UNITED STATES ATOMIC ENERGY COMMISSION

IN THE MATTER OF:

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Place - [illegible]

Date - [illegible] **Pages** [illegible]

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UNITED STATES OF AMERICA

ATOMIC ENERGY COMMISSION

In the Matter of:	
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.	Docket No. 50-247
(INDIAN POINT STATION, UNIT NO. 2)	

12th & Constitution Avenue
Hearing Room C

Washington, D. C.

Tuesday, 6 March 1973

The above-entitled matter came on for further hearing, pursuant to adjournment, at 9:30 a.m.

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

DR. JOHN C. GEYER, Member.

MR. R. B. BRIGGS, Member.

APPEARANCES:

(As heretofore noted.)

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C O N T E N T S

EXHIBITS

None.

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PROCEEDINGS

CHAIRMAN JENSCH: Please come to order. What is the agenda developed by the parties this morning?

MR. TROSTEN: Mr. MacBeth is going to continue his cross-examination. He has advised me that he has some brief cross-examination of Mr. Woodbury, and then we will proceed to Dr. Lauer.

CHAIRMAN JENSCH: Very well.

Will you proceed?

Whereupon,

HARRY L. WOODBURY

was recalled as a witness, and having been previously duly sworn, was examined and testified further as follows:

CROSS-EXAMINATION (Further)

BY MR. MACBETH:

Q Yesterday afternoon you stated and this is reflected in the transcript at page 9551, "There are many people who would strenuously object to the erection of those huge cooling towers on the Hudson River. All one has to do is recall some of the hearings held on other projects on the Hudson River to recall the esthetic objections to things that might be built along the Hudson."

Mr. Woodbury, you are aware, are you not, that the Scenic Hudson Preservation Conference commented on the Staff's Draft Environmental Statement and said, and I am boiling it

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down to the gist that in the situation at Indian Point they did not object to the building of cooling towers at that site?

That comment is reflected in the second volume of the Final Environmental Statement at page 134.

A Will you restate the question, please?

(The record was read by the Reporter.)

THE WITNESS: I think, Mr. MacBeth, it would be more accurate to say that the Scenic Hudson Preservation Conference expressed the view that basically they objected to any intrusion, esthetic intrusion, on the Hudson, but that in the case of Indian Point the intrusion had already been made, and in considering what further intrusion might be created by the construction and operation of cooling towers they expressed the view that the cooling towers would be less objectionable to them than the operation of the plant, presuming that its operation would have serious adverse effects on the fishery.

They made no pretense to having any special knowledge, that I am aware of, or any special expertise on whether or not the plant would have a serious adverse effect. They accepted, I judge, the views that had been expressed by Intervenors and others in this case.

The Scenic Hudson represents, I believe, a group of people who came together expressly to oppose the construction of a power plant on the river. Individuals who are

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associated with Scenic Hudson had very personal concerns with respect to their own property holdings, a concern which they do not have, as far as I know, in the Indian Point area.

They represent a special group of interests on the river. There are other groups and other individuals on the river that they do not represent, and my comments were not related only to hearings, for example, that were held in which the Scenic Hudson was a participant.

CHAIRMAN JENSCH: Excuse me. I wonder if you could direct yourself to the question. I think the question was that you did understand that Scenic Hudson did not oppose cooling towers there. Could you answer that?

THE WITNESS: I think the question was an attempt -- if you would like, I will answer the question yes or no.

CHAIRMAN JENSCH: All right.

THE WITNESS: I will try to clarify then what my understanding of Scenic Hudson is, and they were not accurately expressed in the question.

CHAIRMAN JENSCH: Volume 2 is incorporated in the transcript. I think the question was what is your understanding of the view, and your understanding is that they do not oppose cooling towers for Indian Point Number 2. Is that correct?

THE WITNESS: That is correct, yes, sir.

CHAIRMAN JENSCH: All right. The next question,

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please.

BY MR. MACBETH:

Q I appreciate your expanding the statement, and I don't dispute it. I was just trying to get to the root of the matter. I assume you didn't want to cut off discussions of other groups. What other groups or individuals were you referring to who have made any public statement as to opposition to the construction of cooling towers at Indian Point 2?

A I think you misquoted what I said.

Q You said they would strenuously object. Perhaps I should ask, do you know any who have objected in any kind of public statement reflected in newspapers, or comments to the Staff on the Draft Statement, or in any other place?

A I was speaking of the attitudes that were expressed in the licensing of the Bowline Project and in the consideration of that project by the Hudson River Commission.

Q That is the Hudson River Valley Commission?

A The Hudson River Valley Commission, yes.

Q Were you referring to anyone else, any other group?

