be significant?

10 A. (Witness Campbell) For certain types of non-

11 linear relationships you can still determine -- you can still

12 detect significance.

13 Q. Would you answer the question?

14 A. Would you please repeat it?

15 Q. The question is: Even if a relationship is non-

16 linear, it can still have a great effect.

17 A. Certainly. You can have non-linear effects.

18 Q. Which are significant?

19 A. Yes, ma'am.

20 CHAIRMAN JENSCH: I take it that's related to

21 your studies. You could have significant effects even if

22 it were not linear.

23 Is that your question, Ms. Chasis?

24 MS. CHASIS: Excuse me, Mr. Chairman. I'm sorry.

25 CHAIRMAN JENSCH: I didn't know whether his last

blt 6

1 answer was a theoretical answer.

2 WITNESS CAMPBELL: It was a theoretical answer,

3 sir.

4 CHAIRMAN JENSCH: Excuse me?

5 WITNESS CAMPBELL: It was a theoretical answer.

6 CHAIRMAN JENSCH: But you're really trying to find

7 out something related to the studies now?

8 MS. CHASIS: That's right.

9 CHAIRMAN JENSCH: Would you match it up with

10 the study now?

11 MS. CHASIS: Let me ask a question.

12 BY MS. CHASIS:

13 Q The question is: Could there have been non-

14 linear relationships occurring which your multiple regression

15 analyses did not account for, did not measure, and which

16 still could have a significant impact on the population?

17 A (Witness Campbell) I still have to answer that

18 somewhat in a theoretical framework, and the answer is yes.

19 Q In the analysis that you performed in order to

20 get a correct assessment, do all the variables measured

21 have to be independent of each other?

22 A In this particular analysis, it is my understand-

23 ing that certain types of relationships within this analysis

24 need not be independent. And that is to say the statistical

25 term is -- well, multi-colinearities, and certain types of

blt 7

multi-colinearities are accepted within the statistical model. Other types of multi-colinearities will be thrown out as unacceptable.

However, we have made that determination through computer programs to detect whether all of the multi-colinearities were of the type which would be acceptable.

Q So you're saying that the variables set out here, even though they may be dependent and not independent of each other, are somehow acceptable and may be analyzed together in this procedure that you perform?

A Within the context of this model, that is correct.

Q Would that analysis be set forth in the January 1977 report?

A Yes, ma'am.

Q Now, returning to a subject which was explored yesterday on the bluefish predation, you indicated, I believe, Mr. Campbell, that at least one of the years for the data on which you relied was 1974. And in reviewing the Multiplant Report, which is OT-1, Supplement 2, Volume 1, page V-41, I believe it is stated that limited 1973 data suggested that bluefish do consume juvenile striped bass.

MR. LEWIS: I'm sorry, I can't hear.

MS. CHASIS: I'm reading now. Do you have the page.

WITNESS CAMPBELL: Yes, I do.

blt8

MS. CHASIS: It's the second full paragraph, second sentence, which states:

"Limited 1973 data suggested that bluefish do consume juvenile striped bass and white perch; however, more extensive studies in 1974 found almost no evidence of bluefish predation on striped bass and white perch, even though bluefish were very abundant in the Hudson River during 1974."

It goes on to state:

"Striped bass and white perch juveniles were less abundant."

Now, if this is one of the two critical years of data on bluefish predation that you collected, two years of data, how can you conclude that bluefish predation is a significant factor in controlling juvenile abundance of striped bass?

WITNESS CAMPBELL: Okay. That conclusion was based upon the multiple regression analysis and not upon the food habits data. Certainly bluefish do consume striped bass, among other things, within the Hudson River.

BY MS. CHASIS:

Q. And yet in a year when there was an abundance of bluefish, one of your indices, and a demonstrated small population of striped bass juveniles, there was absolutely no evidence of bluefish predation?

blt 9

A. (Witness Campbell) No, ma'am. There was bluefish predation during that year; however, the amount of predation was lower than in 1973, when striped bass were more abundant, suggesting that the bluefish utilized striped bass more during 1973 because they were more abundant than they did during 1974, when striped bass were less abundant.

This suggested to us the perhaps density-dependent type of predation that you would expect -- that you might expect.

Q. But you state here that there was almost no evidence of predation in '74, is that correct? I mean, you don't disagree with that statement?

A. That was based on the analysis that had been done up to that time. The amount of predation during 1974, based on those samples -- I don't have the specific figures on that right now. It was substantially less than it was in 1973.

Q. And the sampling for that was much more extensive in '74, was it not?

A. Yes, that's right.

MR. BRIGGS: That is sort of confusing, you know. As I understand it, you say that according to one regression analysis there is more predation when the bluefish population is high, is that right?

WITNESS CAMPBELL: When the striped bass

blt 10

population is high.

MR. BRIGGS: I understood you to say that in some of your analyses the striped bass population was low when the bluefish population was high, and I had inferred from that that the predation by bluefish was high when the bluefish population was high. Is that a reasonable inference?

WITNESS CAMPBELL: Yes, I think so.

MR. BRIGGS: All right, fine.

And now you say that this isn't quite right. In 1974, when the bluefish population was high and the striped bass population was low, that predation by bluefish was low; but in 1973, when the bluefish population was low and the striped bass population was high, the bluefish predation was high.

WITNESS CAMPBELL: We do not have estimates of the rates of predation per se, and this would seem to be the critical factor involved here.

Additionally, in the multiple regression framework, other variables are important in determining that relative abundance. So we can't rely solely on the bluefish as the regulatory factor.

MR. BRIGGS: Yes, I understand that.

DR. DAIBER: But, Dr. Campbell, in your December 7 testimony, page 14, towards the top of the page,

blt 11

the sentence reads:

"Abundance of predators was negatively associated with striped bass abundance, while egg production and rate of temperature increase had a positive relationship."

WITNESS CAMPBELL: Yes, sir.

DR. DAIBER: I am confused, also.

WITNESS McFADDEN: I'll offer a comment which is a possible explanation. We'll have to examine the individual data to be certain that this applied.

The possible explanation is that what's spoken about at the top of page 14 is a correlation analysis. In a correlation analysis a significant relationship can emerge despite some pairings of points which are inconsistent with the overall general pattern, so that if there are enough years in which high bluefish is paired with low striped bass in a given set of observations, it's possible for the same set of observations to also contain some years -- but it would have to be only a few years -- in which there are exceptions to that, in which high bluefish was not paired with low striped bass.

WITNESS CAMPBELL: Could I enter a couple of figures?

DR. DAIBER: Just a moment.

This would suggest that perhaps one should know

blt 12

what one is doing with these statistics in order to be able to interpret them validly as they're related to biological information?

WITNESS McFADDEN: That's correct, and I do think we have that knowledge, sir.

CHAIRMAN JENSCH: I think that the uncertainty here is "Now you see it; now you don't." If you don't like the results of the regression analysis, you use a correlation analysis. The net result is there's really nothing certain, as I infer from all of these statements orally and in writing between the December 7 testimony and OT-1, to indicate that there is no damage.

I think that's what you're trying to prove. I just think that every time you get into what appears, at least to the Board members here, as though there is some inconsistency between statements, you come up with some other analysis.

I think there's an endeavor in this proceeding by the Licensee to show that there's no damage by the Indian Point operation, but the net result is a total confusion that doesn't substantiate the Licensee's position.

If you care to comment on that or supply some other figures and look at some other data points, fine, let's see them. But I think the conclusions that have come in here have just led to a no account production and are

blt 13

1 wasting an awful lot of time, because we've got contradictory
2 statements.
3 MR. TROSTEN: Mr. Chairman, with all due respect,
4 sir, we live in a world of uncertainty. When one compares
5 the uncertainties that were present in the Staff's analyses,
6 which were based on a profound of data, with the uncertainties
7 that remain now, I submit, sir, that there is not an adequate
8 basis for your statement.
9 CHAIRMAN JENSCH: WE'll be glad to have your
10 arguments and will be glad to consider them.
11 I think the only point we're trying to indicate
12 to you now is there's an opportunity for you to prove what
13 you're endeavoring to prove. I think the Board has indi-
14 cated that there is such confusion in your presentation that
15 it doesn't establish your point.
16 We're not going back and trying the Indian Point
17 2 decision. It's been reviewed by the Appeal Board, which
18 has given you an extra year's time that the Licensing Board
19 didn't think was justified; but we're not going to try that
20 over again. We're taking just what's right here now as the
21 basis of what you're seeking to establish.
22 I just think that you should know it now, because
23 if there are some other factors that should be brought in,
24 some other analyses, let's see them now, or we'll have to
25 proceed upon the record as we have it.

blt 14

Will you proceed, Ms. Chasis? Did you have some other questions?

WITNESS MAY: Mr. Jensch, may I make a comment in response to this?

CHAIRMAN JENSCH: Surely.

WITNESS MAY: We understand, for instance, the Multiplant Report to be a progress report of the results up to that point. And, as far as the work that we're doing is concerned, our intentions here are to let you know what we expect to be able to present in a synthesis report in January, which has been referred to as the January report, in which we hope to be able to boil down what appears to be inconsistencies and come up with a final synthesis statement on this.

I certainly appreciate the problems of having to look at progress reports and the results of annual studies and not come together to a composite type of synthesis.

CHAIRMAN JENSCH: You're suggesting that we should wait for the January 1977 report before we decide this matter, is that right?

WITNESS MAY: I'm suggesting it is my understanding that it was to bring you up to date on where we were to date on what has been done and what will be forthcoming in the synthesis.

I believe Mr. Briggs requested a synthesis in

blt15

October.

MR. BRIGGS: This is a bit of a diversion. I need to look at a dictionary, but when someone tells me he's synthesizing the data I'm wondering whether he's presenting us with synthetic data.

(Laughter.)

CHAIRMAN JENSCH: To define an analysis, as I understood the term yesterday, it's a procedure that goes on which attempts to describe something. I guess it's a matter of how you look at it.

WITNESS MAY: I use the word in terms of looking-- of bringing all the years together.

MR. BRIGGS: I understand.

CHAIRMAN JENSCH: Are you ready to proceed, Ms. Chasis?

BY MS. CHASIS:

Q I would like to move on to the empirical assessment of vulnerability.

MR. TROSTEN: Mr. Chairman, I'm sorry. Before we go on to the other questions, Dr. Lawler has some comment.

CHAIRMAN JENSCH: Go ahead, Dr. Lawler, and make your statement.

WITNESS LAWLER: I'd like to add a thought to what appears to be some confusion here in this whole question of is there bluefish predation or isn't there.

blt 16

If I understood Mr. Briggs --

MR. BRIGGS: There really isn't any confusion as to whether there is some bluefish predation or not. It's just, in my mind, at least, it's just some confusion in the reliability or accuracy of the analysis that's made.

One set of data seems to show one thing, and another set of data seems to show something else. I don't think there's an argument as to whether bluefish eat striped bass.

End 4

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DAV 1
t.5

WITNESS LAWLER: Well, I think that if I understood your comments correctly, the puzzling thing is that in some instances, it seems that there is a high bluefish concentration and a low striped bass concentration, and in other cases there's the reverse. And, in even a third set of cases, there may be -- let's call it moderate levels of both densities.

And I think all of this fits very properly into the -- virtually every predation model that you see, which always involves the product of the density of the prey and the density of the predator. So that if predation is going on, what you will have is an oscillating kind of calendar, where in some years, the population of the prey tends to be high, because the predator population is down. And then, in other years, you'll have the reverse situation.

And all of that can be fit quite nicely into the kind of standard prey/predator model which always involves a product of the densities of both species.

MR. BRIGGS: Well, thank you.

MR. TROSTEN: Mr. Chairman, Dr. Campbell wishes to supplement his answer to Dr. Daiber's question.

CHAIRMAN JENSCH: All right.

WITNESS CAMPBELL: Yes, sir.

On the reference page in supplement number 2, page V-41 that Ms. Chasis referred to, the very last sentence of the second complete paragraph; we've stated that, in 1974,

1 the one year that was at issue there, being slightly different
2 than 1973, that the bluefish primarily consumed bay anchovy,
3 American shad, and Atlantic tomcod. Striped bass, white
4 perch juveniles were less abundant, and concentrated further
5 upstream in 1974, and were essentially less available to blue-
6 fish predation.

7 We find, in looking at the abundance or relative
8 distribution of bluefish, that they are located primarily in
9 that lower river region where most -- well, what we were talk-
10 ing about earlier; that lower river region is more affected by
11 the salt water. And at this point in the game, when this data
12 had been looked at, many of the fish, the striped bass, were
13 located in a different area of the river.

14 I have checked into the situation in August in the
15 lower river, and we added a 33 percent frequency of occurrance
16 in bluefish stomachs of striped bass. So that, for the areas
17 where the bluefish and striped bass were found together, we did
18 have that high predation. There just weren't as many striped
19 bass in the lower river during that period in 1974.

20 MS. CHASIS: You're talking about August of '74, or
21 another year?

22 WITNESS CAMPBELL: August of '74.

23 MS. CHASIS: But overall -- 33 percent in the lower
24 river. But if you looked at the overall population, it was
25 very low?

DAV3

1 WITNESS CAMPBELL: For that time period, the overall
2 population was low, because the striped bass were located up-
3 river.
4 MS. CHASIS: So that there may be another factor
5 than either abundance of bluefish or of the striped bass which
6 enters into the relationship. Is that correct?
7 WITNESS CAMPBELL: Yes, ma'am. And that's why we go
8 to multiple techniques, rather than the simple techniques that
9 we used earlier in the study.
10 MS. CHASIS: But the fact is that you've got basi-
11 cally three years of data, actual empirical data, concerning
12 predation, two of which are discussed in this report. And in
13 one of them, there is some evidence with relatively little
14 sampling. In the second year, there was extensive sampling, and
15 still very little evidence.
16 So that in two out of the three years, the empirical
17 data is not very strong on supporting the bluefish predation.
18 WITNESS CAMPBELL: The empirical data is irrefutable
19 that bluefish consume striped bass.
20 MS. CHASIS: Well, I'm talking about the rate of
21 predation.
22 WITNESS CAMPBELL: The rates of predation; we do
23 not have strong data on the rates of predation. We do have
24 that analysis, which suggests that bluefish are negatively
25 related to the abundance of juvenile striped bass. And a

1 reasonable hypothesis as to why that would be true would be
2 the process of predation.
3 MR. BRIGGS: Well, again you confuse us. Because
4 there seems to be that other factor, the location of the striped
5 bass, that may be more important in a population of bluefish.
6 And you just say that that's fine, that our analysis of the
7 relationship between the population of bluefish and the popu-
8 lation of striped bass gives us a negative relationship.
9 WITNESS CAMPBELL: Yes, sir. We have a negative
10 relationship, and the two other factors that were included in
11 there as falling out as significant were the temperature in-
12 crease factor and the egg production index.
13 MR. BRIGGS: And the location of the striped bass.
14 WITNESS CAMPBELL: Location was not considered as
15 an independent variable,or as a dependent variable.
16 MR. BRIGGS: So it just wasn't considered. But you
17 offer us this explanation that the reason that the bluefish
18 didn't eat so many striped bass was because the striped bass
19 weren't where the bluefish were.
20 WITNESS CAMPBELL: For 1974, I think that's a
21 reasonable hypothesis.
22 MR.BRIGGS: But you only have one data point now, so
23 you can't make any relationship. Is that right?
24 WITNESS CAMPBELL: Yes,sir.
25 MR. BRIGGS: Okay.

DAV 5

1 BY MS. CHASIS:

2 Q Now, in the empirical assessment of vulnerability

3 which is made, why is it that that assessment has not been

4 used, had the '74 data plugged into it and presented? Why has

5 that not already been done?

6 A (Witness Campbell). Could you refer me to the par-

7 ticular item we're talking about?

8 Q I'm talking about this whole empirical assessment

9 method.

10 MR. TROSTEN: What pages, please?

11 MS. CHASIS: Well, it starts on page 15, the discus-

12 sion ofthe methodology, and it's indicated that that approach,

13 utilizing the '74 and '75 data, will be presented in the 1977

14 report. And I'm wondering why we couldn't have had that

15 assessment already, utilizing the '74 data.

16 (Pause).

17 WITNESS CAMPBELL: To some extent, we have had that

18 available in the supplement to volume 1, Section 6. And I

19 believe we do have some 1974 data in there; at the time this

20 report was prepared, as I mentioned earlier, all of the 1974

21 data had not yet been analyzed.

22 BY MS. CHASIS:

23 Q But I'm wondering why, subsequent to that, there's

24 been over a two-year -- no, I guess a year and a half lapse

25 since this was issued. That analysis has not been undertaken

A (Witness May). Now, you're talking about why hasn't the '75 data —

Q '74.

A Well, the completion of the '74.

Q That's right. And utilizing the equilibrium reduction method.

A (Witness Campbell). Those are two different areas.

Q But that's plugged into the direct assessment.

A But I thought we were talking about vulnerability assessment first of all.

Q But I thought the two were related.

A No.

Q They're completely independent?

A Right.

Q Okay, then let's take one first.

Why haven't we had an analysis of the '74, the full '74 data?

A (Witness May). All right.

The full '74 data has been analyzed, and it is in the process now of completing the final report. That should be coming out. Well, you know, I can't say exactly, but within the next month.

Now, part of this, as far as we're concerned, is a matter of scheduling, and it's a matter of doing the work, and at the same time having another work commitment, which is to

1 get the '77 report out. It's just a matter of allocation of
2 manpower.
3 Q I see.
4 That takes precedence over getting the individual
5 reports out?
6 A Yes. Con Ed provides us the schedule, and you may
7 have to ask them.
8 Q I see.
9 A (Witness McFadden). There's another consideration
10 that relates to the identification on page 16 of analyses of
11 data collected during '74 and '75. Some analyses have already
12 been presented for the '74 data, as Dr. May points out. There
13 are other specific statistical analyses which we deliberately
14 delayed so that we could apply them simultaneously to the '74
15 and the '75 data.
16 Now, those are what I would term the more precise
17 and quantitative statistical analyses, as contrasted with the
18 graphical displays that have been developed in the past reports.
19 Q But you utilized the direct empirical assessment
20 approach on the 1973 data, and presented it in the Storm King
21 proceedings, did you not, Dr. McFadden?
22 A Would you repeat that question?
23 Q You utilized the direct assessment methodology,
24 based on the 1973 data, and made a presentation on that in the
25 Storm King proceedings, did you not?

A Based on 1973 data.

Q So you could have done the same thing for 1974.

A Except that there has been a revision of the method of estimating the impact,and evolution of the methods by which impact is calculated from the time that it was developed in the Storm King Mountain proceedings.

Q Well, I'm not arguing that there might not be refinements which could come through delay. But you could have made that assessment for the full '74 data. Is that correct?

A (Witness May). I believe it was just answered. I believe that it has been done. But apparently, scheduling and the work allocations that we follow -- you know, this report is due out, you know, next month.

Q Now, in making this assessment, there's no need to -- this kind of assessment could be made whether or not the plant was operating. Is that correct?