A I know of no other groups that have gone on public record indicating an objection to the cooling towers at Indian Point. As frequently happens, the objections come late in the game, after you start to build, and after you start to operate. That is when you get the objections, just as we have been getting objections to power plant construction, after the

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plants have been started. When Con Edison presents the 10 year and 20 year plan to all the public agencies and the newspapers and solicits views, it has been our experience that we don't really get those views until somebody, some surveyor shows up on the property and starts to work, and construction crews show up.

Q There are, of course, exceptions like the whole Scenic Hudson controversy?

A I didn't hear you.

Q There are exceptions like the Scenic Hudson controversy, are there not?

A I guess that is correct.

Q But just so we are clear about this, apart from the Hudson River Valley Commission at Bowline and not at Indian Point, you know presently of no other group which has made a public statement of opposition to cooling towers at Indian Point?

A That is correct. If public statements were encouraged, I am sure they would be forthcoming, but it seems to us since cooling towers are a possible alternative that such encouragement is contrary to the public interest.

Q Certainly there was an opportunity when the Draft Statement was published to comment. Looking over the index to the second volume of the Final Statement, I see no comment from the Hudson River Valley Commission. There are, of

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course, a number of comments from other parties. So there certainly has been an opportunity for public comments on this question.

A Oh, yes. Oh, yes. But there are very few comments from anybody who lives in the Hudson Valley in the vicinity of Indian Point. That doesn't say, however, that they have no interest.

MR. MACBETH: No further questions.

MR. KARMAN: I have no questions.

CHAIRMAN JENSCH: Any redirect or anything further?

MR. TROSTEN: No.

CHAIRMAN JENSCH: Thank you, Mr. Woodbury. You are temporarily excused.

(Witness Temporarily Excused.)

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CHAIRMAN JENSCH: Dr. Lauer is the next witness. Dr. Lauer has been previously sworn.

Whereupon,

GERALD J. LAUER

was recalled as a witness, and having been previously duly sworn was examined and testified further as follows:

CROSS-EXAMINATION

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BY MR. MACBETH:

Q. Dr. Lauer, I turn to your testimony on the effects of entrainment on Morone S.P. striped bass and white perch eggs and larvae at Indian Point.

On page 3 of that testimony, you discuss the experiments and observations made at the Connecticut Yankee plant, where it was found the majority of the fish larvae in the discharge canal to be mangled.

Do you know precisely what Marcy meant by mangling?

A. I have never asked him for his definition, no.

Q. Do you know of any reason why one would expect fish, or larvae, excuse me, at Connecticut Yankee, to be mangled and not find them mangled at Indian Point?

A. No.

Q. In other words, you know of no internal differences in the plants?

Did they put barbed wire in the tubes at

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Connecticut Yankee?

A. I have never seen anything like that.

Q. It seems anomolous.

Do you know of any differences?

A. We are discussing different fish species, for one thing, and it is a different plant. And I don't know if all the interior workings are the same or different.

He reports what he has reported, and we report what we report.

CHAIRMAN JENSCH: May I interrupt.

Isn't there something about a thousand foot discharge canal that comes out of Connecticut Yankee, and the water is very hot when it comes out of the plant, but by the time it gets into the Connecticut River, it lessens in degree, but goes through a long process of turbulence in this discharge canal?

Is that not correct?

Is that your understanding, Dr. Lauer?

THE WITNESS: I think it is more like about a mile long.

CHAIRMAN JENSCH: A mile long?

THE WITNESS: Yes.

There are some differences. We went through, in one way or another, those kinds of differences that were elicited earlier in the last session, and I was just avoiding

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being repetitious about the thing. But there are some known differences, one of which you described, which is a much longer discharge canal, a higher delta T, and a higher discharge temperature at Connecticut Yankee compared to the Indian Point plants. And they also have an ~~area~~ well brought up in the last session, composed of riprap rock, or boulders, if you will, that is in the canal to provide back pressure against the pumps, and this is a difference too, that exists there.

CHAIRMAN JENSCH: Both of which could contribute to mangling?

THE WITNESS: I don't know. It depends on what that definition of mangling is.

CHAIRMAN JENSCH: What do you understand it to be?

THE WITNESS: I elaborated at some length on that last time.

As far as I am concerned, when something is being described as ~~mangling~~ mangled, that means it is partially, or totally dismembered, fragmented, gouges out of it. In other words, it is not a whole and entire specimen anymore, and it is obviously not whole and entire from visual inspection, and it doesn't necessarily mean it has to be broken in two, but it could be smashed.

Any kind of major disfigurement of the normal profile of the organism would be described as mangling.

CHAIRMAN JENSCH: THank you.

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Excuse me for interrupting. Proceed.

BY MR. MACBETH:

Q. What about lesser damage to fish larvae coming through Indian Point?

They have been found, for instance, to have a few fins missing, or some other slight denigration.

A. You find some fish like that under any circumstances.

As I have indicated in my testimony, we do see occasional fish that are not complete and total and entire in our samples. One of the contributions to this that we do know that exists, is thatlarvae that may have entered the net or stuck on the side of a net and hangs there for a number of hours, dehydrates and dries out. And you will see those things coming in in the samples occasionally. And they are obviously larvae that have lost their water and they are dried, thin larvae.

So that is the kind of thing you see from time to time.

We haven't, however, seen -- that is within my definition of mangling here -- we haven't seen instances with gouges or fins pulled asunder and things like that.

Q. You may have just answered this question, but why did you attribute to collection damage, the original larvae that were seen in a mangled condition?

A. Part of it, just what I described.

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You see, these larvae come through that have obviously been dried out, and that is from the previous collecting period, those ones that stuck in the net. They are obviously dried out. They are buoyant, they float to the surface, there is no water, they are dried ~~issue.~~ in them tissue

We feel those are attributed to the collecting process.

Q. Have you made investigations in July in particular of the organisms that may be on the bottom of the discharge canal at Indian Point?

A. Yes.

We sampled three depths; surface, middle and bottom.

Q. Did you make any effort to collect anything that was literally sitting on the bottom?

I am thinking of the possibilities of organisms coming through and being stunned or dead, and sinking to the bottom. There have been some indications of that at other plants. I wondered if you investigated that phenomenon here?

A. No, we didn't put any kind of sled or scraping device to sample right at the bottom of the water interface of the canal.

Our bottom net does rest right at the bottom, the bottom of the rim does rest at the bottom.

However, as indicated in the testimony, we have --

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while that is always a possibility -- in looking at the concentrations we saw at the intake, we don't have any large group of organisms unaccounted for that would be for we saw essentially the same concentrations in the discharge as in the intake.

Q. Moving on to page 5 of your testimony, you discuss sampling there from June 4 through August 19.

Now, I have since seen the charts reflecting collection from August 1 on.

Is it not correct that no distinction was made in that period between organisms taken alive, dead and stunned?

A. That is true.

There were relatively few organisms involved, and we haven't got to the data process that would make a distinction. That is between August 1 and August 19, that particular piece of the time period.?

Q. Yes.

In other words, there would be no further information beyond what was contained in Exhibit number 2 as to the incidence of live, dead or stunned larv ae at the intakes and discharge of the Indian Point 1 plant in 1972?

A. No.

I think there will not be next year's ~~next group~~ study effort by our group until this bears fruit.

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Q. I had questions of the interpretation of the figure 2 on page 4. I am not sure how one would read the solid black areas.

Are those a combination of white perch and striped bass that you have not been able to distinguish one from the other? Or just what do the solid black areas represent?

A. Okay.

Yes, I can see how that might be subject to some confusion.

It might be helpful to look at the June 11 to the 17th peak in describing what these mean.

For example, for the 6 millimeter length larvae -- this is on page 6 -- for the 6 millimeter long larvae, for example, there is a hatched line extending up from behind the black line.

What this means is that there were white perch present in the amount represented by the height of that hatched line. In other words, approximately 26 in that bar.

What the blackened line means is that there were also at that same time and in those same samples, striped bass in the amount of approximately 17.

In other words, the white -- the striped bass are superimposed over the white perch. They both existed individually, and they were looked at individually. That is

what that means.

Conversely, where the white lines extend higher than the black lines in the latter part of that time period, the height of the white lines represents the amount of striped bass --

Q. Yes.

A. -- in the total, and the black lines represent the number of white perch.

Q. Yes.

Turning now to the condition of the entrained larvae, on the tables 2, 3 and 4 on pages 10 through 12, did you use all the tows that were made in the course of the summer of 1972 to produce these numbers, or did you select out some of the tows?

A. These were based on everything that was less than ten minutes in duration, because of the prior conditions that existed.

However, we had gone about, because of the questioning about how the longer tows might change the original estimate, we did go back to look at that to see what the effect would be of subtracting out all those organisms, whatever condition they were in, from the totals that were used for that calculation.

It turned out that it made about a 6 percent difference. I think it raised the percent survival by 6

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percent.

So it didn't appear to make a great deal of difference.

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Q Is it true that by pooling the organisms at discharge 1 and discharge 2 into one discharge figure, you are not able to see any distinctions that may exist between the numbers or the percentages, live, dead or stunned, at discharge 2 as opposed to discharge 1?

A Yes, that is true. The reason we did that was, however, because a number of samples at discharge 2 were relatively very few compared to the intake and discharge at 1, and that was due to a number of reasons, the primary one being the difficulty of getting the sampling gear installed early in the season, and we did that because in treating them separately statistically, because of the few numbers of samples, and the very bulky samples, there were no significant differences showing up essentially anywhere for the most part, between the intake and the discharge, and discharge 1 and discharge 2.