A (WItness McFadden). You'll have todistinguish between vulnerability assessment and impact assessment when you're asking that question.

Q Well, I'm referring to --

(Pause.)

-- the empirical assessment of vulnerability is what I'm referring to.

A (Witness Campbell). Pardon me?

Q THe empirical assessment of vulnerability.

(Pause.)

A The empirical assessment of vulnerability -- in some ways, you might say you could do it whether the plant were operating or not. However, if the plant is having some influence on the population or the distribution of the organisms at the time, then it really should be done while the plant is operating.

Q By the way, do you consider '73 to be post-operational for purposes of your analyses,or pre-operational?

A (Witness McFadden). 1973, for Indian Point, is considered pre-operational.

Ms. Chasis, just so that the record is clear, are you clear on the distinction between vulnerability assessment and impact assessment? I'd be happy to offer a brief definition.

Q I don't think so. I think I'm clear on what they mean.

(Pause.)

Dr. Lawler, in connection with the real-time model which you have developed, youlindicate that the empirical data collected in '74 and '75 will be utilized in your model, and presented in the January '77 report. And I'd like to ask you the same question. Why could not this model have been run utilizing the '74 data prior to presentation of this January '77 report?

A (Witness Lawler). First of all, Ms. Chasis,are you

1 referring to some sentence?

2 Q Yes. I'm referring -- it's a bit confused; it's

3 labeled page 25. I think it should really be 26. It's the

4 second full paragraph, first sentence.

5 A Okay. And your question is, why weren't runs made

6 with the 1974 data before this time?

7 Q That's right; and presented.

8 A And presented to whom?

9 Q To the parties and to the Board.

10 A Well, I wasn't aware of any requirement, request,

11 or other to do so.

12 Q Well, I guess what I'm wondering is, why these

13 analyses have been held up for inclusion in the 1977 report,

14 and why they haven't been coming forth.

15 MR. TROSTEN: What analyses?

16 MS. CHASIS: The model runs utilizing the real-time

17 model, which I gather has been -- is now fully developed and in

18 operation.

19 WITNESS LAWLER: Well, let me try to give you some

20 answers that may satisfy your inquiry.

21 First of all, the data in '74 was not out until well

22 into '75.

23 BY MS. CHASIS:

24 Q I understand.

25 A (Witness Lawler). Every year, we succeed in getting

DAV11

1 the data from the prior year out a little earlier than the
2 prior set of years to that one. So I can't tell you the exact
3 date that this data, that the '74 data, was ready for analysis.
4 But it was well into '75.

5 Secondly, the development of the real-time model.
6 Again, I cannot give you the fixed data at which time we felt
7 we were fully operational on that model. But it certainly was
8 into '75, that's for sure.

9 Okay. So you're somewhere between, I would say,
10 late '75 and somewhere in '76 before anything could have been
11 done with the '74 data, as far as runs, etcetera, go. Now,
12 the schedule for doing the work that was to go into the January
13 '77 report was developed, or begun to be developed, sometime
14 in early '76. So from that time forward, all the effort was
15 directed at providing the results in the January '77 report.

16 Q I see.

17 So that even though the data and the model were
18 ready, the decision was made to wait, and to present those
19 results in the January '77 report, rather than at an earlier
20 point?

21 MR. TROSTEN: Mr. Chairman, I object to this contin-
22 uing line of questioning, for the following reasons.

23 Ms. Chasis is, or should be, aware that the techni-
24 cal specifications for this plant provide a schedule. Con Edi-
25 son testified with regard to the schedule for presentation of

1 this, and we have been operating on the schedule.

2 Now, the continued repetitious questioning, attempt-
3 ing to bring out Ms. Chasis' point that Con Edison should have
4 been following a different schedule than is called for by the
5 technical specifications, and on the program that has been
6 laid out before the Commission, I think, is just going too far.
7 I haven't objected; I've allowed her to question to bring out
8 her point. But at this point, really, I think it's going too
9 far, and it should be shut off. And I object.

10 MS. CHASIS: Your Honor --

11 CHAIRMAN JENSCH: Let me see if I understand what
12 his objection is.

13 Here, Licensee is seeking an extension of once-
14 through cooling. And they brought in a report which reflects
15 a certain amount of data. The Hudson River Fisherman's Associa-
16 tion, as I understand it, is saying that if you really wanted
17 to have data that would be related to this request by the
18 Licensee, you would have brought in some of these things that
19 are pending, but which have been deferred because of a priority
20 on the '77 report.

21 But, she's trying to establish that these factors
22 that she is asserting are important for consideration of an
23 extension of once -through cooling. Is that your position?

24 MS. CHASIS: Well, it's my position that this mate-
25 rial could have and should have been provided in making an

DAV 13

1 assessment of whether, in fact, the data they have collected
2 merits an extension and a weighting of this January 1977
3 report.

4 CHAIRMAN JENSCH: In other words, when you're making
5 inquiry about -- oh, has that been put over to '77, you're
6 implying that if they were trying to get an extension of once-
7 through cooling, they would have brought it in here. Is that
8 correct?

9 MS. CHASIS: Yes.

10 CHAIRMAN JENSCH: Well, that's been the understanding
11 I have had of these questions. Now, it's true, licensee has a
12 certain schedule set out in the license of the technical speci-
13 fications. That's fine. I didn't understand that she was
14 attacking that, or seeking to have it varied in any respect.
15 She's trying to say to you, if you're seeking a two-year exten-
16 sion of once-through cooling, you would have brought in a lot
17 of these things that would have been more controlling as to the
18 assessment of the river situation. That's why she's saying,
19 why didn't you bring it in here?

20 Well, you say, we've got another schedule. Well,
21 sure, you've got another schedule. But you have run in this
22 thing after the Appeal Board gave you an additional year over
23 what the Licensing Board felt was justified. And now, we're
24 back for two more. And I expect, as long as we have hearings,
25 that we'll get requests every time we finish with one case to

1 another. And I think what she's saying is, why don't you
2 bring in the stuff that really counts?
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TAKE 6
JRB:jrbl

MR. TROSTEN: Mr. Chairman, in light of the position of the Hudson River Fishermens Association I think that suggestion is totally out of place for the following reasons:

Con Edison filed this application in June of 1975. There was little if any action on the part of anybody with regard to this for approximately a year, including the Hudson River Fishermens Association.

CHAIRMAN JENSCH: Including the licensee?

MR. TROSTEN: No, sir. The licensee during all of this time was trying to generate the information to produce following a schedule. Once does not change a seven-year program, Mr. Chairman, as you know, in midstream immediately to produce information that some party may possibly think is important.

Had a suggestion been made in the fall of 1975 that it was very material to a decision by this Board that a certain run had been done, well, perhaps we could have had that information. But to wait for 18 months after the filing of an application, when the final report is approximately ready to be submitted, and then suggest that six or eight months ago -- and these things take time -- we should have done something else, I submit is totally misplaced on the part of Ms. Chasis.

CHAIRMAN JENSCH: You may disagree with her

jrb2 1 position, and you surely are entitled to do it; but I think
2 what she is saying is that these are important matters that
3 all these gentlemen will agree are important,
4 because they are making studies of them. And she is contend-
5 ing -- and you may not agree to this, -- but she is contend-
6 ing that for a valid assessment of your request for a two-
7 year extension that these data would assist in a better
8 assessment of the Hudson River situation.
9 You are entitled to disagree entirely, but it
10 does not rule out her contention. And she can still make the
11 assertion that what would really be important is something
12 that apparently does not depend upon correlation analysis,
13 vulnerability assessments, impact assessments, linear
14 correlations, all kinds of calculational procedures that are
15 confusing and confounding and extending and protracted,
16 but that you come in with something that is actually related
17 to what is happening.
18 And you do have data, and you have made predictions
19 years ago you were going to have these things; and we get
20 the same kind of an answer -- well, we're studying it. We
21 only need 40 more years and we'll know every molecule of
22 water in the river. But we are never going to get a full
23 study of everything. And we have to move on from somewhere.
24 And if you have something that is worthwhile
25 bring it in. That is her contention.

jrb3 1 MS. CHASIS: Mr. Chairman, I would just like to
2 respond to what Mr. Trosten said.
3 It is not our application. It is their
4 application. And I think in terms of assessing whether or not
5 they should be given the time must be looked at as to what
6 they could have come in with already, and not just hold out
7 this great report which is to be forthcoming in January of
8 77.
9 It is not the burden of Hudson River Fishermens
10 Association or any other party; the burden is on Con Edison
11 to come forward with the data, the analyses, which it has,
12 and could have presented.
13 CHAIRMAN JENSCH: Yes, but he's saying to you
14 you could have made his case for him.
15 MS. CHASIS: That's right.
16 CHAIRMAN JENSCH: You are entitled to your
17 contention, and he is to his.
18 Let's go on. Objection overruled.
19 MR. TROSTEN: Could we have the last question?
20 CHAIRMAN JENSCH: Restate the last question.
21 MS. CHASIS: I think an answer was received.
22 WITNESS LAWLER: One thing I would add to my
23 answer is that yesterday in my testimony I did provide
24 the testimony to the effect that the runs on the 74 and 75
25 data do provide the same uresults, or essentially the same

jrb4

1 level of impact estimates as were originally submitted in
2 the Environmental Report.
3 BY MS. CHASIS:
4 Q Yes, that's different from having the actual --
5 your statements are afforded different weight than reports
6 which are subject to cross-examination.
7 Now, what -- let me ask you this question:
8 What F factor data for 1974 from Indian Point do you intend
9 to utilize?
10 A (Dr. Lawler) The F factor data from Indian Point
11 1974 and 1975 is used, from Roseton and Bowline for 74 and
12 75.
13 Q I have reference now to the NYU progress report
14 for 74 which I believe contains a discussion of relative
15 river intake and abundance. Do you have that available to
16 you?
17 I would like to refer you to page 300, and to the
18 third full paragraph on that page, where it states that the
19 mean abundance of eggs in river samples was less than those
20 at the plant by a factor of 5 at the Unit 1 intakes and at
21 the discharge canal by a factor of approximately 10 at the
22 Unit 2 intakes.
23 Then going over to page 32, the conclusion is
24 reached that because the river sampling differs substantially
25 from the intake and discharge sampling, --

jrb5

1 A (Dr. Lawler) What page are you on?

2 Q Now aI am at 302, particularly the last sentence

3 that because of sampling is different, the sets of data

4 forthcoming are not comparable.

5 Now, the statement is made, as I understand it,

6 only with respect to the eggs; but first of all, are you

7 using the F factors, the data from this report, in your

8 model?

9 A I can answer that, Ms. Chasis -- yes. We are

10 using the data from NYU toward the egg factors. The egg

11 factors at Indian Point for 1974 are greater than 1, and

12 the F factors for the other life stages, namely, yolk-sac

13 larvae, post yolk-sac larvae, and the juveniles, are all

14 substantially less than 1.

15 Q Referring you to the same report, page 301, the

16 table, which indicates the differences in striped bass

17 abundance at night among river, Units 1 and 2 intakes, and

18 discharge canal; and as I understand it, there is no

19 difference in river abundance for yolk-sac larvae, there's

20 no difference in abundance between river and intake for

21 yolk-sac larvae, there is a difference for discharge between

22 the discharge densities and river densities.

23 Therefore, for larvae there is no difference

24 between river and discharge, and there is some difference

25 river and intake.

jrb6

A (Dr. Lawler) That's the yolk-sac larvae.

Q Well, yes, and then if you look at the larvae you see that there is no difference between the discharge concentration, concentration in the discharge, and the river; there are differences between the -- between the intake and the river.

Is that correct?

A That's right.

These are night values.

Q Well, as I understand it, those are the primary values which you obtained, that was when most of the river sampling occurred?

A That's what was used in the intake. During the day values for the transect in the very near vicinity of the plant, as opposed to the overall river sample is what we used to calculate the F factor.

Q I see.

Now, given that the statements made in this report about the lack of comparability of data, how do you justify using exactly that data to derive your F factor?

A Well, you will have to show me where the statement is made.

Q At the bottom of page 302.

Let me ask you, did you read these pages?

CHAIRMAN JENSCH: Let him finish. I think he's

jrb7

1 going to give you an answer.

2 WITNESS LAWLER: Did I read these particular

3 pages? I don't recall whether I personally read these

4 particular pages.

5 I am aware of the statements.

6 What we do in estimating the F factors is to take

7 all of the information that we have, both in our own

8 sampling program, as well as the NYU sampling program, as

9 well as any other program for which information is available

10 in the vicinity of the plant we're making the estimate at;

11 and put it all together.

12 And in some cases we have to make judgments on

13 whether you can match the data or whether you can't, because

14 of this problem of different gears, of gear located in a

15 fixed position as opposed to moving through the river and so

16 on and so forth.

17 And the final value that we select for that

18 does reflect the kinds of problems that are referred to here.

19 Secondly, it does reflect the use of our own

20 data in the river as well as data, in this case, collected

21 by NYU.

22 Q That's for other plants, is it not?

23 A Well, I'd have to check this point precisaly, but

24 on some of the Indian Point analyses have included the

25 sampling program that we have had operational in the -- in that

jrb8

1 vicinity of the river. We have made substantial samplings
2 in the river, because there are other plants across the
3 river where we've taken our own data, as well as the data
4 of NYU in computing the F factors for the various years in
5 question.
6 Q Now, do you have any idea why it took so long for
7 this 73 data on F factors at Indian Point to come out in
8 this form, the report issued August 76? I am referring to
9 another report now.
10 MR. TROSTEN: Would you show us the report?
11 MS. CHASIS: It is "Hudson River Ecosystem
12 Studies, Effects of Entrainment by the Indian Point Power
13 Plant on Biota in the Hudson River Estuary".
14 CHAIRMAN JENSCH: Prepared by whom?
15 MS. CHASIS: New York University.
16 CHAIRMAN JENSCH: Finish up on your last answer,
17 Dr. Lawler; in other words, you didn't use the NYU report
18 as I understand it on egg factors for your F factors?
19 WITNESS LAWLER: No, it would not be true to say
20 we did not use the NYU report.
21 I am saying that the NYU information is not the
22 only information we used.
23 CHAIRMAN JENSCH: Can you identify some record
24 information which you did use?
25 I think the problem she has is that there's some

jrb9

1 reference to the NYU report having charge of this work, so
2 they write reports and they come up with some factors that
3 she doesn't believe would justify F factors. And here we've
4 got something over here, and we have something there.
5 What was it?
6 WITNESS LAWLER: I thought I did.
7 In the Indian Point vicinity our -- that is to
8 say LMS sampling program -- is also active in the river.
9 CHAIRMAN JENSCH: What's LMS?
10 WITNESS LAWLER: Lawler, Matusky, Skelly Engineers.
11 We have for the years in question sampled
12 extensively the area of the Roseton plant, which is some
13 20 miles above Indian Point, the area of the Bowline plant,
14 which is some six miles below Indian Point, also the vicinity
15 of Indian Point because the Lovett plant is directly across
16 the river. So we have information on that area as well.
17 Secondly, the other point to make -- one thing I
18 am saying is that that information is used in conjunction
19 with the NYU information.
20 Secondly, the NYU information referred to by
21 Ms. Chasis in a lot of respects of qualitative, but it's
22 the statements you are referring to that are qualitative;
23 and they have to be converted into a quantitative estimate,
24 which the F factors are.
25 So we are certainly using the NYU information.

jrb10

CHAIRMAN JENSCH: Have you see the latest report that was just referred to, just identified?

Do you have some particular page in that to which you could direct his attention?

BY MS. CHASIS:

Q Page 49.

This is a report which came out in 76 with 73 data.

A (Dr. Lawler) You asked me a question, do I have any idea why it came out in 76? My answer is no.

Q Now, I would like to draw your attention to page 49, the second full paragraph.

It states, "The results and conclusions contained in this report, based upon a single season's sampling of striped bass life history stages, cannot provide an estimate of real or potential impact of the Indian Point Power Station on Hudson River striped bass."

MR. TROSTEN: Read the next sentence, too?

BY MS. CHASIS:

Q "The information herein, by inclusion in models designed to provide such estimates, serve to increase the data base required for more refined model estimates".

Does that first sentence throw any question as to the utility of the 73 data, or indicate reservations

jrb11

on the part of NYU as to the utility of estimating real or potential impact?

A (Dr. Lawler) I can't read NYU's mind, but, certainly, the sentence doesn't say that.

The sentence simply says the results and conclusions in this report, which I don't know what this report contains.

Q This report is the F factor data.

A Furthermore it says it cannot provide an estimate of real or potential impact.

Now, that can mean a lot of things: it can mean the report simply did not go as far as going through a model or some type of analysis to provide an estimate of impact. I would say that with the information gathered over a single season you can provide an estimate of real or potential impact, as was done in 1973, and testified to in the FPC proceeding in 1974, and also submitted in the Environmental Report.

Q So you might disagree with that statement?

A You have to understand that NYU has never been asked to make an estimate of the impact of the Indian Point power station.

Q Yuh, but they say "used" in making an estimate.

A It does not, it says the results and conclusions contained in this report cannot provide an estimate. I

jrbl2

1 would concur with that statement, because I do not think
2 the results and conclusions in this report, which results
3 by your comment are F factor results -- it's insufficient;
4 because that isn't all you use, as we have demonstrated on
5 any number of occasions.
6 So for NYU to say that the results and
7 conclusions in this report cannot provide an estimate is
8 true; they can't.
9 For me to say that means I can't use the F factor
10 information and the other information that has been developed
11 in a given year, and make an estimate, is incorrect.
12 CHAIRMAN JENSCH: Excuse me just a moment.
13 Just for the sake of the record, if you would
14 tell us, how does NYU get into it? You just said NYU was
15 never asked to make an assessment at any point at the
16 Indian Point area. I don't know how large that is, whether
17 it goes down to Mile 12 or 27.
18 Who employes NYU? Is this Con Edison's employment?
19 What are they directed to do?
20 MR. TROSTEN: Yes, Mr. Chairman.
21 New York University, Institute of Environmental
22 Medicine, is one of several contractors working on this
23 program. Dr. Lawler can describe, and Dr. Marcellus,
24 together, can describe the scope of the NYU effort.
25 Would you like a description?

jrbl3

CHAIRMAN JENSCH: Since he has just made a reference that he has never been asked to do something, who asked them to do what?

MR. TROSTEN: Con Edison is the one.

CHAIRMAN JENSCH: Are they doing it up and down the river, then, or a certain area?

MR. TROSTEN: No, sir, no, sir.

NYU, I will say, subject to correction by witnesses, is responsible for evaluating certain of the entrainment information at the Indian Point power plant.

CHAIRMAN JENSCH: Just entrainment at the Indian Point plant?

MR. TROSTEN: That, I believe, is correct, unless they have some other river collection information.

Is that correct?

WITNESS MARCELLUS: NYU collects entrainment data and river transect data directly in front of Indian Point.

MR. TROSTEN: They have a specific and relatively limited assignment.

CHAIRMAN JENSCH: Well, then, they are making some assessment of the Indian Point area?

MR. TROSTEN: They are assessing the affects of entrainment at the Indian Point power plant.

CHAIRMAN JENSCH: And the other one was transect?

jrb14

WITNESS MARCELLUS: Transect data.

CHAIRMAN JENSCH: What's that mean?

WITNESS MARCELLUS: Collecting samples are various locations across the river at Indian Point.

MR. TROSTEN: Mr. Chairman?

CHAIRMAN JENSCH: Excuse me. Let me ask Mr. Trosten: then the statement to which Dr. Lawler's attention was directed, would it be your view that that statement that they can't use the estimates in the Indian Point area?

MR. TROSTEN: No, sir.

Let me try this again.

CHAIRMAN JENSCH: I understand Dr. Marcellus said it was to get entrainment and transect data. What kind of transect data would there be -- F factors? Larvae? Yokl-sac?

WITNESS MARCELLUS: NYU's transect data includes collection of various life stages of eggs, yolk-sac larvae, post yolk-sac larvae, perhaps some juveniles; and that data, along with the data collected by Texas Instruments, that collected by LMS in this programs for other utilities, combined, can be used for the purposes of impact assessment.

CHAIRMAN JENSCH: Well, I don't want to get into a long contract, but is there some brief summary of what they are supposed to do?

jrb15

MR. TROSTEN: Yes.

CHAIRMAN JENSCH: I don't want to get, you know, who signed it and all that; but just give us something from the contract so we will know.

MR. TROSTEN: Certainly.

CHAIRMAN JENSCH: I understand Dr. McFadden may have indicated to Dr. Lawler that they have never intended to do anything at Indian Point; and I understand they are doing something at Indian Point.

MR. TROSTEN: Mr. Chairman, we will be happy to do that. We have testified to this before.

CHAIRMAN JENSCH: We have kind of a new record here.

MR. TROSTEN: Yes, we will be glad to do it.

Let me just say at this point, NYU was not responsible for defining the impact of power plant operations; they are responsible for determining the effects on organisms of passage through the power plant at Indian Point. And they are also responsible for collecting the data Dr. Marcellus mentioned.

Now, we will be happy to provide you with a statement as to the scope of NYU's responsibilities.

CHAIRMAN JENSCH: All right, I won't interpret that they are supposed to determine the effects of power plant operation because you said they have to measure

jrb16

1 something, the character of the organisms, or something.

2 MR. TROSTEN: That's a very different point,

3 Mr. Chairman.

4 CHAIRMAN JENSCH: Is that still impact?

5 WITNESS MARCELLUS: Effects of power plant

6 entrainment, you can look at it from the point of view of

7 survivability of organisms in passage through the plant.

8 NYU is addressing that subject.

9 With respect to the impact on the river, NYU

10 has collected a portion of the data that is used for

11 impact assessment.

12 MR. TROSTEN: In other words, Mr. Chairman, we

13 are distinguishing between effect on population and

14 effect on specific organisms that pass through the plant.

15 That is the point. That's the distinction I was trying

16 to draw.

17 CHAIRMAN JENSCH: Fine, we'd like to see a summary

18 of the contract.

19 BY MS. CHASIS:

20 Q Dr. Lawler, you state the NYU document which you

21 utilize to derive F factors, it's qualitative, not

22 quantitative? You mean you did not actually take ratios

23 of abundance or density found at the intake and discharge

24 canals as compared to the river concentrations as observed

25 by NYU?

jrb17

A (Dr. Lawler) Yes, we do do that.

When I said that the statements you referred to are qualitative, I didn't say they had no data, or we didn't use it.

They do have data, we do use it.

Q You use it as they present it?

A That's correct.

CHAIRMAN JENSCH: We have not had a recess this morning, and we are alternating reporters and alternating with witnesses; the only one who really carries the burden is the interrogator.

MS. CHASIS: We could continue.

WITNESS MAY: Do we have a choice? I need to be excused for a moment, if I could.

(Laughter.)

CHAIRMAN JENSCH: We don't have to do that, we'll give him five minutes and everybody can raise their hand.

(Laughter.)

(Witness May withdrew from the hearing room.)

BY MS. CHASIS:

Q Dr. Lawler, in your effect of derogations do you make any correlation or account in any way for the difference which may exist between the transect concentration and the river segment concentrations?

This was a criticism that was leveled.

jrb18

A (Dr. Lawler) I am aware of the criticism that was leveled. If you recall, it was leveled based on the fact that the segments in the transport model were some ten miles in length, and the proposition on the part of the Staff was, therefore, the -- in computing F factors, the river concentration that was used should have reflected that ten mile length rather than the specific transect data.

We did not agree with that concept. However, more to the point, the real time model segments are much shorter, on the order of two miles in the vicinity of the plants, and we believe that the transect data is quite appropriate, the appropriate data to use for F factors in the real time model.

Q So that you have not attempted to correlate transect and average concentrations for the reasons you state?

A What I am saying is the segment concentration and the transect concentration are the same for the segment that is being used now.

At some time in the past in the transport model segments were ten miles in length, and it could be argued as to what was the proper concentration to use for that river segment. It's a moot point at this point.

Q How do you know? In other words, you have

jrb19

1 examined and developed and you can show that the segment
2 average concentration is equivalent to the transect average
3 concentration?
4 A What I am saying is, the transect, the length of
5 the transect is such that it covers a, you know, reasonably
6 good percentage of the segment that's being used in the
7 model.
8 Q What percentage?
9 A Well, the transects can run anywhere from a
10 quarter of a mile to a mile; and you are talking a segment
11 length of probably about two miles in the vicinity of the
12 plant. So you are covering virtually 50 percent of the
13 transect.
14 Q You may be?
15 A I think in general your transect lines are
16 probably toward the longer end than toward the shorter.
17 Q Is it consistent? It varies, does it not?
18 A It can vary, yes; because based on the tide.
19 (Witness May reentered the hearing room and
20 resumed his place at the witness table.)
21 Q You have made no attempt to correlate? You
22 assume because the transect is a greater percentage of the
23 segment than previously, you do not need to differentiate,
24 or account for any differences; is that correct?
25 A Well, we're simply saying is that the transect

jrb20

is the sample by which you characterize the segment of concentration; there is no other measure.

Q How about the river-wide sample?

A That is what I am referring to.

Q I am not talking about transect; I am talking about the longitudinal sample?

A Oh, no, we have not made that correlation, to the best of my knowledge.

Q Do you assume 100 percent withdrawal from the upper quadrant?

A No, we do not.

Q What percentage?

A The percentage withdrawal is roughly 60 percent from the upper half of the river, and roughly 40 percent from the lower half.

This does reflect a change in the approach we have taken in the years past, and it reflects the findings in the LaSalle model study, which show that more of the water is withdrawn from the deeper level than we had originally believed to be the case.

Q Is that report available?

A The LaSalle model study?

A (Dr. Marcellus) The LaSalle model study for Indian Point has not been completed yet; they are still writing it. But that is expected to be out very soon.

jrb21

A (Mr. Lawler) I can add that that's the report I was referring to, Ms. Chasis. On a 50-50 basis, that is to say, the upper layer being half the depth and the lower level being the other half of the depth, the water withdrawal in the LaSalle report showed 57 percent from the upper level and 43 percent from the lower layer.

We are in the process of estimating the percentage withdrawal from the upper two-thirds and the upper one-third only because in the prior years I brought this out in the 74 proceeding -- at the FPC -- that the computation procedure used to estimate the $f_1$ actually was assuming water withdrawal from two-thirds of the depth rather than half.

So we would expect to find something on the order of 75-25; that's purely a guess. But you know it's got to be more than 67-33, because you know from the LaSalle report that the ratio of water withdrawal to depth favors the upper regions, rather than the lower.

Q Thank you.

MR. BRIGGS: Excuse me just a minute.

The report that you were referring to is a report that was aimed at determining the depth of the river from which water was withdrawn into the Indian Point 2 plant; is that right?

WITNESS LAWLER: That's correct.

END TAKE 6
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1 MR. BRIGGS: And the numbers you gave were 57
2 percent from the upper layer and 43 percent from the lower
3 layer?
4 WITNESS LAWLER: Correct, with the upper and lower
5 layer being defined as the upper half and the lower half.
6 MR. BRIGGS: And that report will show what's
7 withdrawn from the lower quarter, also, will it?
8 WITNESS LAWLER: Yes, you can extract that from
9 it. What I'm saying is we're in the process of doing it.
10 I do know that when you get down to somewhere
11 within 10 to 15 percent of the bottom, we show very --
12 extremely little water being withdrawn from those very bottom
13 depths.
14 The report also shows that the withdrawal takes
15 place over a very narrow breadth of the river, which you
16 should also expect based on the tidal flow.
17 BY MS. CHASIS:
18 Q Now, turning to the $f_c$ factor, you have indi-
19 cated -- and I for some reason can't quite locate this table.
20 It's the table where you make the corrections for the net --
21 that was attributable to net mortality.
22 A (Witness McFadden) This is on page 33, Ms.
23 Chasis.
24 Q Thank you.
25 And you make that correction for 1974 -- well,

blt 2

you make that correction for 1974 data, is that correct?

A (Witness Lawler) That's correct.

Q For 1975 as well?

A Yes.

As I indicated yesterday, the NYU 1975 data for post-yolk-sac larvae, which shows values of 0.48 and 0.45, are essentially the same regardless of how you classify the stunned organisms. That has not been corrected for differential net mortality.

Q Okay. That's what I wanted to know.

A I think that I can add to that. The reason why it has not been corrected is we have not established at this moment that the -- what the velocity was in the discharge canal during -- and in the intake, for that matter -- during the period of the trend in 1975.

Assuming it was essentially the same, that number would come down rather substantially.

Q Am I correct that the basis for your correction was the study that was performed entitled "Mortality of STriped Bass Eggs and Larvae in Nets"?

A That's correct.

Q And this was prepared by NYU, and it's dated July 1976?

A Right.

Q Do you have a copy of that? On page 18 of that

blt 3

report, they state that:

"It would be imprudent to apply the results of these laboratory studies directly to the field situation without detailed knowledge of the velocity of water in the intake forebays and discharge canal at the time of sampling, and a firm understanding of the proportion of alive and dead organisms in the river population from which plant samples may be drawn."

Now, without that detailed information, how can the correction which you have made in the 1974 data -- how can that correction be made in the 1974 data?

A. Well, first of all, that detailed information is available, and it was used to make the correction. And the velocity of the water in the intake forebays and the discharge canal during the entrainment period and during the time of sampling in 1974 was 0.52 for the intake and 1.45 for the discharge.

Q. Excuse me. Where is that information?

A. I don't think it's in this report.

Q. Would it be in the 1974 progress report, do you know, or is that information available to us?

A. Ms. Chasis, I'm sure it's available. I wouldn't know where in any of these reports to identify for you.

We obtained it by obtaining the flows at Indian

blt 4

Point during the period of sampling, and we computed the velocities in the intake and the discharge forebays.

Q "We" being whom?

A We being LMS.

Q At Indian Point?

A At Indian Point.

Q So this was not done by NYU at the time they were sampling? It was done by LMS?

A What I'm saying, Ms. Chasis, is that the computation of the velocity in the discharge canal and in the intake was done by us. NYU did the sampling.

Q And when did you do the calculations?

A I don't know the exact date, but it's kind of immaterial as to when it was done.

What you need to do it is the information on the flows and the tidal stages and -- well, that's it.

Q Was it done at the time of sampling?

A No, Ms. Chasis, it was done after the time of sampling. It was done prior to making the corrections.

In other words, it's a computation, but the information required to make the computation existed at the time of sampling.

Q But it was not taken?

A Yes, it was taken. It was taken by the plant operating people.

olt 5

Q So if you took -- now, let me get this clear. You took plant operating information to calculate, and based on that you calculated velocities?

A Absolutely.

Q So you went out at another time when the plant was operating at that same level and measured the velocity?

A That's right. Velocities have been measured also and confirm the computation approach used.

Q How detailed are those records? I mean, did they give you the variation in flow on a minute-by-minute basis? How is it broken down?

A Well, Ms. Chasis, you know the number of pumps operating at any time and you know the condition under which the pumps are operating. You know the tide level in the river at the time, and as a result you can compute the velocity.

Q Do you -- isn't it possible that the records would not necessarily reflect some fluctuations in the withdrawal flow, or there could be a variation in the tidal flow?

In other words, it seems to me you can't have a perfect reconstruction of velocity.

A In my judgment, Ms. Chasis, you can have a reconstruction that's highly accurate, because you do know on a day-by-day basis the number of pumps operating and the condition under which the pumps were operated. You do know

blt 6

on an hour-by-hour basis the tidal behavior. What you're looking to do is to construct the average behavior over the period of sampling, recognizing that the behavior does not vary substantially during the sampling period.

Q Do you have information on fluctuations hour to hour of the plant operation, or is it only on a day-by-day basis?

A On the plant operation, to the best of my knowledge it's on a day-by-day basis.

I would also say that to the best of my knowledge in virtually all cases there is not much change, if any, on an hour-by-hour basis.

What I'm simply saying is that we're quite confident that the velocity levels we're using in the intake and discharge are quite correct.

Q Would it in your judgment be best to make those measurements simultaneous with the sampling if you were to design a system in order to account for that mortality?

A Well, let me put it this way: I would say that my confidence --

Q That's not my question.

A Well, it's a proper answer, because you asked me what would be best. And what would be best depends on my confidence in the results.

Q My question was would that be the best method?

blt7

Would that be the best way of going about it?

A What? To make the measurement --

Q Simultaneous with the sampling.

A Would you allow me to answer it in terms of confidence?

Q Yes or no.

CHAIRMAN JENSCH: I think what she's asking you is would you have greater accuracy if you did it this way.

WITNESS LAWLER: My answer is no, you would not have greater accuracy in my judgment.

MS. CHASIS: Thank you.

WITNESS LAWLER: I'd like to expand on that, Mr. Jensch.

CHAIRMAN JENSCH: Go ahead.

WITNESS LAWLER: If I was to go out and make extensive velocity measurements every time I made -- every time I made the set, and I recalibrated my velocity meters every time I made the sample, and I really took an excessive level of pain in making the measurement, then yes, that would be a better measurement. I wouldn't argue that.

What I'm saying is that for this particular situation, in my judgment, the estimation of velocity gives you a set of numbers that is quite closely the number that actually existed during the sampling. And that's been confirmed by making measurements and comparing them to the

blt 8

calculated result.

You also must keep in mind that what we're talking about is a rather substantial difference in velocities and a level of about half a foot per second in the intake and a foot-and-a-half in the discharge.

CHAIRMAN JENSCH: Well, let me ask you about a previous answer you gave-- I think something to the effect that you have day-by-day data when the plant was operating and that you know the pumps that were operating and you felt that was adequate to do your calculations and you could somehow know what the situation was hourly.

Is that essentially the answer that you gave?

WITNESS LAWLER: That's correct, Mr. Chairman.

CHAIRMAN JENSCH: How did you determine whether there are variations within the day?

WITNESS LAWLER: Well, the operating records normally tell you whether the pump setup has been changed for that day.

CHAIRMAN JENSCH: Well, I don't know whether the fluctuations in power level -- the pumps wouldn't change.

WITNESS LAWLER: The flow through the plant is a function of the number of pumps operating and the conditions under which they are operating, whether they are throttled or non-throttled.

CHAIRMAN JENSCH: What does this daily report

blt 9

show? Is it 8:00 o'clock in the morning until midnight, or 8:00 o'clock in the morning until the next morning at 8:00 o'clock? How do the day-to-day reports indicate sufficient accuracy?

WITNESS MARCELLUS: I might add a comment relative to that.

CHAIRMAN JENSCH: Let me first get the order of the day-to-day report. I'm trying to get to the hourly possibility.

What do the day-to-day reports say that gives you the accuracy you're seeking?

WITNESS LAWLER: What I'm saying, Mr. Chairman, is that the operating reports will indicate that pumps are running and under what conditions they're running.

If there is a change in the operation, the operator's report will indicate that. That's the only thing I'm saying.

There may not be a change for six weeks.

CHAIRMAN JENSCH: Is this report, daily report, the one for December 7, 1976, say, what does it show as to the flow volume of the pumps, at what time on that day? Do you know?

WITNESS LAWLER: I defer to Mr. Marcellus.

WITNESS MARCELLUS: For a specified date, it indicates the volume of water pumped, the flow capacity

blt 10

of the pump, and the calculated estimate of intake velocity.

It also indicates whether or not a pump was turned on or off and the hour at which that was done.

CHAIRMAN JENSCH: If the pump flow was affected in any way, would it show on the daily report?

WITNESS MARCELLUS: The pump was affected by what?

CHAIRMAN JENSCH: Any adjustment in the pumping or power level of the plant?

WITNESS MARCELLUS: If the plant operator elects to shut off the pump, that would show up on the daily record.

If the plant operated at a 60 percent level flow, that would show up.

CHAIRMAN JENSCH: And would it show the time of the change from 100 percent to 60 percent?

WITNESS MARCELLUS: Yes, that shows. That's indicated in the records.

CHAIRMAN JENSCH: Is it indicated in the daily report to which Dr. Lawler has referred?

WITNESS MARCELLUS: Yes. It would be --

CHAIRMAN JENSCH: Could you bring us a sample of a daily report so we can take a look at it and see what it shows?

WITNESS MARCELLUS: Yes.

CHAIRMAN JENSCH: All right, thank you. One

blt 11

that shows a variation, if you will.

WITNESS MARCELLUS: Okay.

CHAIRMAN JENSCH: Thank you.

WITNESS LAWLER: One more point I'd like to mention. The only thing I'm trying to say here is that you do know quite accurately when the pumps are operating, at whatever level.

CHAIRMAN JENSCH: Excuse me for interrupting. Would you proceed, please?

BY MS. CHASIS:

Q The question is, was this report, the NYU report on mortality of striped bass eggs and larvae in nets, was it intended that the results of that study be taken and actually applied to the field, or was it anticipated that this is qualitative, indicating that net mortality could be a significant contributing factor to the mortality results?

A (Witness Lawler) I would say it certainly was intended to be useful for precisely the use that we've made of it. It was designed to determine whether or not net mortality varied under a variety of conditions, and it concluded that net mortality did vary under the condition of velocity while sampling.

And the intention was to have sufficiently quantitative data so that you could apply the results to

blt 12 1 the actual operation of the plant.

2 Q The reason I say this, for example, on page 20,
3 the last page of text in this report, it states -- and
4 this is the first full paragraph, the second sentence:

5 "Using the results of the present flume
6 study, one may hypothesize that mortality of
7 ichthyoplankton in power plant discharges is
8 a combination of net mortality and plant-induced
9 stress. This hypothesis may be tested in con-
10 trolled situations such as at the Con Edison
11 experimental flume. If the contribution of net
12 mortality to total mortality is ignored, power
13 plant impact on ichthyoplankton populations may
14 be greatly overestimated."

15 Now, unfortunately, there is nobody here from
16 NYU, but that says to me that there was some question as to
17 whether this could be directly applied in a quantitative
18 sense or whether further tests still have to be done to test
19 this out further.