In order to get more precision and sensitivity -- well, that is indicated in the testimony -- in order to get more sensitivity into the analysis, we combined the two so that we could have a chance of seeing a distinction between intake and discharge.

Q That is sensitivity in the sense of reducing -- of having more confidence in the numbers produced rather than sensitivity in distinguishing discharge 1 from discharge 2?

A That is correct.

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MR. MACBETH: Turning to your Rebuttal Testimony of February 20th, at page 3, I have to report that in Mr. Clark's testimony of February 12th, there is a typographical error at the bottom of page 3 of Mr. Clark's testimony, where it says "Table 3." It should say, "Lauer Testimony Table 2."

MR. TROSTEN: Could we have just a minute on that?

MR. MACBETH: Certainly.

CHAIRMAN JENSCH: What page is that?

MR. MACBETH: Page 3, the bottom paragraph.

MR. BRIGGS: That should say "Table 2"?

MR. MACBETH: Yes, it should say, "Table 2".

MR. TROSTEN: "Lauer Testimony, Table 2"?

MR. MACBETH: Yes. Unfortunately, the two numbers did, I think, quite by accident appear on Table 3. I can see how you would be confused.

BY MR. MACBETH:

Q Will you take a look at that paragraph at the bottom of page 3 in Clark's testimony and then just glance over your own statement on percent of survival?

A My February the 5th testimony?

Q Yes, and your February 20th Rebuttal. My question is that with that correction, the discussion of percent of survival simply isn't relevant to what Mr. Clark meant to say.

If you would like to say something else in rebuttal, I would be happy to have you put it in, but I just

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wanted to make it clear ---

MR. TROSTEN: I think what we ought to do, Mr. MacBeth, is to give Dr. Lauer an opportunity to look back at Table 2 of his February 5th testimony. Why don't we do that on a break?

MR. MACBETH: Fine.

MR. TROSTEN: You can go on if you want.

MR. MACBETH: Yes. I just have one other question I would like to put.

BY MR. MACBETH:

Q At the end of the Rebuttal Testimony in the discussion of the size range -- well, obviously, that has to be striped bass larvae here, number 4 on page 5 -- but in discussing the size range of bass larvae in pressure column studies, do you know what the average size of the -- size and length of the larvae was?

You give a range. It remains unclear as to what the distribution across that range was.

A Are you referring to page 5 of Mr. Clark's?

Q No, page 5 of your Rebuttal Testimony.

A February ~~22nd~~ 20th?

Q Yes.

MR. TROSTEN: I have it right here.

Would the Reporter read the question, or would you restate it?

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MR. MACBETH: Let me restate it. I stated it rather badly.

BY MR. MACBETH:

Q In the discussion that starts on page 5 on striped bass larvae in the pressure column and going on to page 6, you gave a range of the sizes of larvae in the study. What I am interested in is the distribution of the organisms across that range. Do you know what the average was, and do you know whether there was a heavy clustering around the average?

A That is really not amenable to an average kind of figure. You had asked for some of that information, and I was able to follow Mr. ~~Bibco~~ Bibro around the country and retrieve some of it. There were quite a few stages of eggs and larvae used in these experiments, and you will see the reason why it is not possible to give an average.

Do you want me to go down through these?

Q Is it written up in a simple report?

A It is a table I made up from our telephone conversations from information he related to me on the subject. But it involves quite a different range.

Q Yes. Why don't you just report on it orally?

A We had the following stages of organisms that were tested. These are striped bass, developmental stages of striped bass, eggs and larvae, that were used in this kind of an experiment.

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They used 4 hour old eggs, 10 hour old eggs, 12 hour, 18 hour, 31 hour, 36 hour, 46 hour eggs. The organisms hatch at about 48 hours, and this stage was also tested. Then subsequently, larvae were tested that were 55 hours old, from fertilization of the egg stage, 120 hours, 144 hours, 240 hours, 340 hours to 350 hours, and then this was all done at the Moncks Corner Hatchery, and then that crop of larvae then gets moved up to the Edenton, North Carolina Hatchery.

So we followed them along, and also ran experiments on larvae from that same Cooper River, Moncks Corner stock at the Edenton Hatchery, and these were larvae about 30 days of age.

Now, for all these experiments, the minimum number of experiments that was carried out for each of these stages was four experiments, and each one of these experiments involved 480 organisms per experiment, and the total number of specimens, then, for each stage I mentioned, the minimum number exposed was approximately 1900 organisms.

There were additional experiments run from there, but this is the set sampling design, the experimental design, the profile. That was true for all stages through the 340 to 350 hour larval stage.

For the 30-day old larvae, there were 24 organisms -- these were bigger, and only one could be used per experimental chamber -- 24 organisms were used per experiment.