20 A It doesn't say that to me at all.

21 Q Okay. I guess the record will have to speak
22 for itself.

23 I would like to ask why nobody from NYU was pre-
24 sented or was involved in the preparation of this testimony,
25 since so much of this related to their work.

blt 13

MR. TROSTEN: Ms. Chasis, there are a large number of people who are involved. If you will consult the list of the research reports that have been presented over the last several years, you will, I'm sure, agree that we had to make some selections.

We made those selections, and our panel is here.

MS. CHASIS: I would only note that the entrainment mortality has been recognized as one of the critical factors.

MR. TROSTEN: There are a number of things that are recognized as critical factors.

MS. CHASIS: And the contractors on those subjects are here.

MR. TROSTEN: Not all of them.

CHAIRMAN JENSCH: If this goes long enough, we may wear out this panel and have to use a NYU panel.

(Laughter.)

BY MS. CHASIS:

Q Dr. Lawler, I understand the subject of entrainment mortality -- to your knowledge, did the NYU mortality data, entrainment mortality data, for '73 or '74 look beyond 72 hours to see if there was any latent mortality?

A (Witness Lawler) I know it all went through 72. I don't recall offhand whether any of it went 96.

I'm not sure of that. I'd have to go back to

blt 14

the reports to be sure. It did all go to 72, that's for sure.

I think that the '74 only went through 72 hours. The '75 may have gone to 96. I'm not certain of that.

Q Do you consider 72 to be adequate? You stated yesterday that you considered 96 to be standard.

A. There are all sorts of standards. People do 48-hour tests; they do 96-hour tests; they do 72-hour tests.

One of the problems in all of these tests is that once you go beyond this length of time it's difficult to maintain viability in the controls as well as in the test sample.

Q But I gather, then -- and I just checked in the 1974 progress report. It was 72 hours.

A Yes, I know it's 72 in the '74 report.

Q So that for both '73 and '74, then, you have only latent mortality studies running through 72 hours?

A I don't know what kind of context you want to put the word "only" in, but that's true in '73 and '74. It went to 72 hours.

Q Were there any tests that you know of that were made on the increased vulnerability of the organisms which had passed through the plant to predation or to disease?

A Other than the tests that were made in the 72- and 96-hour holding vessels, no.

blt 15

CHAIRMAN JENSCH: I think we'll leave the matter of the recess up to HRFA. Can you advise us if this is a convenient place for a break?

MS. CHASIS: I was hoping to get through before lunch, if that's possible.

CHAIRMAN JENSCH: All right. Go ahead.

BY MS. CHASIS:

Q Now, moving on to the subject of compensation and the stock-recruitment relationship that has been referred to in the testimony, in your opinion does the relationship which you have observed with the lag period of 5 years, does that indicate, if it indicates compensation at all, when compensation is occurring in the population?

A (Witness Campbell) No, it would not indicate that.

Q So it could be at any point in the 1 to 5 years?

A Yes, ma'am, zero to 5.

Q Zero to 5. All right.

Has there been an examination of compensation in other species than striped bass?

A Oh, yes, ma'am, many species.

Q Has a compensatory relationship been observed?

A I think Dr. McFadden can comment on that at length.

Q Not at length.

blt 16

(Laughter.)

A. As I recall, he has a 2-page summary of all compensatory responses.

A. (Witness McFadden) I could take that as an invitation. I'll make a brief comment in which I'll respond by naming of variety of significant marine fishes for which compensatory relationships --

Q. I'm sorry. I mean in the Hudson.

A. Other species in the Hudson?

Q. Yes.

A. Oh, I see.

CHAIRMAN JENSCH: The 2-page report doesn't cover that?

WITNESS CAMPBELL: That was with reference to fish populations in general.

With respect to those species themselves or the actual populations occurring in the Hudson River?

BY MS. CHASIS:

Q. The populations occurring in the Hudson River.

A. (Witness Campbell) Populations occurring in the Hudson River, no, ma'am.

Q. Am I correct that with respect to the success of the stocking program we will not know by January of '77 whether or not those hatchery-reared fingerlings which have been stocked over the last three years will return in fact

blt 17

to spawn in the Hudson River?

A (Witness May) That is correct. Enough time will not have passed.

end 7

MS. CHASIS: I think that's all.

MR. BRIGGS: Before recess, I'd just like to ask the Con Ed people if they could provide some information for me at the end of the lunch hour.

In the final environmental statement, on page 7-10, there is a table 1.

(Pause.)

As I remember the Indian Point 2 proceedings, there was a phenomenon, if you wish, that I believe was called John Clark's dilemma. And this had to do with the relationship between the population of year-old striped bass in the Hudson River, and the number of striped bass that were captured in the ocean sometime later.

As I result of that dilemma, I had thought that considerable information would be obtained, and numbers would be presented, concerning the total population of the striped bass at various stages in the Hudson River. And so, we had some of that information here for 1973 and 1974. Are there similar numbers for 1975?

WITNESS CAMPBELL: Yes, sir.

MR. BRIGGS: Are they published in a particular report, and could you give me the values after the recess for lunch, please?

WITNESS CAMPBELL: I believe those are to appear in the January report. I don't know if I have the values here.

1 MR. BRIGGS: Well, maybe if they're in the January
2 report, you could call somebody and ask them.
3 MR. TROSTEN: Yes. We will check that, Mr. Briggs.
4 WITNESS CAMPBELL: Could I ask, perhaps, a question
5 of the NRC staff on that; exactly where they would obtain these,
6 and that would help us out. Is that all right for us?
7 MR. BRIGGS: Oh, yes. I understood that they got
8 this information from you or your reports, and if that's right,
9 fine. They should have the same numbers. And I'm just, of
10 course, interested in, of course, the life stages of the striped
11 bass here. I don't care about the other numbers.
12 CHAIRMAN JENSCH: Is there any other matter that we
13 can take up before we recess? How long do you want to recess?
14 MR. TROSTEN: Could we have an hour and a quarter,
15 Mr. Chairman? Is that satisfactory?
16 CHAIRMAN JENSCH: Any objection?
17 (Pause.)
18 In a burst of generosity, Mr. Briggs is even suggest-
19 ing we might even take an hour and a half. How much more time
20 do we have on this section? Is the regulatory staff going to
21 have any interrogation?
22 MR. LEWIS: Yes.
23 CHAIRMAN JENSCH: Well, are you willing to proceed
24 after lunch?
25 MR. LEWIS: Yes.

CHAIRMAN JENSCH: All right.

The clock on the wall keeps confusing it a bit. I have about 12:07. How about 1:15?

MR. TROSTEN: 1:15? I have 12:05 or so. 1:15 by your watch?

CHAIRMAN JENSCH: Our watches.

MR. TROSTEN: Okay, 1:15 by my watch.

CHAIRMAN JENSCH: We will recess for lunch until 1:15.

(Whereupon, at 12:05 p.m., the hearing was recessed, to reconvene at 1:15 p.m., this same day.)

1 AFTERNOON SESSION

2 (1:15 p.m.)

3 Whereupon,

4 KENNETH L. MARCELLUS,

5 M. PERRY CAMPBELL

6 MALLORY S. MAY,

7 JOHN P.LAWLER,

8 and

9 JAMES T. McFADDEN

10 resumed the stand, and having been previously duly sworn, were

11 examined further and testified as follows:

12 CHAIRMAN JENSCH: Please come to order.

13 If I understand, the Hudson River Fishermen have

14 completed their cross examination.

15 MS. CHASIS: That's correct.

16 CHAIRMAN JENSCH: Village of Buchanan; any examina-

17 tion?

18 MR. D'ALVIA: I'm just going to ask a couple of

19 questions here, Mr. Chairman.

20 CHAIRMAN JENSCH: All right.

21 MR. D'ALVIA: All right?

22 MR. TROSTEN: Yes.

23 BY MR. D'ALVIA:

24 Q On pages 22 and 23 of the report --

25 CHAIRMAN JENSCH: That's of the testimony that was

DAV 5

adduced in the December 7 --

MR. D'ALVIA: That's correct.

CHAIRMAN JENSCH: Wait a minute. Where is staff counsel? Is he here?

DR. GECKLER: He's here, but I'm not sure where he went.

CHAIRMAN JENSCH: Can we just wait until the staff counsel returns?

(Pause.)

CHAIRMAN JENSCH: All right, Mr. D'Alvia. Can we go forward, please?

BY MR. D'ALVIA:

Q. On pages 22 and 23, do I read correctly that the reduction due to the impingement and entrainment of the population of striped bass is set forth as 1 percent or less, due to the Indian Point Unit number 2, and approximately 2 percent for the multi-plant case? Is that correct?

A. (Witness Campbell). That's right.

Q. And do you still consider these trivial?

A. Yes, sir.

Q. Now, on page 82 --

A. (Witness McFadden). Page 2, irsir?

Q. Page 82, sorry; it says, it's stated that tests with angled screens and louver systems were found to bypass 95.5 percent and 86.6 percent of the fish. Does this mean that from 86.5 to 90 percent of the 2 percent impinged andeentrained are

1 the expected population reductions?

2 A. No, sir.

3 Q. Can you explain that to me, please, sir?

4 A. (Witness Campbell). This is the result of an

5 experiment in a flume, and it was for larger fish, and could

6 only possibly refer to the impingement impact. It could not

7 refer to the entrainment impact.

8 Q. Thank you.

9 Now, the last question that I have; were sufficient

10 and complete studies made of the impact of industrial users of

11 process water upstream from Indian Point in your studies?

12 A. Only the power plant users, sir.

13 Q. Nothing about the other industrial users up there?

14 A. (Witness Marcellus). Con Edison has not undertaken

15 a study of the impacts, nor the releases of discharges from

16 other industries on the Hudson River.

17 Q. You just make studies with respect to discharges

18 into the river?

19 A. With respect to its own plant.

20 Q. Well, in other words, perhaps some of these indus-

21 trial plants could have caused the death of some of these

22 fish, and then throw them back into the river?

23 A. That's entirely possible.

24 MR. D'ALVIA: That's all I have, Mr. Commissioner.

25 CHAIRMAN JENSCH: Do you have any evidence that that

1 did occur from the other plants?

2 MR. D'ALVIA: I don't have it, not at this time.

3 CHAIRMAN JENSCH: Well, do you have it at any time,

4 or is that just a surmise that you thought might occur?

5 MR. D'ALVIA: That's what our engineer advised me.

6 But he didn't give me any specific cases. So I can't tell you

7 which one. We did have a plant up there called Standard Coated,

8 I believe.

9 CHAIRMAN JENSCH: And they used to scoop out the

10 fish and throw them back? Is that it?

11 MR. D'ALVIA: I don't know. That's only guesswork,

12 that's all.

13 MR. BRIGGS: Excuse me a minute.

14 With regard to that question, is there information

15 about the amount of water that's used by other industrial users

16 relative to that that's used by power plants along the Hudson?

17 (Pause.)

18 WITNESS LAWLER: Excuse me, Mr.Briggs. I'm the one

19 who should answer the question, and I didn't hear you.

20 MR. BRIGGS: I understand -- do you know what

21 fraction of the industrial water that's used on the Hudson is

22 used by power plants, as opposed to other kinds of plants, like

23 steel plants or chemical plants or others?

24 WITNESS LAWLER: Most of the industrial water on

25 the Hudson is power plant cooling water.

MR. BRIGGS: Is this like 60 percent or 80 percent or 90 percent of, would you say?

WITNESS LAWLER: I would estimate it's 90 percent, possibly more than 90 percent.

MR. BRIGGS: Okay, thank you.

CHAIRMAN JENSCH: Let's see if I understand. The 90 percent is what?

WITNESS LAWLER: Mr. Briggs' question is, what percentage of the total industrial water use on the Hudson River is power plant use? And I said, I would say on the lower Hudson River, from the dam at Troy south -- which is the Hudson River estuary -- in all likelihood, the power plants represent 90 percent or more of the total water use. There is extensive use in the upper Hudson River for paper mills.

CHAIRMAN JENSCH: Staff, are you ready to proceed?

MR. LEWIS: Yes, sir.

CHAIRMAN JENSCH: I don't know if it would be any help to you to move a little closer. If you'd like to move your chair on this side of the table --

MR. LEWIS: I will project.

WITNESS LAWLER: One final point, just to correct even the last statement; the use on the upper Hudson River is probably well water, as opposed to river water itself, as far as an intake goes. It discharges to the Hudson, a lot of it.

CHAIRMAN JENSCH: Do you want to give those figures

1 that Mr. Briggs inquired about? Are you able to do it now?

2 MR. TROSTEN: The 1975 data?

3 MR. BRIGGS: Yes.

4 MR. TROSTEN: Just a moment, sir; I'll inquire whe-

5 ther we have it or not.

6 (Pause.)

7 We don't have them now at this point.

8 Mr. Chairman, there are several documents which we

9 would like to have marked for identification and offer into

10 evidence now. We can do ifter the staff cross examination;

11 we've been waiting for an appropriate opportunity. Or we could

12 do it now.

13 CHAIRMAN JENSCH: If you would indicate for the

14 record -- if you would identify the documents, and do you have

15 copies for service and that sort of thing?

16 MR. TROSTEN: Yes.

17 CHAIRMAN JENSCH: All right.

18 MR. FIDELL: Mr. Chairman, all of these documents

19 have been previously distributed to the parties; they're in

20 that category.

21 I give to the Board, and to the Court Reporter, a

22 document entitled, Predation by Bluefish in the Lower Hudson

23 River, February 1976, by Texas Instruments, Incorporated. And

24 I ask that it be marked as --

25 CHAIRMAN JENSCH: CT-4?

MR. FIDELL: -- OT-4 for identification.

(The document referred to was marked Licensee's Exhibit OT-4 for identification.)

MR. FIDELL: And directing my questions to Dr. May and Dr. Campbell, I ask you if you are familiar with the contents of Licensee's OT-4 for identification.

WITNESS MAY: Yes.

MR. FIDELL: Was this report prepared under your direction and supervision?

WITNESS MAY: Yes.

MR. FIDELL: Are the contents of this report true and correct to the best of your knowledge, information and belief?

WITNESS MAY: Yes.

MR. FIDELL: Mr. Chairman, in view of the discussion that was previously had, I think the foundation has already been laid for it. So I will move that it be admitted into evidence.

CHAIRMAN JENSCH: Any objection from the regulatory staff?

MR. LEWIS: No.

CHAIRMAN JENSCH: Energy Office?

MR. KING: No.

CHAIRMAN JENSCH: Hudson River?

DAV 11

1 MS. CHASIS: No.

2 CHAIRMAN JENSCH: Attorney General of the State of

3 New York?

4 (No response.)

5 CHAIRMAN JENSCH: Village of Buchanan?

6 MR. D'ALVIA: No.

7 CHAIRMAN JENSCH: There being no objection, Licensee's

8 Exhibit OT-4 is received into evidence.

9 (The document referred to, having

10 been previously marked for iden-

11 tification as Licensee's Exhibit

12 OT-4, was received in evidence.)

13 MR. FIDELL: Mr. Chairman, I now hand to you three

14 copies, and one to the Court Reporter, of a document entitled

15 Hudson River Ecological Study in the Area of Indian Point:

16 Thermal Effects Report,' dated September 1976, and I ask that

17 this be marked as Licensee's Exhibit OT-5 for identification.

18 CHAIRMAN JENSCH: The document which the Licensee's

19 counsel has so identified may be so marked, as Licensee's OT-5.

20 (The document referred to was

21 marked Licensee's Exhibit OT-5

22 for identification.)

23 MR. FIDELL: Addressing my questions to Dr. May

24 and Dr. Campbell again, gentlemen, I ask you if you're familiar

25 with the contents of Licensee's OT-5 for identification.

WITNESS MAY: Yes, I am.

MR. FIDELL: Was it prepared under your direction and supervision?

WITNESS MAY: Yes, it was.

MR. FIDELL: Are the contents true and correct to the best of your knowledge, information and belief?

WITNESS MAY: Yes, they are.

MR. FIDELL: Mr. Chairman, I move that Licensee's OT-5 for identification be admitted into evidence at this time.

CHAIRMAN JENSCH: Any objection by the regulatory staff, New York State Energy Office, Hudson River Fisherman's Association, Attorney General of the State of New York, Village of Buchanan?

(No response.)

CHAIRMAN JENSCH: There being no objection, Licensee's Exhibit OT-5 is received in evidence.

(The document referred to, having been previously marked for identification as Licensee's Exhibit OT-5, was received in evidence.)

MR. FIDELL: Thank you, sir.

CHAIRMAN JENSCH: Is this your last exhibit?

MR. FIDELL: No, sir. That is the largest, however. Mr. Chairman, I have provided to the Board and to the

Court Reporter copies of a document entitled, Fisheries Survey of the Hudson River, March to December 1973, Volume 4, Revised Edition, June 1976; and I ask that this be marked as Licensee's OT-6 for identification.

CHAIRMAN JENSCH: The document identified by Licensee's counsel may be so identified.

(The document referred to was marked Licensee's Exhibit OT-6 for identification.)

MR. FIDELL: Thank you, sir.

Addressing my questions again to Dr. May and Dr. Campbell, I ask you gentlemen if you are familiar with the contents of Licensee's OT-6 for identification.

WITNESS CAMPBELL: Yes.

MR. FIDELL: Was this document prepared under your direction and supervision?

WITNESS MAY: Yes.

MR. FIDELL: Are the contents of this document true and correct to the best of your knowledge, information, and belief?

WITNESS MAY: Yes, they are.

MR. FIDELL: Mr. Chairman, I move that Licensee's OT-6 for identification be admitted into evidence.

CHAIRMAN JENSCH: ANy objection? Regulatory staff New York State Energy Office, Hudson River Fishermen, Attorney

General, Village of Buchanan?

(No response.)

CHAIRMAN JENSCH: There being no objection, Licensee's Exhibit OT-6 is received in evidence.

(The document referred to, having been previously marked for identification as Licensee's Exhibit OT-6, was received in evidence.)

MR. FIDELL: Thank you, sir.

DR. DAIBER: A question. It says, Revised Edition. Does that apply to Volume 4, or to the first three volumes as well?

WITNESS MAY: That applies only to Volume 4.

MR. FIDELL: Mr. Chairman, I provide to the Board three copies, and to the Court Reporter a copy, of a document entitled Hudson River Ecological Study in the Area of Indian Point, 1974 Annual Report; and I ask that this, too, be marked as an exhibit for identification. as Applicant's, or Con Edison's, OT-7.

MR. LEWIS: What's the date on it?

MR. FIDELL: It bears the date 1974 Annual Report, and on the inside cover page, it bears the date 1975.

CHAIRMAN JENSCH: The document identified by Licensee's counsel may be so marked for identification purposes, as OT-7.

DAV 15

(The document referred to was marked as Licensee's Exhibit OT-7 for identification.)

MR. FIDELL: Thank you, sir.

Dr. May and Dr. Campbell, I ask you if you are familiar with Licensee's OT-7 for identification.

WITNESS CAMPBELL: Yes, sir.

MR. FIDELL: Was it prepared under your direction and supervision?

WITNESS MAY: Yes, it was.

MR. FIDELL: Are the contents of Licensee's OT-7 true and correct, to the best of your knowledge, information, and belief?

WITNESS MAY: Yes.

MR. FIDELL: Mr. Chairman, I move that Licensee's OT-7 for identification be admitted into evidence.

CHAIRMAN JENSCH: Any objection? Regulatory staff, New York State Energy Office, Hudson River Fishermen, the Attorney General of the State of New York, the Village of Buchanan?

(No response.)

CHAIRMAN JENSCH: There being no objection, Licensee's Exhibit OT-7 is received in evidence.

DAV 16

(The document referred to, having been previously marked for identification as Licensee's Exhibit OT-7, was received in evidence.)

MR. FIDELL: Thank you, sir.

I provide to the Board and to the Court Reporter -- and I ask that the record also reflect that I provided copies of each document from Licensee's OT-4 to the present, to counsel for the State Energy Office -- I've provided to the Board, to the Reporter, and to Counsel for the State Energy Office, a document entitled, Final Report of the Synoptic Subpopulation Analysis, Phase 1; Report on the Feasibility of Using Innate Tags to Identify Striped Bass -- Morone saxatilis -- From Various Spawning Rivers, dated September 1975.

Dr. May and Dr. Campbell, I show you a copy of Exhibit OT-8 for identification -- Mr. Chairman, I ask that this be marked for identification.

CHAIRMAN JENSCH: It may be so marked; Licensee's Exhibit OT-8 for identification purposes.

(The document referred to was marked Licensee's Exhibit OT-8 for identification.)

MR. FIDELL: Thank you, sir.

Gentlemen, I show you a copy of Licensee's OT-8 for identification, and ask you if you are familiar with its contents.

DAV 17

WITNESS MAY: Yes.

MR. FIDELL: Was Licensee's OT-8 for identification prepared under your direction and supervision?

WITNESS MAY: Yes, it was.

MR. FIDELL: Are the contents thereof true and correct, to the best of your knowledge, information and belief?

WITNESS MAY: Yes, they are.

MR. FIDELL: Mr. Chairman, I make the same motion as to Exhibit 8 for identification, and ask that it be admitted into evidence.

CHAIRMAN JENSCH: Any objection? Regulatory staff, New York State Energy Office, Hudson River Fisherman's Association, Attorney General of the State of New York, Village of Buchanan?

(No response.)

CHAIRMAN JENSCH: There being no objection, Licensee's Exhibit OT-8 is received into evidence.

(The document referred to, having been previously marked for identification as Licensee's Exhibit OT-8, was received in evidence.)

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MR. FIDELL: Thank you, sir.

I request the record to reflect that I'm providing to the Board, and to the Court Reporter and counsel for the State Energy Office, copies of a document entitled, Semi-Annual

Progress Report for Hudson River Ecological Study in the Area of Indian Point, 1 January to 30 June 1974, dated April '75. I request that this be marked for identification.

CHAIRMAN JENSCH: The document identified by Licensee's counsel may be marked for identification as OT-9.

(The document referred to was marked Licensee's Exhibit OT-9 for identification.)

MR. FIDELL: Thank you, sir.

Dr. May and Dr.Campbell, I show you a copy of Licensee's Exhibit OT-9 for identification, and ask if you recognize it.

WITNESS CAMPBELL: Yes, sir.

WITNESS MAY: Yes.

MR. FIDELL: Are you familiar with the contents of this report?

WITNESS MAY: Yes, sir.

MR.FIDELL: Was it prepared under your direction and supervision?

WITNESS MAY: Yes.

MR. FIDELL: Are the contents thereof true and correct to the best of your knowledge, information, and belief?

WITNESS CAMPBELL: Yes, sir.

MR. FIDELL: Mr. Chairman, I move that Licensee's OT-9 for identification be admitted into evidence as OT-9.

CHAIRMAN JENSCH: Any objection? Regulatory staff, New York State Energy Office, Hudson River Fishermen's Association, Attorney General of the State of New York, Village of Buchanan?

(NO response.)

CHAIRMAN JENSCH: There being no objection, Licensee's Exhibit OT-9 is received in evidence.

(The document referred to, having previously been marked for identification as Licensee's Exhibit OT-9, was received in evidence.)

MR. FIDELL: Thank you, sir. We're nearing the end. As our penultimate, may the record reflect that I've provided copies to the Board, the Court Reporter, and the State Energy Office counsel; a copy of a document entitled, Feasibility of Culturing and Stocking Hudson River Striped Bass, 1974 Annual Report. And I move, Mr.Chairman, that this document -- I offer this document for identification.

CHAIRMAN JENSCH: The document identified by Licensee's counsel may be marked for identification as OT-10.

(The document referred to was marked Licensee's Exhibit OT-10 for identification.)

MR. FIDELL: Thank you, sir.

Dr. May and Dr. Campbell, I show you a copy of

1 Licensee's OT-10 for identification, and ask you if you're
2 familiar with the contents of it.
3 WITNESS MAY: Yes, I am.
4 MR. FIDELL: Are the contents of this document true
5 and correct, to the best of your knowledge, information, and
6 belief?
7 WITNESS MAY: Yes.
8 MR. FIDELL: Was the document prepared under your
9 direction and supervision?
10 WITNESS MAY: Yes.
11 MR. FIDELL: Mr. Chairman, I move that Licensee's
12 OT-10 for identification be admitted into evidence as Exhibit
13 OT-10.
14 CHAIRMAN JENSCH: Any objection? Regulatory staff,
15 New York State Energy Office, Hudson River Fisherman, Attorney
16 General of the State of New York, village of Buchanan?
17 (No response.)
18 CHAIRMAN JENSCH: There being no objection, Licen-
19 see's Exhibit OT-10 is received in evidence.
20 (The document referred to, having
21 previously been marked for iden-
22 tification as Licensee's Exhibit
23 OT-10, was received in evidence.)
24 MR. FIDELL: Thank you, sir.
25 Mr. Chairman, this is our final offering at this

1 time. I provide to the Board, the Reporter, and counsel for
2 the Energy Office, copies of a document entitled Indian Point
3 Impingement Study Report for the Period 1 January 1974 through
4 31 December '74, dated November '75. And I ask that it be
5 marked for identification.
6 CHAIRMAN JENSCH: The document identified by Licen-
7 see's counsel will be marked for identification as Licensee's
8 Exhibit OT-11.
9 (The document referred to was
10 marked Licensee's Exhibit OT-11
11 for identification.)
12 MR. FIDELL: Thank you, sir.
13 Drs. Campbell and May, I'm showing you a copy of
14 Licensee's OT-11 for identification. I ask you if you are
15 familiar with the contents of this report.
16 WITNESS MAY: Yes.
17 MR. FIDELL: Was it prepared under your general di-
18 rection and supervision.
19 WITNESS CAMPBELL: Yes.
20 MR. FIDELL: Are the contents thereof true and cor-
21 rect, to the best of your knowledge, information, and belief?
22 WITNESS MAY: Yes.
23 MR. FIDELL: Mr. Chairman, I move that Licensee's
24 Exhibit OT-11 for identification be admitted into evidence.
25 CHAIRMAN JENSCH: Is there any objection from the

1 regulatory staff, New York State Energy Office, Hudson River
2 Fisherman's Association, Attorney General of the State of New
3 York, the Village of Buchanan?
4 (No response.)
5 CHAIRMAN JENSCH: There being no objection, Licen-
6 see's Exhibit OT-11 is received in evidence.
7 (The document referred to, having
8 previously been marked for iden-
9 tification as Licensee's Exhibit
10 OT-11, was received in evidence.)
11 MR. FIDELL: Thank you, sir.
12 MS. CHASIS: Mr. Chairman, at this time, I'd like to
13 inquire whether Con Edison intends to make, as its Exhibit, and
14 part of the record, the NYU studies which form the basis of
15 many of the statements, both in the testimony of December 7,
16 and in their earlier November 10 submission? I think that if
17 they're attempting to establish and put into the record the
18 studies on which they rely, I would hope that they would do
19 that completely and fully.
20 MR. TROSTEN: We were not planning to offer them at
21 this time, Mr. Chairman. Obviously, we will take into account
22 the developments of the hearing in deciding whether we should
23 offer them.
24 CHAIRMAN JENSCH: All right.
25 MR. TROSTEN: Mr.Chairman, we have the information

Mr. Briggs requested.

CHAIRMAN JENSCH: Can we proceed on it?

WITNESS CAMPBELL: Sir, the values corresponding for 1975, corresponding to those values on Table 1, page 7-10 of the final environmental statement, are as follows. I would point out that these are peak standing crop estimates, rather than totals , as they are labeled in the document. We discussed this with Dr. Van Winkle at the break.

In other words, these refer to the time period -- that is, the sampling interval -- in which the maximum number of that particular life stage was maintained. Okay?

The numbers are, for post yolk-sac larvae, 716,670,230 --

MS. CHASIS: Could you repeat that, please?

MR. CAMPBELL: Yes. 716,670,230. The juvenile peak standing crop, based solely on icthyo-plankton sampling, the second number in the table for 1975, would be 5,366,394. The juvenile beach seine peak standing crop for 1975 would be 2,295,323.

(Pause.)

MR. BRIGGS: Thank you.

WITNESS CAMPBELL: You're welcome.

CHAIRMAN JENSCH: Is the staff ready to proceed?

MR. LEWIS: Yes.

BY MR. LEWIS:

Q My first line of questioning pertains to the panel's testimony with regard to the contribution of the Hudson River striped bass stock of the Atlantic Coast fishery. I might say that at the beginning, we are anxiously awaiting the January '77 report, on the basis of the statements of the panel that that report will considerably supplement the analysis on this subject.

Now yesterday, for the first time, we did see the December 1976 report, and we noted that there are estimates in there of the percent contribution of the Hudson River striped bass stock to each of ten strata along the coast, and in each of six time periods. Now, we noted that these estimates are based on sampling done along the Atlantic coast in 1975. My first question is whether or not such sampling was also done in 1976.

A (Witness Campbell). No, it was not.

Q Do you have any opinion as to whether or not there is likely to be a substantial yearly variation in these figures?

A There will obviously be some. We don't know how substantial it will be.

Q Do you have any intentions to sample in any subsequent years?

A (Witness May). We do not determine this. It's based on being requested.

Q You have not previously been requested to do this as part of this study?

A Yes.

Q Let me pose some questions based upon some testimony on the $f_i$ intake f-factor. Now, since the operating license proceeding on Indian Point 2, LMS has come forth with a number of modifications in its equations and methods of calculating $f_i$. We would like to know, since the first-round transit studies in 1973, what efforts have been made in the following areas.

First, field work to more clearly define the zone of withdrawal at Indian Point at various phases of the tide, particularly in the vertical direction.

MR. TROSTEN: Now, could you be a little bit more specific, Mr. Lewis? You say, since what time, please?

MR. LEWIS: Well, my frame of reference is since the operating license proceeding on Indian Point 2.

MR. TROSTEN: You see, this took place over a period of time, and that's why I'm asking you to try to be specific about it. The hering took place over a period of about a year. Testimohy took place at certain times, the license was granted at a certain time. And if you could pin it down --

MR. LEWIS: Well, that's going to be a little bit difficult. I do have reference tothe fact that we are interested in knowing what work has been done with regard to the vertical withdrawal question, with respect to the vertical

column, since the first transit studies. And perhaps --

MR. TROSTEN: Would it answer your question if we attempted to respond in terms of the data that we relied upon in the Indian Point 2 period in our testimony, relative to what has been done since that time? Would that answer the question?

MR. LEWIS: Well, yes. What I think I really want to know is, what -- fine. I'd like you to make that comparison for me, yes.

MR. TROSTEN: Fine.

WITNESS CAMPBELL: Are you referring specifically to the studies on the water withdrawal, or organism count distribution-type data?

BY MR. LEWIS:

Q I'm talking about water withdrawal.

A (Witness Campbell). Okay.

AKE9
JRB:jrbl

(Pause.)

MR. TROSTEN: Bear with us a moment, Mr. Chairman, we are trying to decide which person is best to answer.

WITNESS LAWLER: I will answer the question, Mr. Lewis.

With respect to your question on what field work has been done to establish the zone of withdrawal of water at the plant, with particular emphasis on vertical, I testified this morning that a study had been made by the LaSalle Hydraulic Laboratory to determine the zone of withdrawal.

In doing so, LaSalle did make a plant visit to the site. The extent of measurements or observations that they made in the river in conjunction with their model study, I don't know what the extent of that was.

Their conclusion of their model study was as I indicated this morning, that the zone of withdrawal is relatively -- a relatively narrow ban in the lateral -- I can't give an exact dimension at the moment -- and in the vertical withdrawal of water, 57 percent of the water is coming from the upper half, and 43 percent of the water is coming from the lower half.

BY MR. LEWIS:

Q Basically, this is a model study?

A (Dr. Lawler.) It is.

And any model studies are always observations

jrb 2

1 made at the site; I simply don't know the extent of the
2 observations that were made.
3 Q Is my understanding correct that there has not
4 yet been issued any report by LaSalle with respect to the
5 Indian Point site; is that correct?
6 A (Dr. Marcellus) That is correct.
7 Q Do you know whether or not LaSalle has undertaken
8 any studies at Bowline and Roseton?
9 A (Dr. Lawler) First of all, that is a physical
10 model, not a mathematical model.
11 Q Physical model? I'm sorry.
12 A Hydraulic.
13 To the best of my knowledge I am virtually certain
14 there have not been studies made by LaSalle at Bowline.
15 LaSalle did make some studies of Roseton a number
16 of years ago. They were very -- they were studies that had
17 to do with the intake velocity that you could expect at
18 the intake itself, and what changes might be made in the
19 intake to lower those velocities.
20 Q I take it, however, your answer is that LMS
21 has not personally done any field work on the question of
22 the vertical withdrawal?
23 A We did do some dye studies at Roseton a
24 number of years ago, and I don't recall recall the results
25 of that study. I don't think it was terribly conclusive.

jrb3

1 Otherwise I am sure I would remember the results.

2 There was a dye study done by EAI, Ecological

3 Analysts, at Bowline this past year to look at the question

4 of recirculation between the intake and the discharge. I

5 don't know if that has been published yet.

6 Q Now, moving on to a second question, and once

7 again I am interested in any changes -- your comments on

8 changes -- since the Indian Point 2 hearings with respect

9 to any studies that LMS might have undertaken to evaluate

10 the relative efficiencies of fixed nets at the intakes,

11 and larger towed nets in the river?

12 A There have been -- we have done a number of

13 studies of one extent or another on the question of

14 net efficiency. We are not prepared at this moment to tell

15 you just what the results of those studies are.

16 I have asked my staff to pull all of that informa-

17 tion together. It is quite pertinent to the question

18 of evaluation of the impacts.

19 Q Would this be something we would expect to see

20 in the January 77 report?

21 A Well, I would not want to guarantee that you will,

22 because I simply don't know the status of that question.

23 There have been attempts to look at this question,

24 not simply of standing nets to moving nets; but more impor-

25 tantly, the velocity of the water with respect to the net,

jrb4

1 whether it is fixed or moving is really the key question
2 here.
3 We have made a number of observations over the
4 years at different points in the river for different purposes,
5 and what I am attempting to do is to gather all of that
6 information together and determine whether on the basis of
7 all of it we can make the statement with aspect to whether
8 the net efficiency is significantly different under the
9 various conditions of sampling.
10 It's really what we want to know. The F factors
11 that have been calculated to date have been calculated
12 on the basis of no difference between the net sampling at
13 the intake and net sampling in the river. And what we really
14 want to know here is can we make that assumption?
15 The only reason why I am somewhat hesitant
16 -- and I am saying, too, that I don't know that the
17 information will be in the January report -- is that it is
18 not one simple study.
19 There has been, to the best of my knowledge, no
20 extensive study made on this particular point. On the other
21 hand, there is a lot of information that we have that I
22 believe we can draw together to draw a reasonable conclusion
23 at this point.
24 How long it is going to take to do that, I
25 would not want to say at this point.

rb 5

1 Q I am sure that is true. Your comments,
2 Dr. Lawler, do raise in my mind a question -- perhaps any
3 member of the panel or counsel could address it.
4 On numerous occasions during cross-examination
5 by various parties reference has been made to the fact that
6 certain pending technical questions might or might not be
7 answered in the January 1977 report.
8 I am wondering what is the -- what sort of
9 continuing reports are there going to be? Are there going
10 to be further reports beyond the January 1977 report
11 which are going to address some of these questions, which,
12 apparently, are not going to be included in that report?
13 MR. TROSTEN: I can answer the question,
14 Mr. Lewis, that, indeed, there will be continuing studies,
15 and the nature of the continuing studies are in general
16 terms described in the technical specifications Staff
17 requires for the Indian Point 3 facility.
18 Now -- so the answer to your question is,
19 certainly, there will be continuing studies.
20 Now, if you will identify a particular question
21 as to whether that would be the subject of a continuing
22 study, we will certainly endeavor to answer that.
23 MR. LEWIS: I was simply getting more of a general
24 impression.
25 Obviously, one matter has been identified here

jrb6

which may not be in the January 77 report.

MR. TROSTEN: That's right.

MR. LEWIS: And I don't know if that is something that is intended to be the relative efficiency of different types of net? Is that something that might be in a subsequent report?

WITNESS LAWLER: We first of all will address the question as best we can with respect to what goes into the January report. If in our judgment that addressing is not complete or sufficient or satisfactory at that time, then we would very definitely plan to complete our answer to that question at a later date.

BY MR. LEWIS:

Q The next matter pertains to whether or not, since -- basically since the 1973 transect studies, there has been any consideration given or any change made -- we understand the present sampling design or schedules to involve regular two-week intervals.

And many times we have noted that this is adhered to whether or not there are any striped bass and ichthyoplankton in the vicinity being sampled. And many times we see zeros in the reports.

Has any thought been given to taking the sampling at times when it has been identified perhaps by up-river sampling that ichthyoplankton are present in some

jrb7

numbers -- whoever on the panel?

A (Dr. Lawler) I can answer that at least partially.

In the study programs that involve sampling for ichthyoplankton in the river this question has been brought up on a number of occasions. One thing that has been done, and I cannot at the moment identify what year and what periods, but samples have been taken but not analyzed.

The amount of time involved in this whole thing of getting ichthyoplankton density is heavy laboratory time; and a much more time is involved than in sampling of the river. So that there has been sampling that has taken place where the samples have not been analyzed.

There is currently on the very question you have asked -- is two weeks adequate or not? -- that question is undergoing evaluation in the proposal for 1977 work of this nature.

Q Well, my question is not simply whether that is the appropriate -- or some other interval is appropriate -- but, rather, whether or not one cannot devise some kind of a warning system, so to speak, some kind of smapling system upstream and key your sampling efforts to times when you know there is going to be some concentration; rather than simply going out there and finding nothing?