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There were approximately 20 experiments run, or a total number of organisms of 480. Those organisms ranged in length between 25 and 33 millimeters. Experiments were also done with pressure changes being employed concomitant with exposure to high temperatures, and the same stages were involved, and the same numbers of organisms were involved in those latter experiments with a combination of stresses.

In short, for all stages from 4 hour eggs up to 340 to 350 hour larvae, there were four experiments run for each stage, and each experiment involved 480 organisms, for a total of 1920 organisms for each developmental stage.

Then for the 30-day old larvae, there was again 20 experiments involving 24 organisms with each experiment for a total of 480 organisms, and the ranges for those larger larvae in size was between 25 and 33 millimeters.

Q These larger larvae, was there any increased mortality or behavioral aberration noticed?

A No. As I had indicated previously in my testimony, they experienced no increase in mortality or behavioral aberrations compared to the controls.

MR. MACBETH: I have no further questions. Perhaps this would be a good time to take a break.

MR. TROSTEN: This concludes your cross-examination?

MR. KARMAN: We have no questions.

CHAIRMAN JENSCH: How many minutes does Applicant's

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counsel desire?

MR. TROSTEN: If we could have about fifteen minutes, Mr. Chairman, that would be enough.

CHAIRMAN JENSCH: Let's recess and reconvene in this room at 10:05.

(Recess.)

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CHAIRMAN JENSCH: Please come to order.

Have you completed your examination?

Do you have some further interrogation, Hudson River?

BY MR. MACBETH:

Q. Would you agree with me that the discussion in your rebuttal testimony which is directed to the citation in Mr. Clark's testimony, this Table 3, simply is not relevant when the typographical error is corrected to Table 2?

A. I would not say it is not relevant.

The changing to Table 2, as far as I can see and understand it, makes a lot more sense than reference to Table 3.

Q. Yes.

All I wanted to establish to start with, is as far as this rebuttal goes to Table 3, it isn't relevant.

I also wanted to give you the opportunity to say anything you like with respect to rebuttal to Table 2.

A. Okay.

What I would say now, talking about Table 2 instead of Table 3, because the reference to Table 3 was not only confusing, but sort of ridiculous --

Q. It was. It doesn't make sense.

A. But relative to Table 2, now, the only thing that I can see from MR. Clark's testimony in terms of the

use of ~~members~~ numbers 34 and 56 that show up on Table 2 would be relative to the pooled averages in the top panel.

Q. That is right.

A. And that, wherein he divided the 34 percent for the discharge canal into the 56 percent for the intake and came up with a figure of 61, I would like to make it clear there was no such equation.

It reads in his testimony, like he pulled this out of mine, and ~~thtese~~ these are his own mathematical calculations, not mine.

Q. Yes.

A. And I would further indicate that in our opinion the -- while in his approach ~~that~~ has been taken by some, and in general, is similar to that which is similar to that first approximation approach that I took before we had gotten further along with the digestion of the data, that it is much more appropriate to again utilize the figures because they are based upon 95 percent confidence intervals, to use the figures for that kind of projection of survival that are indicated in the bottom panel on Table 2, whether it be without delta T, with delta T, or pooled average.

What one comes out within that ~~with that~~ instance is not a magic number of 61 percent, but what one does come out with is differences in live organisms between intake and discharge, for the pooled average of as little as 10 and as much as 33.

Again, using the example that I used in my rebuttal testimony in a sense, and in his glossing over things, but for the sake of understanding what this really means, it is that if 100 organisms were to be passed into the intake in an alive condition, you would expect, based upon our sampling information under the conditions specified in the testimony before, you would expect somewhere between 90 percent and 67 percent of those to come out the other side in an alive condition. That is what the bottom panel means.

There is no basis at this point for identifying one number within that range as being any more, really, any more reliable or likely than any other number in that range between 10 and 33 percent that is given there.

That is the 95 percent confidence limits on the data. So I would still maintain that those are the appropriate numbers and ranges to use, rather than an individual number that has no confidence limits attached to it.

MR. MACBETH: I have no questions.

MR. KARMAN: No questions.

CHAIRMAN JENSCH: Any redirect?

MR. TROSTEN: Yes.

REDIRECT EXAMINATION

BY MR. TROSTEN:

Q. Dr. Lauer, with reference to your testimony of

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February 5 on the effects of entrainment, on page 3, where you describe the condition of the larvae observed in the intake and discharge.

Did you observe any significant differences in the number of larvae which were observed in a mangled condition in the intake as opposed to the discharge?

A. No, we did not.

Q. Dr. Lauer, there have been comparisons drawn between the Marcy study at the Connecticut Yankee plant and the study performed by New York University at Indian Point 1.

Would you compare the level of effort?

Are you able to compare the level of effort from the standpoint of personnel employed in the Marcy study as compared to the NYU study at Indian Point 1?