A Well, it is a little hard to do that any better

jrb8

1 than what we already know as to the spatial and temporal
2 distribution of these organisms, because of the time lag
3 between the actual sampling and the appearance of the results
4 is substantial.
5 You are talking several weeks and more before
6 you get the information out.
7 The samplers themselves from time to time can
8 give you an idea -- yes, we are finding eggs; yes, we are
9 finding larvae. First of all, they have to be capable of
10 identifying them, which they are not always.
11 Secondly, even if they see them, it is a little
12 hard to say, well, they've seen the peak. It is not that
13 easy to get advance information beyond the kind of knowledge
14 you already have as to when they appear.
15 WITNESS MAY: May I ask a question?
16 Are you talking about a specific sampling design
17 related to one contractor? Or are you talking about all
18 ichthyoplankton sampling being taken?
19 MR. LEWIS: I really wasn't making a distinction.
20 I was simply trying to get at the question of whether or
21 not there might be -- my technical expert has informed me
22 that much of the data they see simply shows that the sampling
23 was done, and zero showed up.
24 And we were wondering if there might not be a more
25 helpful way of sampling so that --

jrb9

WITNESS MAY: When you say biweekly, our long river survey during periods we consider to be most concentrated for fish larvae, et cetera, are on a weekly basis; so I thought perhaps you were ruling out other types of studies that are being done.

MR. LEWIS: No, I wasn't.

WITNESS CAMPBELL: I think the point here also is that it does take some time to work up the actual physical samples; and to do the identification so that if you attempt to devise some early warning system like this, you might be too late by the time you had analyzed the physical samples.

WITNESS MC FADDEN: I would like to extend that answer, also, to a specific case where the ichthyoplankton population is being estimated in the river.

DR. VAN WINKLE: Our concern is strictly with the transects to get at F factors, not with the river water.

WITNESS MC FADDEN: That wasn't clear in the question, so I will not extend the answer.

DR. VAN WINKLE: Specifically for transect sampling designed to get the distribution.

WITNESS LAWLER: The only thing I would like to add to that is the appearance of zeros does not invalidate the sample. It says that there is no ichthyoplankton in the river, or at least as far as the sample is indicating at that point.

jrb10

WITNESS CAMPBELL: We do in fact find zero samples in areas of high concentration due, primarily, we suspect, to the underlying distribution of organisms.

BY MR. LEWIS:

Q Moving on to the $f_c$ value, cropping factor, there has been much discussion here among the parties that the F factors relating to -- that the F factors and the compensation function parameters are the two most critically sensitive inputs in the models that we have been using here.

We recognize that the choice of values for compensation parameters or even the choice of compensation functions can receive very little guidance directly from the collection of empirical data.

On the other hand, the F factors would seem to be highly amenable to direct measurement.

Now, with respect to the $f_c$ values we would like the panel to give us the opinion as to which is the more accurate method of selecting data with respect to $f_c$, whether it is the fixed ichthyoplankton net intake and discharge or the larval tables, which have been discussed in your December 7 testimony?

A (Dr. Lawler) Let me begin to answer that question by firstpointing out the problems associated with each methodology.

jrbll

Q Yes?

A The problems associated with fixed nets are, first of all, it has been fairly well demonstrated, we believe, by a number of ways that there is a substantial degree of mortality that takes place due to the nets.

There are two indications of this, one, at virtually every station sampled -- and nets have been used at all of these stations, including the older plants on the river -- the intake mortality -- there has been a substantial intake mortality.

Secondly, the Brome (spelling phonetic) study that was carried out by NYU in 1975, to which I discussed Ms. Chasis this morning, has shown a fairly substantial influence of the actual velocity at which the water passes through the nets as being a determining factor in the net mortality.

And one of the problems with the nets, therefore, is that we do not have the same velocity in the intake and the discharge at most plants, primarily because the intakes are designed specifically to reduce the velocities, going back in history to the impingement problem; whereas, in the case of the discharge, there has not been a criterion on discharge velocities.

So your sampling point for discharge in the case of all of the plants has been at a location where the

jrbl2

velocity is higher than in the intake; so you do get what I refer to in Footnote A as "differential".

Okay, that's the disadvantage associated with nets.

Now, with respect to the so-called larval tables, as I indicated in the testimony, the larval table was developed to avoid this whole problem of high velocities and differential velocities in catching nets.

We believe that the larval tables work very well. There is one disadvantage with them: it is virtually impossible to operate the larval tables at a level beneath the level of the intake water level. So the net result there -- I'd better be careful how I use the word "net" -- but the result there is you have to pump your sample onto the larval table.

One of the problems or one of the beliefs with respect to larval mortality across the plant has always been that there is a substantial stress placed on the organism as it goes through the plant pumps; so here you have a sampling device that requires a pump to lift the water from the intake up onto the larval table.

If I can describe this larval table, it is a device about as long as -- well, about as wide as this conference table, and perhaps extending all the way down to the point where the table T's; and water is brought onto the

jrbl3

1 table on the head end and moves in such a way that the larvae
2 aer permitted to be collected without coming in contact
3 with nets as they begin to concentrate.
4 And the result of all this is that you succeed
5 in collecting your organisms without exposing them to high
6 velocity contacts with nets.
7 But you still have to get the water onto the
8 larval table; and to get it onto the larval table you have
9 to pump it on.
10 So what is happening in the laval table studies
11 is that a certain mortality is being imposed on the organisms
12 due to the pumps.
13 Now, the pumps we use are a recess impellor
14 pump, which means the impellor is pulled back from the point
15 where you would normally see it; and what happens is that the
16 larvae in the water, particles in the water in general don't
17 come in contact with the blades of the pump. So that is an
18 attempt to keep the pump mortality low.
19 You can get your discharge sample in many of
20 the plants without pumping, but to keep the experimental
21 method the same between intake and discharge, the discharge
22 sample has also been pumped onto the larval table.
23 So, what I am saying here is that even the larval
24 tables do have a certain sampling mortality imposed.
25 Of the two, in my judgment, the larval table is

jrb14

1 probably the better sampling method because it keeps sampling
2 mortality down to a minimum.
3 Your ideal method would be to have zero sampling
4 mortality, 100 percent survival in the intake sample.
5 Q Now, as I undersand it, the larval table
6 sample method is being used at Bowline and Roseton; is that
7 right?
8 A That is correct.
9 Q Has it been used at all at Indian Point?
10 A To the best of my knowledge, it has not been used
11 to date at Indian Point.
12 Q Do you know whether or not there are any plans
13 to use it at the Indian Point site?
14 A (Dr. Marcellus) Con Edison is considering use
15 of larval tables at Indian Point in 1977; it has not made
16 a firm commitment to do so, though, at the present time.
17 Q All right.
18 I would like to direct your attention to page 33
19 of your testimony, and Table E-1.
20 Now, with respect to this table, the thing that
21 interests the Staff is that we are seeing in here some
22 figures for the F factors which are substantially lower
23 than what we were seeing in any of the previous information
24 in the various Indian Point 2 and 3 proceeding.
25 But, particularly looking at the post yolk-sac

jrb15

1 larvae, because that appears to be the life stage which is
2 most likely to be impacted by the withdrawal through the
3 system, and specifically with an 0.09 at Bowline and a
4 figure of 0.25 for Roseton, we are wondering -- we note
5 that there are extensive footnotes on that table which
6 indicate that for the egg yolk-sac and juvenile stages
7 at both Bowline and Roseton, there was very limited data or
8 no data.
9 What was the availability of data with respect
10 to the post yolk-sac larvae?
11 A (Dr. Lawler) I don't know the numbers -- this
12 refers to the number of larvae actually captured in the
13 intake and the discharge. The number to the best of my
14 recollection was over 100. I can get that number for you.
15 The number was sufficient to enable us to apply statistical
16 tests.
17 It was substantially in excess of what we found
18 for eggs, yolk-sac, and for juveniles.
19 MR. LEWIS: May I have one moment, please?
20 (Pause.)
21 BY MR. LEWIS:
22 Q Do you know, Dr. Lawler, or anyone else on the
23 panel, whether or not there are plans to continue this type
24 of sampling at Bowline and Roseton?
25 A (Dr. Lawler) To the best of my knowledge

jrb16

1 both Orange & Rockland utilities, which runs the Bowline
2 plant, and Central Hudson Gas & Electric Corporation, which
3 runs the Roseton plant, do intend to continue these studies
4 in 1977.
5 They also were carried out in 1976; that informa-
6 tion is not available at this time. It is being analyzed
7 at this time.
8 Q Now, the footnote notices that the -- do we have
9 the 1975 data that underlies the larval table -- oh, yes;
10 I see; okay.
11 I withdraw that question.
12 Has that been reported in any reports that have
13 been submitted in this proceeding, the information on the
14 Bowline and Roseton larval studies -- larval table studies?
15 Do you know?
16 A I don't think that the EAI 75 reports have been
17 finalized. We've gotten the data from EAI, from their
18 draft reports and other existing drafts. I don't think they
19 are finalized.
20 Q Well, do you know --
21 A And I don't think they have been submitted in this
22 proceeding. I am almost certain of that.
23 Q Does anybody know whether or not they will become
24 part of the record of -- are they intended to be reports
25 to be submitted in connection with this application by Con Ed,

jrb17

or the subsequent application?

MR. TROSTEN: Just a moment, please.

(Pause.)

MR. TROSTEN: Yes, it is our intent to include data from these EAI studies in the application which we would file at the beginning of next year; so the answer to your question is, yes, we do intend to submit data from these studies.

MR. LEWIS: I see.

BY MR. LEWIS:

Q Does any member of the panel know -- I have already mentioned apparently with respect to eggs and yolk-sac larvae and juveniles in samples, in addition to reporting, does anybody know what the scope of the studies undertaken at Bowline and Roseton in the future is?

A (Dr. Lawler) I can comment on that.

We have been in communication with EAI people with respect to their 76 information, and in 76 again they found more than enough post yolk-sac larvae to do their analyses. They were able to get more juveniles than they did in 75. The continue to have the problems of collecting eggs and yolk-sac larvae.

One of the reasons -- the egg sac larvae are only in the yolk-sac larvae stage for somewhere between 6 and 12 days; the eggs are only in the egg stage between 1 and 3 days.

jrb18

That's one of the reasons why you don't collect that many

And secondly, at Bowline, we never find eggs. We rarely find juveniles. That is the reason for Footnote C and E, for example; we just don't find them.

You correctly pointed out that as far as impact is concerned of the four life stages involved, in all likelihood it's the post yolk-sac larvae where the concern is properly applied, because the eggs don't live that long in that stage; the juveniles by and large don't seem to appear in the plants; and even your post yolk-sac larvae are in that life history stage for that many days.

The number of days of life of the stage is an important factor in assessing the impacts; so it's one of the significant parameters in the estimates we have made.

Q I might state by way of explanation that it is Staff's view that the information that is again to be reported on the larval table method is very interesting, and that a comparison of results of sampling with nets and with larval tables would be something that certainly our technical experts would be very interested in seeing.

That is why I have been trying to find out whether or not the future does hold something of this type for the Indian Point sampling program; and also what is intended to be undertaken at Roseton and Bowline.

That's just my comment.

jrb19

A (Dr. Lawler) As Dr. Marcellus said, this is being considered at Indian Point; and I know that it is virtually certain these studies will continue at Bowline and Roseton.

A (Dr. Campbell) Mr. Lewis, I point out in the Bowline area the concentration of eggs in the river are not particularly high. I think that is the reason.

Q Then it might be particularly interesting to apply that method at Indian Point where, perhaps, we might get some more interesting data and results.

A It might be.

A (Dr. Lawler) Mr. Lewis, with respect to your suggestion that studies be made, there is little likelihood in my judgment that comparative studies of nets versus larval tables would be good at Bowline or Roseton, particularly Bowline, because there you really get into a differential in net mortality problems.

The differential, the net velocity at Bowline is something on the order of 8 to 10 feet persecond; and there is just no way you can keep the organisms alive.

Q What is it at Indian Point?

A One and a half feet per second.

Q You are talking towed net?

A No, net fixed in the discharge, as opposed to the net fixed in the intake.

jrb20

What you are suggesting or what you are saying -- Staff is suggesting -- is that a comparative study be made between the cropping factor, entrainment mortality, as determined by net studies which has been the method used at Indian Point to the determination of the same parameter applied to larval tables.

What I am saying is, whereas that possibility may have existed at Indian Point, it would be pointless to do it at Bowline. Well, not pointless; because we could get into the pumping procedure. No, I take that back.

There is no good sampling location in the Bowline plant for nets; where the velocities are less than 8 feet per second is another reason for the development of the larval table. There was no way of catching larval organisms in the Bowline discharge because the velocities, the nets, were on the order of 8 feet per second.

Q Fine, thank you.

Now, a matter that has been brought up on cross-examination by the other parties is with respect to the fact that many of the estimates of F factors, both $f_c$ and $f_i$ which have been put forth by LMS in this proceeding have not contained any measure of uncertainty of variation, stated the measure of uncertainty variation associated has not been stated in the submittals we have seen.

In this regard, turning to first of all to page

jrb21

33, the same table we have been looking at, and then also, subsequently, to page 45, which has another table which we've looked at a number of times here; we wonder what the standard deviation associated with the values in those tables is?

A (Dr. Lawler) I can't give you the numbers for the values on page 45, because to the best of my knowledge that has not been done.

The question of testing the $f_i$, the statistical treatment of the $f_i$, is currently under consideration. We have not done that up to this time.

With respect to the $f_c$ factors on page 33, the values given for post yolk-sac larvae also have been subject to statistical testing; and I can't give you a standard deviation, but what I can say to you is that with respect to the values that Bowline -- at Roseton -- a significant difference was detected at the 5 percent level, and the mean or best estimate of that difference is the .25 or the .34.

In the case of Bowline the tests of significance did not show a difference. The .09 simply represents the mean, and the fact that the test did not show a difference is -- you would expect to see that; because .09 is not really that far from zero.

In the case of Indian Point 1974, the tests of significance between the intake and the discharge

jrb22

1 mortalities did show a significant difference and the values
2 reported are the mean values.
3 Q So, therefore, with respect to your testimony
4 that the standard deviations have not been derived, you do
5 not know what the standard deviations are? That has not
6 been approached?
7 A That is correct.
8 Q With respect to $f_c$ there has been an analysis
9 or comparison of the two different figures that appear on
10 Table E-1?
11 A Correct.
12 I did not give you an answer in terms of
13 standard deviation; but the answer I am giving was equivalent
14 to that. It is saying the tests of significance have been
15 applied to the data on Table E-1, where the data was
16 sufficient to do such a test, which is the case for the post
17 yolk-sac larvae.
18 I think offhand the tests of significance have
19 been applied to the eggs at Indian Point. I'm fairly certain
20 that's been applied there, because there have been large
21 enough numbers of eggs captured to do that.
22 Q Moving on to another question, there has been
23 testimony previously here that during the 1976 spawning
24 season Unit 2 was not in operation, and I believe it has
25 also been testified that 1976 was the first year of operation

jrb 23

of Unit 3.

If this is correct, are we correct in concluding that there has not yet been a sampling season during which you had simultaneous operation of both units; is that correct?

A (Dr. Marcellus) That is correct.

Q With reference to the spawning season, the summer season of 1976?

A (Dr. Marcellus) (Nodding affirmatively)

Q Turning now to the work done by NYU with respect to the $f_i$ and as I understand it perhaps someone could clarify this for me, the scope of NYU's work was simply to collect the data; is that what I understood Dr. Marcellus to testify to earlier?

A That is correct.

Q Now, would it be your view, Dr. Marcellus,-- or anyone else if they want to answer -- that would it not be your view that it would be better to have the organization that did the collection of the data calculate the $f_i$ factor as well?

A To the effect that the $f_i$ factor applies to modeling work, interpretation of that data and incorporation of that data into a model, I think it best be examined by the contractor responsible for the model.

Q Certainly. But my question goes not to whether

jrb24

or not the contractor responsible for the model should use the data, but, rather, whether or not you would agree with me that having assembled a very competent team to go out and do the collecting of data on distribution of -- in the area of the Indian Point site, it might not be logical to also have that group calculate the $f_i$ values?

MR. TROSTEN: Mr. Lewis, you aware I assume NYU does not collect the data at the other power plants operating on the river?

Are you aware of that?

MR. LEWIS: Well, I was referring for the moment to the Indian point. My understanding is they had done transects, that is, at Indian Point?

MR. TROSTEN: That's right.

MR. LEWIS: That's the only one I am concerned about right now.

MR. TROSTEN: I want to be sure you are aware the evaluation being done is a multi-plant evaluation which includes Indian Point, and the other plants on the river; NYU collects data at Indian Point. They do not collect data -- I just wanted to make sure we are all together.

WITNESS MARCELLUS: There has been considerable discussion between LMS and NYU, and you might say there is a joint resolution of various entrainment factors between the two contractors.

jrb25

BY MR. LEWIS:

Q But it is correct, Dr. Marcellus, that this division of responsibility is that NYU is collecting the transect data, and LMS is calculating the $f_i$ values; is that correct?

A (Dr. Marcellus) NYU collected the transect data; data collected by Texas Instruments was also collected and employed in this case.

Q You say it may not be just NYU, there may be others who have also collected data?

A In terms of calculating F factors, yes. All data was brought to bear on that question.

A (Dr. McFadden) Mr. Lewis, we do not subscribe to the view that the particular individual or contractor who collected a body of data is always the best person, the best group, to completely analyze it and draw all conclusions from that body of data.

We have made it a practice to draw together a number of important areas including the F factor data, scientific representatives from all of the contractor, on the premise that the soundest overall conclusions could be established by drawing upon the expertise and the different insights of all the participants in this joint effort on the Hudson River.

Q Certainly, no one could possibly quarrel with that

way of proceeding.

I was just focusing on the particular division of responsibility that seems to have been highlighted here.

I would like to draw your attention to the Table F-3 on page 45 of the testimony here, and we note the -- that in Table 19 and 20 of the NYU reports on the effect of entrainment at the Indian Point power plant, the addendum 1973 report -- do you have that?

MS. CHASIS: What tables?

MR. LEWIS: Page 41 and 42, Tables 19 and 20.

The $f_i$ values in Tables 19 and 20 appear to offer quite a contrast with the values in Table F-3 for Indian Point.

BY MR. LEWIS:

Q Would you care to comment?

A (Dr. Lawler) I can comment on several things that have transpired, if you can give me two seconds to look at Tables 19 and 20.

Q Certainly.

(Pause)

A Well, my first comment would be that the addendum referred to came out well after this table was compiled. This table was compiled back in mid-1974.

Q When you say "this table"?

A Table F-3 was compiled in 1974.

jrb27

The data that appear in the Environmental Report, if you recall, is the data that had been utilized in the proceeding before the FPC in late 1974; and that had been compiled at that point.

So I don't know off the top of my head what the picture we have from NYU was at the time this data was compiled.

Secondly, with respect to an answer I gave Ms. Chasis this morning, on the 1974 data I was incorrect when I said that the data that we, LMS, took at the Lovett plant was used in conjunction with the Indian Point values; the $f_i$ values computed for 1974 at Indian Point which will appear in the January 1977 report, were taken directly and solely from the 1974 Indian Point NYU study.

And it is the case, as I indicated this morning, that for eggs the values at Indian Point exceeded a factor of 1. The values for the other life stages did not.

END TAKE 9 Bobbiefls

THORPE:
blt 1
Begin 10

Q The Tables 19 and 20, as I understand, are 1973 data from Indian Point, is that correct?

A Yes. My last remarks were simply to straighten up something that I had said this morning to Ms. Chasis, which I think, you know, bears on this whole question.

This data in Tables 19 and 20 is 1973 information. I would have to examine the actual NYU data versus what was reported back two years ago before I could comment any further on Tables 19 and 20.

Q Well, to make sure I understand what the table shows, it does have numerous entries which you say indicate there were not any comparisons made on particular life stages. But to look at Table 19 it appears to indicate that for eggs, day and night, and for juveniles, night, the concentrations in the Indian Point 1 intake were higher than riverwide concentrations, is that correct?

A That's correct. What I'm saying is we found the same thing in 1974, and I thought -- well, I guess I didn't correct the table F-3 value at Indian Point for eggs this morning when I was responding to Ms. Chasis, but my comments this morning were with respect to 1974. And I indicated that we will see higher values for eggs at Indian Point in the January '77 point.

Q Thank you.

MR. LEWIS: Mr. Chairman, the Staff is somewhat

blt 2

concerned along the same lines as HRFA with the fact that there do appear to be some inconsistencies in the data contained in the NYU reports and the data reported in the December 7 testimony and in the other documents placed in this proceeding.

We did note when those documents were placed in the record by Mr. Fidell that the NYU documents were not among those placed in the record. Certainly they have been referred to numerous times. We would have expected them to have been -- we did expect them to be introduced as foundation documents on the basis of what we have heard here.

We would make a motion that some appropriate representatives from NYU be made available for discussions of various of the data which are contained in their reports.

MS. CHASIS: We would join that motion.

CHAIRMAN JENSCH: Can you identify the reports that are particularly involved?

MR. LEWIS: One report I'm looking at now is the Institute of Environmental Medicine, Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Addenda to the 1973 Report.

CHAIRMAN JENSCH: That's NYU?

MR. LEWIS: Yes, that's NYU.

The second one is also by NYU. It's entitled

blt 3

"Mortality of Striped Bass Eggs and Larvae in Nets." It bears the date of July 1976.

MR. TROSTEN: Mr. Chairman, I think -- Mr. Lewis, are you offering these documents into evidence?

CHAIRMAN JENSCH: He's identifying those which he'd like you to offer.

MR. TROSTEN: I see.

MS. CHASIS: I'd like to add two others, if Mr. Lewis is finished, both by NYU.

One is the "Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1974." The second is the "Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1973."

CHAIRMAN JENSCH: Are you in position to get those reports?

MR. TROSTEN: Mr. Chairman, I think we have the reports available. I'm going to suggest that we mark these reports for identification at this time, if you will give us a moment.

CHAIRMAN JENSCH: Very well.

MR. TROSTEN: Just give us a moment, please.

(Pause.)

CHAIRMAN JENSCH: While you're assembling those

blt 4

and before we start the identification process, I might refer to some problems we have to recessing at 2:59 p.m. and reconvening at 3:00 o'clock in the proceeding that was heretofore noticed to deal with two other aspects. The due diligence matter has already been disposed of, but the other matters have not.

We expect that that phase of the matter won't last any more than 20 minutes; however, I will need about a 20-minute recess to see if we can have another courtroom in this building for tomorrow.

If we cannot, we will recess this evening, to reconvene at the Holiday Inn, down the road a bit. I'll have to get the correct address.

MR. LEWIS: Elmsford, I believe.

CHAIRMAN JENSCH: In Elmsford.

I'll have to check with the administrator of this building first. We may be able to stay somewhere in this building. I don't know.

The Reporters have made a special request, stating that if we do move they have to take all of their equipment. They were here until 1:30 this morning, and they are not anticipating with much delight a repetition of that schedule. So we might recess a little earlier today. We might just keep those matters in mind.

Are you ready to proceed?

blt 5

MR. TROSTEN: Yes, we're ready to offer those reports for identification, Mr. Chairman.

MR. FIDELL: Mr. Chairman, in response to the motion that has been made by the Staff and joined in by HRFA, we have copies of five New York University reports. We will need a few minutes to find additional copies, but I have one of each for the Reporter. I will now read the titles and ask that they be marked for identification.

CHAIRMAN JENSCH: All right. You may do it seriatim. Just go through the whole thing.

MR. FIDELL: Yes, sir.

Mr. Chairman, the first document is entitled "Hudson River Ecosystem Studies, Effects of Temperature and Chlorine on Entrained Hudson River Organisms, Progress Report for 1975."

CHAIRMAN JENSCH: That document may be marked for identification as Licensee's Exhibit No. OT-12.

(The document referred to was marked as Licensee's Exhibit No. OT-12 for identification.)

MR. FIDELL: The next document, Mr. Chairman, is entitled "Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Addenda to the 1973 Report," and it goes on, "1. An Analysis of the Abundance of Four

blt 6

Life History Stages of Striped Bass (Morone saxatilis) Collected in the Intakes and Discharge Canal of Indian Point Unit 1 and in the Hudson River at Indian Point; II. Larval Striped Bass (Morone saxatilis) Length Frequency Analysis."

CHAIRMAN JENSCH: That document may be marked for identification as Licensee's Exhibit No. OT-13.

(The document referred to was marked as Licensee's Exhibit No. OT-13 for identification.)

MR. FIDELL: Mr. Chairman, the next is entitled "Mortality of Striped Bass Eggs and Larvae in Nets: A Special Report."

CHAIRMAN JENSCH: That document may be marked for identification as Licensee's Exhibit No. OT-14.

(The document referred to was marked as Licensee's Exhibit No. OT-14 for identification.)

MR. FIDELL: Mr. Chairman, the next document is entitled "Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1973."

CHAIRMAN JENSCH: That document may be marked for identification as Licensee's OT-15.

blt 7

(The document referred to was marked as Licensee's Exhibit No. OT-15 for identification.)

MR. FIDELL: Sir, the last is "Hudson River Ecosystem Studies, Effects of Entrainment by the Indian Point Power Plant on Biota in the Hudson River Estuary, Progress Report for 1974."

CHAIRMAN JENSCH: That document may be marked for identification as Licensee's Exhibit OT-16.

(The document referred to was marked as Licensee's Exhibit No. OT-16 for identification.)

MR. FIDELL: Thank you, sir.

MR. LEWIS: Mr. Chairman, as I understand it, these are being identified by Mr. Fidell.

Do you propose to stop there, Mr. Trosten?

MR. TROSTEN: As we discussed the point, Mr. Lewis, there is no one from New York University here.

MR. LEWIS: I think it's a very good idea to get them here.

MR. TROSTEN: We've been testifying about this this morning. We've been taking into consideration what was going on in terms of whether we need a New York University witness.

MR. LEWIS: All right. Thank you.

blt 8

CHAIRMAN JENSCH: Have you completed your examination?

MR. LEWIS: I only have one more.

(Pause.)

That concludes my cross-examination.

CHAIRMAN JENSCH: Are there any other questions? Does any party have any other questions?

(No response.)

CHAIRMAN JENSCH: The Board has some questions.

MR. KING: Mr. Chairman, I did pose a couple of questions to Dr. Lawler yesterday, and he had promised me responses today.

CHAIRMAN JENSCH: All right.

BY MR. KING:

Q Dr. Lawler, let me refresh your recollection. You gave an estimate on the record with respect to the reduction of striped bass population without reflection of compensation. You gave a 15 percent figure as an upper limit. Do you recall that?

A (Witness Lawler) That's correct.

Q Do you recall that I asked you what might be the lower limit of this estimate, again without compensation reflected?

A That's correct.

Q Do you have such a figure?

blt 9

A Well, I haven't satisfied myself completely that I do, but I think that a number between 10 and 15 percent is a proper range to use for the estimate of impact without compensation.

Q Do you also recall that I asked you your best estimate of the total reduction of the striped bass population considering compensation; and your answer was between 1 and 2 percent, but again you wanted to check on that.

Have you since checked on that?

A I can't -- again, I'm in the process of checking on it. I would say that the range is between 1 and 4 percent at most. I may get back to you and confirm the original 1 to 2 percent.

But it's more confidently than I expressed it to you yesterday, those ranges that I'm giving you now.

Q One final question. Will these figures be more particularly described in the January '77 report?

A Yes, sir, with the probable exception of the estimate without compensation, because, as you know, it is our contention that the view of impact without incorporating the notion of compensation is simply an unrealistic view of the river. In fact, I should point out that the estimates I gave you without compensation refer to the reduction in the population of the young-of-the-year in the first year of operation.

blt 10

In other words, the point is -- and we testified to this at length in the earlier proceeding -- if you eliminate compensation or resiliency or some notion of the ability of the system to regulate its population, the imposition of even a 10 percent or 15 percent reduction each year throughout the 40 years of life would bring your population way down. It's just simply an unrealistic view of how the fish operate. So I'd like to distinguish between those two notions.

Q Thank you.

xxxx

EXAMINATION BY THE BOARD

BY MR. BRIGGS:

Q I'd like to be clear on the statements that were just made. As I understand it, all other conditions being equal, you calculated that with compensation operation of Unit 2 at Indian Point would reduce the population of juveniles by 1 to 4 percent, and without compensation it would reduce them by 10 to 15 percent. Is that right?

A (Witness Lawler) First of all, Mr. Briggs, those numbers, those numbers are for the multiplant situation.

Q For all plants?

A All the plants.

Q All right.

A Secondly, the estimate of impact with compensation

blt 11

1 operating refers to the 40-year life of the plant, whereas
2 the estimate of impact without compensation operating
3 refers simply to the loss in the young-of-the-year popu-
4 lation in the first year of life.
5 Q When you say the 40-year life of the plant,
6 I'm not quite clear of what population is being reduced.
7 Is this the entire population?
8 A Yes, sir, population of the -- adult population,
9 including the recruits to the adult population, which is
10 the young at the end of their first year of life.
11 Q And this is a reduction in the population over
12 what one would have without power plants on the river?
13 A That's correct. And, also, I might add that
14 that's the Hudson River fish that we're referring to, not
15 the Atlantic or Middle Atlantic or what-have-you.
16 A (Witness May) Mr. Briggs, may I ask you where
17 the 4 percent came from? Was that from Dr. Lawler's model?
18 Q Well, I thought Dr. Lawler set the range of 1
19 to 4 percent.
20 A I'm sorry. I didn't understand.
21 MR. KING: May I ask one further question on
22 this subject?
23 FURTHER CROSS-EXAMINATION
24 BY MR. KING:
25 Q Dr. Lawler, with respect to the figures given

blt 12

in the reduction for the 40-year life of the plant, have calculations also been made with respect to the various plants that will be retired during this period and various other plants that may be constructed during this period?

A. (Witness Lawler) That multiplant situation refers to the units at Indian Point, both units at Roseton, and both units at Bowline, and does not include any other plants.

As far as retirement goes, to the best of my knowledge none of those plants are scheduled for retirement in that period, and I'm virtually certain that none of those plants have been eliminated from that analysis during that period.

xxxx

EXAMINATION BY THE BOARD (Continued)

BY DR. DAIBER:

Q I would like to continue on this subject of compensation. I'm not quite sure of the geographic parameters or the time parameters that are involved here.

On page 21, in the middle of the page, there is a number 1 and a number 2. I am referring to the December 7 testimony: "The exploitation rate is estimated directly from population size at the beginning of impingement vulnerability and number impinged."

From the time they might become impinged on the intake screen through the entire adult life of a fish or

blt 13

population that might be available --

A (Witness Campbell) The time of impingement we've used in these estimates is from July through June of the following year. By that time most of the striped bass from the year-class have left the area.

Q All right.

Then, in terms of your compensation values, are you focusing only on the population that exists in the Hudson River, or are you considering the population that would extend out into the ocean from, for example, North Carolina to Maine in terms of your analysis of compensation?

A This refers to the Hudson River population.

Q Only?

A Yes, sir.

Q All right.

Yesterday Dr. May was talking about the Atlantic Coast fishery in terms of the inner zone and the outer zone, and he used -- there was some discussion, also, with Dr. McFadden with respect to the 5-year lag between, I between, the young-of-the-year or the juveniles and what represented a peak in the commercial fishery or the sports fishery.

It's my understanding, or my memory tells me, that you were using -- what I think you mean is the so-called fishery statistics originally compiled by the

blt 14

Fish and Wildlife Service, now NOAA, is this correct?

A. Yes, sir.

Q. In terms of landings?

A. Landings and other statistics compiled by now National Fishery Service under NOAA and formerly the Bureau of Commercial Fisheries.

Q. Is landings synonymous with catch?

A. No, sir. It is often not synonymous with catch. In many fisheries, particularly marine fisheries, this is the case. However, in the Hudson River fishery it is practically so.

Q. All right.

So you feel confident that the records that are established in the so-called fishery statistics are valid for use in the computation of compensation values?

A. Yes, sir.

Q. Is the word "exploitation" used synonymously with "predation" in terms of predator-prey relationships?

A. Well, we could certainly consider a predator as exploiting a population, and in that respect we could also consider the fisherman as being a predator; so there is some similarity in the terms.

This is the precise definition of "exploitation" as given by Dr. Ricker.

Q. In terms of the impact upon the individual fish,

blt15

it usually results in death to the individual fish to be caught in a fisherman's net or to be caught by a bluefish or to be impinged upon the intake screens of a power plant?

A. Usually, yes, sir.

Q. So that in your computation of compensation, how do you distinguish between those three forms of predation: of impingement, predation by bluefish or some other type of creature, or of human capture?

A. The predation factor, or the mortality due to predation, we have considered as part of the natural mortality which would occur to the population whether or not man was exploiting it. The two forms of man-induced exploitation, either through power plants or through the fishery, are much the same in terms of their influence on the eventual equilibrium population size.

We have looked at the amount of exploitation -- I should say the amount of effort -- that has been applied in this commercial fishery over the last 20 years, and it has not shown great fluctuations over that time period.

What we are talking about here is the added increment of exploitation which is put onto the population as a result of impingement and entrainment. Since we're exploiting the fish primarily during the first year of their life--and that would in most cases, in most fish populations, be during or prior to the compensatory phase

blt 16

of their life history -- it would have the same effect as if you were exploiting their parents. So it would be the same as applying that exploitation rate to the parental generation and in that respect would be equivalent to an increase in fishing exploitation.

End 10

Q. Much of the impingement is involved with the young of the year, as a result, on the intake screens. Did I understand you to say that this would occur before you actually plug this into the formula, in terms of compensation?

A. I'm not sure I understand that question. Would you repeat it again?

Q. I'll try.

A moment ago, you said something about the young of the year;predation here occurred very largely before compensation values were normally considered for a population.

A. What I'm referring to is the general hypothesis which has been put forward in the fishery literature that much of the density-dependent types of mortality occur during the first year of life. And this goes along with the idea of the density-dependent growth which we found.

Q. Density dependent?

A. Yes, sir.

Q. Which do you consider to be more important in terms of compensation; density-dependent or independnet?

A. Sir?

Q. Measuring the impact of compensation.

A. In order to have compensation, you need to have density dependence nin the population. Some of these factors may be density-independent factors that are causing the mortality. And they are offset to the extent that density-dependent

factors also operate in the population.

Q The other thing that I would like to just touch on -- and I think this is going to be aimed at you, Dr. May, primarily, in view of the seining operations; I think that you were the one that made some comments yesterday about -- looking through supplement number 2 to the environmental report, volume 1 of number 2, there are some sketches showing the seining operations where there is a diagram illustrating how a power boat was used for a 100-foot seine; also, apparently, where some human divers were employed to pull a 50-foot seine.

If I remember correctly, in your statistical analysis, you evaluate the impact of size seines and so forth. You're talking in terms of catch per unit area. Is this correct?

A (Witness May). Perry was the one that was talking about it.

Q I'm sorry.

A (Witness Campbell). Yes, sir; it was in terms of catch per unit area.

Q All right.

A Since obviously, the 50-foot seine takes up a lesser area.

Q Right.

Now, is the mesh size the same in both of these seines? In fact, I think you said you had three seines; 50,

100, and something else.

A. Yes, sir. There was also a 75-foot seine, which I believe had exactly the same mesh as the 100-foot seine. I'm not absolutely certain on that point. However, we did the test under two extremes; the 50-foot versus the 100-foot.

Q. All right. Let's just concentrate on those two, then.

What's the depth of those seines?

A. As I recall, the depth of the 100-foot seine is ten feet -- either ten feet or eight feet at the wing ends. We may have this described in here somewhere, and --

(Pause.)

I'm sort of talking off the top of my head right now, but on the order of eight to ten feet, and I believe about a twelve-foot depth in the bag, so to speak. And does that answer your question?

Q. All right.

We're going to have to come back to this topic again. The Chairman is nudging my elbow. We have to stop and go on to something else here. But I want to come back to that.

CHAIRMAN JENSCH: At this time, let's recess to reconvene in this room at 3:40.

(Whereupon, at 3:00 p.m., the hearing was recessed, to reconvene at 3:40 p.m., this same day.)

jrbl

CHAIRMAN JENSCH: Since it is now 3:40, and since we have not concluded with the previously convened session, we will reconvene the extension of interim operation at 4 o'clock, standard time today in this room.

(Whereupon, at 3:42, the hearing was recessed to reconvene at 4 p.m., this same day at the same place.)

CHAIRMAN JENSCH: It now being 4 o'clock, the proceeding in reference to extention of interim operation is recessed to reconvene at 4:45, here this afternoon.

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blt 1
Begin 13

CHAIRMAN JENSCH: Please come to order.

Whereupon,

KENNETH L. MARCELLUS,

K. PERRY CAMPBELL,

MALLORY S. MAY,

JOHN P. LAWLER,

and

JAMES T. McFADDEN

resumed the stand on behalf of the Applicant and, having been previously duly sworn, were examined and testified further as follows:

CHAIRMAN JENSCH: The witnesses have resumed the stand, and Dr. Daiber has a few more questions.

EXAMINATION BY THE BOARD (Continued)

BY DR. DAIBER:

Q Dr. Campbell, we were talking about, at the time of the break, we were discussing 50- and 100-foot seines. If I remember correctly, I asked you the question about the depth of the seines, and if I remember correctly your response was that a 100-foot seine had wings of 10 feet in depth and the center was 12 feet in depth.

A (Witness Campbell) That was my response, but it turns out to be incorrect.

Q Okay.

A The wings at the end are 8 feet in depth, and

blt 2

the bag at the center is 10 feet in depth.

Q All right.

Then the 50-foot seine, how deep is that?

A The 50-foot seine, as nearly as I have been able to determine, is 4 feet in depth. I'm having some inquiries made on that right now. I didn't recall exactly what that was.

Q All right.

But the question is -- and I think more important -- the one that was being -- the 50-foot seine was being handled by people?

A Yes, sir.