A. Relative to the effort at Indian Point 1, last year?

Q. Yes, last year.

A. The level of effort being expended at the Indian Point plant to determine entrainment effects by New York University last year,was on the order of 4 to 5 times greater than the effort expended by the Marcy study.

This isn't being said to criticize the Marcy study, it is just simply an indication of the magnitude of manpower being employed.

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Last year, it ranged in terms of people, from 12 to 20 people on a given day, studying the effects of entrainment, and in Marcy's effort, they had 2 or 3 people generally trying to do the same kind of study.

CHAIRMAN JENSCH: Excuse me.

Proceed.

THE WITNESS: As far as this coming year is concerned, it is a monumental effort we are anticipating taking on, but we have currently a sampling program designed specifically to get at the ~~delta~~ the 15° delta T information which everybody has acknowledged is less than sufficient.

With the sample design that we have this year based upon what we learned last year, it is going to involve diurnal sampling around the clock, and that is going to involve on each collection day, a total of 24 people, or thereabouts, and will in that effort -- we will be taking a number of samples for abundance of live, dead, stunned condition assessments in one 24-hour period which will, essentially, exceed in one day the number of samples that are represented in the analysis.

So it is going to be a monumental effort involving many thousands of samples.

CHAIRMAN JENSCH: Let me ask Applicant's counsel: What is the relevance of that statement?

Are we to get into the subjective analysis and

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how capable the people are?

Supposing the two or three at the Marcy study are all Ph.D.s and have qualifications far beyond, and are nimble and quick and can grab samples faster, and they don't have a time clock measurement.

Are we going into saying that Dr. Lauer is setting up a crew of 20 to 24 people who never saw the water before, and they scoop out sand instead of water? Do we have to go into all that?

THE WITNESS: I didn't say all those things, sir.

CHAIRMAN JENSCH: I know you didn't.

You have a greater number of people and it is bound to be better. I am having difficulty with that conclusion, unless we know who the people are.

You could pick out on the train coming out, a half dozen and stand them on the river, and ipso facto, we have a better job done. Is this relevant?

MR. TROSTEN: Mr. Chairman, I appreciate your questions and the relevance of the question and Dr. Lauer's answers to it are very simple. It has to do not with any criticism of the quality of the Marcy investigators or any comparison of the relative merits of the investigators of NYU and Marcy and Kerner, but it has to do with the data base on which decisions are made.

If, for example, you were dealing with a

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comparatively scanty data base, it calls into question, for example, conclusions that might be drawn from that relatively scanty data base.

Similarly, if criticisms are leveled at the results of experts that are the result that are produced by a much greater level of research effort, assuming all other things being equal, it makes one question whether those who rely on a much lesser data base to draw certain conclusions are justified in doing so.

So that is the relevance of the question. It is simply to compare the relevant data base, assuming that all investigators are equal and that everybody is working on the same plane and we are all trying to achieve the same result.

CHAIRMAN JENSCH: I didn't understand that that was your question.

Your question was, what was the relative effort per catch, or effort undertaken, and he gave us numbers of people involved, and he did develop that there would be a 24-hour take in one phase of the program. That does extend, I assume, the data base.

But I didn't understand from your question -- I thought you were asking the number of people involved, and he gave that. I couldn't see, on that basis, the relevance.

MR. TROSTEN: Mr. Chairman, it is rather

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difficult, and I am not undertaking to determine the magnitude of effort other than simply in a personnel expenditure or dollar expenditure. I wasn't trying to go into what were the relative qualifications of the people involved, or what have you.

I don't think it is necessary or desirable to go into that.

CHAIRMAN JENSCH: I didn't think so either.

I understood that to be the purport of your question.

Proceed.

MR. TROSTEN: I have no further redirect.

CHAIRMAN JENSCH: ARe there any further questions.

DR. GEYER: In the rebuttal testimony on the effects of entrainment at page 2, Figure 1, you show the sampling stations ~~B-1 and B-2~~ D-1 and D-2 in the discharge canal and I-1 and I-2 in the intake.

Are the intake sampling stations back or downstream of the fixed screens?

THE WITNESS: Yes, sir, they are.

They are between the fixed screens and the traveling screens. They are inside the canal.

DR. GEYER: Do you have data showing the situation outside of those fixed screens?

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THE WITNESS: We have a great deal of data outside the fixed screens, and that is data that comes from the eight-station sampling out in the river at three depths.

DR. GEYER: Not in the front?

THE WITNESS: No, not in the front.

There will be efforts to get closer to the intake screens this summer to determine the abundance of the organisms vertically and in time in front of the screens relative to what we see coming through.

DR. GEYER: Fine.

I think that would be useful information.

Thank you.

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CHAIRMAN JENSCH: If there are no further questions, thank you, Dr. Lauer, you are excused.

(Witness Temporarily Excused.)

CHAIRMAN JENSCH: Who is the next witness, Dr. Lawler?

MR. TROSTEN: Dr. Lawler is the next witness. Dr. Lawler has been previously sworn.

CHAIRMAN JENSCH: Hudson River Fishermen, you may proceed.

Whereupon,

DR. JOHN P. LAWLER

was recalled as a witness, and, having been previously duly sworn, was examined and testified further as follows:

CROSS-EXAMINATION

xxx

BY MR. MACBETH:

Q Dr. Lawler, in your testimony on February 5th on the contribution of the Hudson River to the Middle Atlantic striped bass fisheries ---

MR. TROSTEN: Give us a moment to find that.

BY MR. MACBETH:

Q Since we are moving into a topic that was not in the sworn testimony, I would like to put to you a few questions on your qualifications in the fields. Have you undertaken yourself any tagging recapture studies of fish?

A Personally?

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Reba 2

Q Yes.

A No, sir.

CHAIRMAN JENSCH: You will have to speak a little louder, because the Reporter will need to hear you better.

THE WITNESS: Fine. No, sir, I have not personally.

BY MR. MACBETH:

Q Prior to the February 5th testimony, have you written or published any analysis of tagging recapture studies?

A There may be some analyses of tagging and recapture studies in the various reports that have come out of our office. I can't at the moment give you a specific citation.

Q You said you had not personally undertaken any tagging or recapture studies. Have you directed personnel who have undertaken such studies?

A To a minor extent, yes, sir. As you are aware, my organization is involved in rather extensive water basin studies, and to carry out these studies we have a team of biologists, engineers, mathematicians, chemists, and representatives from various scientific disciplines, and there have been some tagging studies done by our organization, but nothing of major consequence as yet.

Q What was your role in directing those minor studies?

A My role in my organization is to supervise all such studies that deal with the water environment.

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Reba 3

CHAIRMAN JENSCH: I wonder if you would explain that? Supervise, is this after the work has been done, or what do you direct?

Can you give us some enumeration of items that you utilize in directing the work to be done?

THE WITNESS: Well, Mr. Jensch, our organization deals ---

CHAIRMAN JENSCH: Just what you enumerate to be done. You say you supervise. Do you direct the work before it is done, or do you review it after it has been done? What specific items do you set up as standards either for the work to be done or the character of the review that you undertake.

THE WITNESS: I am involved, really, in all facets of the work from the beginning to the end. It is usually I that deals with the potential client in describing the kinds of things that are needed for the particular problem, the problem that he may have.

I write many of the proposals, and in these proposals a work plan or scope of work is delineated. I pass this work on to various project managers, project engineers, project biologists, in our group and during the course of the study I maintain rather active interests in and participation in the study.

The final reports before they go out, are all

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Reba 4

draft reports, many draft reports, are reviewed by myself, and when a final report goes out, I have usually had some substantial input into it.

So I am involved in virtually all aspects of the job.

CHAIRMAN JENSCH: Maybe my question wasn't clear. You have described the mechanical things that happen, how you talk to the client and tell him about the program that I presume you would undertake or something, and then you say you review it.

What are the items that tell whether it is a good report or a bad report that is finally done by your group of biologists or chemists or engineers? How do you decide whether it is a good report or not?

THE WITNESS: Well, I suppose that is a matter of judgment, but one thing that I find to be particularly important in judging and analyzing any of this work is to determine whether the problem has really been addressed correctly, whether it -- I am fond of using the expression that we have to make sure we can distinguish the forest from the trees.

I am particularly interested in seeing that the overall problem that has been posed is, in fact, kept in the forefront and that we don't go down some sidetrack that may be very ~~interested~~ interesting but doesn't necessarily bear on the overall problem or solution that is required.

CHAIRMAN JENSCH: Let me take no further time.

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Reba 5

Thank you.

BY MR. MACBETH:

Q Have you yourself undertaken any other analyses which relate to spawning and nursery areas of fish to a larger adult fish? That is, aside from what is reflected in your February 5th testimony in this proceeding, or, rather, testimony in this proceeding?

A What is reflected in the February 5th testimony that you are referring to is one portion of the activity that I have been involved in throughout this proceeding from Mid-1971. So I would say, to answer your question, the analysis and assessment of the role of spawning and developing stages has been something that I have been involved with in this particular proceeding for a year and a half or more.

Q My question went a little further. It was relating the spawning and development stages to the adult fishery. I really meant that in a geographic sense. This testimony goes to the relations between the Mid-Atlantic coastal fishery and the spawning grounds in the Hudson.

Have you done any other studies of that sort?

A Not outside of this proceeding, no.

Q Have you directed any studies of your personnel in that type of activity?

A Again, not outside this proceeding.