Q I think two people.

A Yes, sir.

Q Whereas the 100-foot seine, one end was anchored on the shore, and then there was a circle made by a boat.

A Yes, sir.

Q The 100-foot seine, is that lead line always on the bottom?

A The lead line --

Q Do you know what I mean by the lead line?

A Yes, sir. The lead line would not always be on the bottom.

Q All right.

What would be the possibility of fish ducking

blt3

underneath that?

A. That would be possible.

Q. Would this have some influence on the kind of catch that you might be getting in terms of the kind of fish that you were perhaps interested in?

A. It may.

A. (Witness May) Dr. Daiber, if I may make a comment.

Q. Certainly.

A. Talking about the lead line being on the bottom, are you talking about the time of deployment or the time you form a semicircle?

Q. From the time you start your sweep upward to try to catch fish and you make this run around. Is it a simple loop, or do you traverse along the parallel of the shore?

A. The boat has three people on it. You have an operator of the boat and two technicians. One technician gets out as the boat moves up the shore and walks to the shore to anchor the one end on the beach, and then the boat immediately backs, straight back, perpendicular, and makes a quick sweep there but does not go all the way to the beach for obvious reasons.

The second technician gets out and walks up to the beach there. An effort is made to work beaches

blt 4

where the lead line will be on the bottom, and the depth is appropriate so that this is minimized here. And in the incidences where rocks or other objects may cause the lead line to come off the bottom, those results are not treated the same as results where we are fairly certain that the lead line stays on the bottom during the entire duration of the tow. So there is a very definite effort made to insure that the lead line stays on the bottom.

A (Witness Campbell) During the tow, during the powered portion of the tow, the end of the beach seine, which has been extended some 100 feet now from the beach, will in part be off the bottom in most cases.

Q This is when you move straight out?

A This would have something to do with the slope of the particular beach.

Q But after you start to make your sweep, you have now essentially moved in close enough so that the lead line is now on the bottom.

A Once we've completed the powered operation -- we've now made the semicircle.

Q Yes.

A At that point, I believe, for most cases the lead line would be on the bottom. Of course, the seine is towed in at that point by the end in the standard manner,

blt 5

with an attempt made by keep the lead line on the bottom, so that the lead line is drawn in on the bottom.

A (Witness May) If I may add to this, I think that there are occasions when the lead line -- when it goes all the way out, when it goes back and all the way out; but most frequently, I believe, the slope on the beach is such that it will frequently, even at that distance out, be on the bottom.

There will be times when it is not. Of course, as you pointed out, after it comes back around, one technician sits in the middle, as you're probably aware, actually on the beach, and pulls the lead line along parallel to the side, like this (indicating), holding the lead line down.

The two other people -- now, the boat operator has docked the boat. He has come up. He's taken one side, and the other technician has taken the other side. He's pulling this along. They are parallel, pulling the float line in at the same time to keep this balance.

Q I understand.

A All right.

Q In the encirclement that would be accomplished, for both the 50-foot and the 100-foot seine, is the time interval the same, so that you have encircled an area of water or an area of bottom -- is the interval the same?

blt 6

What I'm getting at is the potential for fish to get away from you, both the differences in pulling capability as displayed by the boat on the one hand and the muscle power on the other.

A. (Witness Campbell) It may be possible that the encirclement is completed more rapidly with the power boat. I'm not certain about that.

Q. Would this have some influence on the kinds of catches that you might get -- not only in terms of total numbers of individuals but also some emphasis on the kinds of fish that might be present?

A. It may indeed, particularly the larger fishes.

Q. As I recall, you indicated that there were three different parties or groups of operators involved and three different years. Is that correct? There are three different parties that were involved in these beach seining operations?

A. Three different parties, yes.

Q. Three different years?

A. More than three years. A period of 10 years.

Q. Ten years.

And are you sure that the same procedure was employed all of that time, over that 10-year period, for both the 50-foot seine and the 100-foot seine, so that all of these results would be comparable?

blt 7

A. As I stated the other day, the 50-foot seine was towed in a different manner, as was mentioned just now, towing parallel by hand.

The 100-foot seine and the 75-foot seine, both of which were used by Raytheon Company, were towed in the same manner as we now tow the 100-foot seine.

A. (Witness May) Dr. Daiber, may I add to that?

If I understood your question, you're asking if the 50-foot seine was towed in the same way every year that it was used and there was consistency in that?

Q. That's right.

A. And we were following the methodology as reported in the reports?

We have, of course, no reason to believe that they were other than how they were reported.

Q. What I'm concerned about, there is two different seines or three different seines, three different sizes, and at least two different ways of handling them, and yet in your analyses you show no significant difference.

A. In catch per unit area.

Q. Yes. And there is also a time factor involved here and water depths and whether the seine is on the bottom or not and many other problems.

A. (Witness Campbell) Specifically, that analysis was done for junvenile striped bass.

blt 8

Q You did not evaluate any other species in terms of the variability?

A That happened to be what we were catching at the time we did the experiment. We didn't have sufficient data on other species at the time.

A (Witness May) We're not insensitive to the problems associated with that methodology. This is the best information we had to work with, since this research program was not originally designed to be carried out this way; and yet, on the other hand, to be assured that we bring to bear as much historical data as we can possibly use, we try to evaluate or to gear evaluations in order to make this data comparable. It's an effort, of course, we realize.

We also exercise very definite care to make sure that our beach seine operations are consistently carried out year after year after year, even to the point of frequently verifying that we're following our standard procedure.

Q I understand what both of you are saying, and I appreciate it; but it was not evident--at least in looking through the documents it didn't hit me -- that all of these things have been addressed, and I wanted to be sure that that was being covered.

A (Witness Campbell) At the time of the submission,

blt 9

or at the time that we prepared -- I believe it's the supplement, the multiplant report, whatever that supplement is -- the Supplement 2, we had not yet done that experiment. That was one of our concerns, and that was the reason for doing some experimental work in that area.

DR. DAIBER: That's all I have.

BY MR. BRIGGS:

Q I'd like to get one item out of the way. I believe I asked yesterday for information on the operating history of Indian Points 2 and 3 during the months of June through September.

MR. TROSTEN: Yes, Mr. Briggs, Mr. John Szelogoswki, who have been previously sworn, can come forward and answer your question.

CHAIRMAN JENSEN: Will he come forward, please?

Whereupon,

JOHN SZELOGOWSKI

resumed the stand on behalf of the Applicant and, having been previously duly sworn, was examined and testified further as follows:

WITNESS SZELOGOWSKI: Mr. Briggs, we are putting together a set for you, for the record. What we have done is to make Xerox copies of the Indian Point annual and semiannual operating reports.

They contain, I believe, the data that you

blt 10

requested.

BY MR. BRIGGS:

Q So that information is in those papers that will be given to us, then, is that correct?

A (Witness Szelogoswki) That's correct, except for the year 1976. The annual report has not yet been completed.

Q What happened in June through September of 1976 with Indian Point 2?

A I'll have to take a look at it.

Q Do you have that information there?

A Yes.

MR. TROSTEN: We have some of these copies, Mr. Briggs. We'll pass them out now, and then we'll decide whether we should mark them or what have you.

(Documents distributed.)

WITNESS SZELOGOWSKI: You asked about Unit No. 2 from June to September of 1976?

BY MR. BRIGGS:

Q Yes.

A (Witness Szelogowski) For '76 the material that's supplied, replacing that for the annual report, are cover letters and the attachments that are sent to New York State pursuant to our 401 certification. The covers indicate for September, August, July and June that basically Unit 2

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was offline for the entire period.

Q So Unit 2 was offline all those months?

A Yes, sir.

Q And the information is here for the rest of the time?

A Yes, sir.

Q I was thinking, as I indicated yesterday, I'm having a problem with cost-benefit analyses, and particularly with that item g. of Table 4-4 entitled "Carrying Cost of Capital from Replacement Capacity for Plant Down-time for Cutting Fuel Cost."

A Yes.

Q What was the reason Unit 2 was off all summer in the summer of 1976, do you know?

A Oh, in this case, I don't recall specifically.

Q But it was off?

A Yes.

Q Was the carrying cost for capital for replacement capacity for plant down-time during the summer of 1976 roughly $200- million to $250 million?

A I really don't know how to answer that question.

CHAIRMAN JENSCH: Try yes or no.

WITNESS SZELOGOWSKI: I believe it wasn't. There was no such expenditure.

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BY MR. BRIGGS:

Q So there was, then, a cost that the customer had to bear on the order of $250 million in present worth of revenue requirements for last summer? And, according to this table, that amounts to something like $26 million in annual levellized revenue requirements?

(The panel conferring.)

A (Witness Szelogowski) I'm sorry, Mr. Briggs. I didn't hear the last question.

Q Pardon?

A I didn't hear your last question.

Q Well, what I'm saying is, since the plant was down all summer last summer, then in my simple way of looking at it, the carrying cost for capital for replacement capacity for plant down-time should be the same as though the plant were down for construction of the cooling tower. Is that not right?

A I think that's a question for our Systems Planning Department.

MR. TROSTEN: I really think, Mr. Briggs, that Mr. Szelogowski is not fully familiar with the information that you're asking about and that we would have to have another person. He isn't really prepared to answer your question.

MR. BRIGGS: Well, does it make any difference

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whether the plant is down during the summer because a pump was broken and the plant can't run or because the plant is down for construction of a cooling tower?

MR. TROSTEN: I'm not sure I understand what you mean by "does it make any difference," Mr. Briggs.

MR. BRIGGS: Well, it's down, and someone has to bear the cost; and in the cost-benefit analysis the Licensee has said that if the plant is down for construction of a cooling tower there is a present worth revenue requirement of $248 million for being down during that summer.

MR. SACK: Mr. Briggs, maybe I can explain.

The difficulty to some extent is that the figures depend upon assumptions for a particular period of time, and I believe the system planners used a method of calculating a decrease in system reliability even though it may be possible to purchase additional power at the time. So there are many factors which someone from the Systems Planning Department who actually did those calculations would have to respond to if you want to get into that kind of detailed calculation.

Mr. Szelogowski is prepared to answer questions on pump operations, not the economics of the down-time cost.

MR. BRIGGS: Well, I'm just interested really in an order of magnitude figure, because if the plant is

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down in the wintertime and there isn't any cost, according to the table 4-5, for the expedited schedule it was just assumed that the plant was down from October through May. There is no cost.

MR. SACK: I'm afraid we do not have in the room today the appropriate people to answer these kinds of questions.

MR. BRIGGS: Well, if what I've said is grossly wrong, would you let us know about it?

MR. SACK: Yes, sir.

MR. TROSTEN: Yes, we will.

MR. BRIGGS: I'm sure you will.

(Laughter.)

MR. BRIGGS: But it certainly does look like the state of New York su fered greatly because Indian Point was down last summer.

MR. SACK: Well, there's no question that it did lead to increased costs. The exact magnitude, I don't know that we have the figure; but it was a serious problem.

CHAIRMAN JENSCH: Would you get the exact figure for this past summer?

MR. SACK: We'll see if we have that.

CHAIRMAN JENSCH: If you have enough calculators and can find the analysis and get the correlation worked out.

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(Laughter.)

MR. BRIGGS: I'd like to look at Table 1 in the Final Environmental Statement, on page 7-10, and these numbers, as I understand it, are peak standing crops.

BY MR. BRIGGS:

Q Is it fair to say that the peak standing crop is proportional to the total population of any of these -- of all of these stages in the life of striped bass?

A (Witness Campbell) No, sir.

Q It's not?

A No, sir.

Q What is the peak standing crop related to?

A The general difference between the two, the peak standing crop is merely the population of that particular life stage at the time at which it was at maximum.

Let me try to explain this correctly. They may vary from year to year, depending upon the duration of the spawning season, for one reason. If spawning takes place over a protracted period of time rather than a very short time period, then the peak standing crop for, for instance, the post-yolk-sac larvae may be less, because the organisms are being recruited in over a longer time period and living also over that longer time period, whereas if the spawning takes place in a shorter time interval the peak standing crop is more indicative of the total population

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for that life stage. So there is that kind of variation. It does not represent the total number which existed in the life stage throughout the season or throughout the year.

Q Well, then, is it possible that the total number of post-yolk-sac larvae in the Hudson River during 1973 is the same as 1974?

A That's possible, but I don't believe it's true. I think it was actually greater.

Q You think it was greater, but you don't know how much greater it was? These numbers don't represent how much greater one was than the other?

A No, sir.

Q Do the numbers for ichthyoplankton gear and beach seines represent different stages in the life of the juveniles? Are they Stage 1 and Stage 2? Or what stages are they?

A I'll have to get the Staff to answer this, because I don't have the table that they came from.

Q You have the information for 1975, do you not?

A Yes, for 1975 the peak standing crop of juveniles and ichthyoplankton gear represented a time period-- essentially the week of 21 July -- and the peak standing crop for juveniles from beach seine data represented the time period from August 25 through September 7.

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What's happening here is that we're having a recruitment to the beach areas from -- of the juveniles.

Just a moment. Dr. May will provide us the information for '73 and '74, I think.

(Pause.)

A (Witness May) Mr. Briggs, you understand that a standing crop is the number from which the population size can be estimated. And, if I can use an analogy -- and I think it's not a bad one -- it's like looking at a container of running water. The water is running into it and water is running out of it, which is analagous to recruitment. If you take a measure of the volume of that water at several times during the period in which that water is running in, you estimate the volume, votal volume, of the water for the period, and this is the difference.

In standing crop, though, we do feel like, based upon our estimations over those different years, that we can make statements about the difference in the populations during those years. It should not be confused that they could be the same, but then we have to go back and look at the complete set of our data for those years to make that statement off the cuff. It's a matter of going back and reviewing it.

Q Can you use the numbers that are shown here for the purpose that's shown in the title of Table 1,

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comparison of the probability of survival from post-sac -- post-yolk-sac larvae to juveniles?

A (Witness Campbell) No, sir, I don't believe you can.

Q Well, then, I'm wasting my time.

A I'm sorry about that.

Q Okay.

MR. BRIGGS: I don't see that there is any need for more questions on this if it can't be used for that purpose.

DR. DAIBER: Let me just ask one question. It's a small one.

WITNESS CAMPBELL: Yes, sir.

BY DR. DAIBER:

Q In all three years in this particular table on page 7-10 you have several millionths and you've carried it out to the last digit. How much significance do you attach to those?

A (Witness Campbell) I wouldn't put a lot, sir.

Q Would you round it off to the nearest thousandth?

A Oh, at least.

Q Okay.

DR. DAIBER: That's all.

MR. BRIGGS: Let me follow that up a little bit.

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I have the same question.

BY MR. BRIGGS:

Q. This number for the ichthyoplankton gear says 15,880,690. When you finish rounding it off, do you get somewhere between 10- and 20 million, or is it 15 million, plus or minus a million? Or what is the accuracy of that number?

A. (Witness Campbell) I would tend to round that number about 15.8 million. The precision of the estimate -- I don't know if I have that right here.

I don't have that.

Q. I'm not so much concerned about the precision of the number as I am the accuracy of the number.

A. I recognize that. The accuracy -- precision, of course, would be the kind of thing we'd talk about putting confidence in for a rounded estimate, and accuracy is how close is it to a real number.

Q. That's right.

A. I think that's one of the things that is very difficult to determine statistically. I just don't -- I just can't give you the answer to that.

Q. I had hoped that would have been solved by now.

A. The problem of sampling bias enters here in the probability of potential gear avoidance, like we were talking about with the beach seines, because this is an

blt 20

extrapolation type of estimate. Without a knowledge of the actual number that were there to compare, there's no way that I know to get a handle on the bias.

MR. BRIGGS: I don't have anything more.

CHAIRMAN JENSCH: Here's just one further possibility you might consider.

This room tomorrow, as I understand it, is going to be used for some naturalization --

WITNESS CAMPBELL: We could tend to say that the direction of the bias would be in a negative direction. It would tend to be. What we have here is an underestimate.

MR. BRIGGS: Yes.

CHAIRMAN JENSCH: I don't know how long it's going to take. We have to knock off at 3:00 o'clock at the Holiday Inn. We might come back here from 4:00 to 6:00 and use as much time as we can tomorrow.

We'll give consideration to that possibility later on.

MR. TROSTEN: Mr. Jensch, could we have these three sets of operating reports marked as an exhibit? In view of the question that Mr. Briggs raised, I think it would probably be appropriate that they be received into evidence.

CHAIRMAN JENSCH: All right. Let's lump them all together into one.

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We have ours in a clip here. Everybody else does, I guess. The first sheet carries the heading "Unit 1, River Water Discharge, May 1974." The last sheet says "Data Sheet, September 1976, Indian Point Station, River Water Discharges by Circulator, Unit No. 3."

That collection may be marked for identification as Licensee's OT-17.

I assume these are true and accurate records of the company, are they?

MR. SACK: Yes, they are.

(The documents referred to were marked as Licensee's Exhibit No. OT-17 for identification.)

MR. BRIGGS: Was this the information that Dr. Lawler used in making his calculations?

(The panel conferring.)

WITNESS LAWLER: You're referring, I think, to my answer this morning with respect to Ms. Chasis' question on the calculation of velocity?

MR. BRIGGS: Yes.

WITNESS LAWLER: I'd like at this time to add one correction to that.

The specific velocities that I mentioned, 1.45 and .52, were in fact actual measurements. I was

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incorrect in saying that they were estimated velocities based on calculations.

What was done was that the conditions of the flow in the entrainment period in the year 1974 were re-simulated or rerun at Indian Point, and measurements, velocity measurements, were made in the nets under those conditions.

Now, to get back to the conditions of re-simulating the same conditions as the entrainment period, you would have had to created conditions that did exist during the entrainment period. I would presume that the conditions that existed were taken from the operating records.

And one final point. We have made calculations with respect to velocity in the intake and discharge areas of all of the plants, and when you do make those calculations the way you do them is to go to the operating records and get this type of information.

End 13

MR. BRIGGS: I just wondered whether these were the operating records that you used, and whether they were the daily records at the water gap.

WITNES LAWLER: What I'm saying was that an actual measurement was made. But to make that measurement, operating records would have had to have been used to reconstruct the condition, since the measurements were made after the actual period.

CHAIRMAN JENSCH: I take it the answer is yes or no, in any event.

Are you offering Licensee Exhibit OT-17? Any objection by regulatory staff, State of New York Atomic Energy Office, Hudson River Fishermen, Attorney General of the State of New York, Village of Buchanan?

(No response.)

CHAIRMAN JENSCH: I hear no response from either the village of Buchanan or the Attorney General. Licensee Exhibit OT-17 is received in evidence.

(The document referred to, having previously been marked for identification as Licensee's Exhibit OT-17, was received in evidence.)

CHAIRMAN JENSCH: Let's recess to reconvene tomorrow morning at 9:00 o'clock in the conference room of the Holiday Inn, Elmsford, New York, on Route 119, Tarrytown Road.

(Whereupon, at 5:15 p.m., the hearing was recessed, to reconvene at 9:00 a.m., Thursday, December 9, 1976.)

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