Q Apart from more general information that is

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included in testimony throughout this proceeding, have you yourself undertaken any other studies of the spawning and the nursery conditions of any species of fish?

A No. Again my answer would be the same.

Q None outside this proceeding?

A None outside this proceeding. I could add that the kinds of things that have developed over the past year and a half in this proceeding ---

CHAIRMAN JENSCH: Would you speak a little louder, please?

THE WITNESS: I might add that the kinds of things that have been developed in this proceeding over the last year and a half are indeed applicable to other work that we are involved in on the Hudson River, but, again, I would include that in my formal answer.

BY MR. MACBETH:

Q Yes. Have you directed any of your personnel in studies of spawning and nursery conditions of any species of fish besides those that are reflected in this proceeding?

A Well, we are involved in one other study in North Carolina at this time that does bear on many of the same types of things that we discussed in this proceeding and does include the consideration of fish spawning and fish development in an area totally unrelated to this proceeding.

So the answer would be yes, there are those studies.

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Reba 7

Q Could you describe the North Carolina study to me? What species of fish are involved?

A This is a study in the Cape Fear River Estuary in North Carolina. It is in assistance to the Corps of Engineers in the Wilmington, North Carolina District in preparing an Environmental Impact Statement dealing with river and estuarine and harbor dredging. The Cape Fear River does have a fish of commercial value and some shellfish, and the concern on the part of the Corps is to properly assess the impact of continuing dredging operations and the disposal of the spoils and this involves the whole gamut of the ecosystem, including the damage that might be done to the residents or migratory fish populations.

Q What species of fish are involved in that?

A Well, I can't give you right offhand the particular species. There are a series of crabs and shrimp on the shellfish side. There are some fin fish. The particular fin fish involved, at least to the best of my knowledge at this time, are not considered to be terribly important in that area.

I can get this information for you.

Q That is sufficient, I think. What has your role been in supervising that project?

A Well, in this particular project, this is being carried out by a group known as the Total Environmental Group, of which we are a member, and the Project Manager for that

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Reba 8

group is a terrestrial ecologist from the University of Massachusetts in Amherst. He is also a participant in this group, and in this particular project he was selected by the group to be Project Manager for the entire operation.

Our own organization is responsible for all of the aquatic studies, and we have assigned a project biologist who has been resident in North Carolina since last summer, and he reports to our biological group who in turn reports to me.

CHAIRMAN JENSCH: I think the question was what do you do? Did you just send him down there, or do you tell him what to do and what he is to look for and to write up? What instructions did you write for him?

THE WITNESS: Well, what I wrote for him was a series of concerns that I would have with respect to the proposed project, which was the dredging of a significant number of miles of this waterway, and what this individual was instructed to do was to set up a biological sampling program.

There was very little -- well, I shouldn't say there was very little information. The North Carolina people did have some very good information on the subject area and the kinds of biological organisms that were found there. I particularly instructed my personnel to, in setting up a sampling program which was to cover the distribution of

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Reba 9

benthic organisms and the distribution of planktonic organisms and the distribution of fishes to bear in mind that the ultimate objective here would be to tie together the relationship of each of these organisms one to the other and to the overall aquatic environment in which they were living, and the idea there was that rather than simply come out with a report that suggested that, "Well, there are so many fish here, and so much there, and there is this distribution of them, and there are so many types of bottom dwellers," my objective would be to be able to say in a report the role that each one of these organisms plays, one to another, so that in making an assessment of how many organisms and what percentage of the organisms might be lost due to the dredging and spoils disposal, one might be able to make some predictions as to what effect this would have on the overall estuary, not simply a particular species.

These are instructions that are laid down to the individual in question.

CHAIRMAN JENSCH: I think, as I understand the interrogation, he is trying to find out have you had such experience in data collections as Dr. Lauer has, for instance, and which Con Edison has utilized in this proceeding, as a basis for your testimony about the contribution of the Hudson River to the Middle Atlantic striped bass fishery.

I take it you have in this case been primarily

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Reba 10

concerned with data collected by Dr. Lauer and others, and you now are proposing to reflect an experience similar to Dr. Lauer's as the basis for your opinions, I take it, in this February 5th Rebuttal Testimony.

Do you feel that you have covered the same field in your experience as Dr. Lauer has, for instance?

THE WITNESS: I didn't get the impression that that is what Mr. MacBeth was asking, but to answer your question, no, I don't feel that the area of my experience is similar to the area of Dr. Lauer's, definitely not.

CHAIRMAN JENSCH: Thank you.

You may proceed.

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BY MR. MACBETH:

Q Have you had the experience in collecting statistics on either the commercial fishery or the sports fishery?

A Inside of this proceeding, yes.

Q Besides what is in the testimony in this proceeding?

A I don't recall any offhand. Theremay have been some use of commercial fishing statistics, particularly in the past. I just don't recall any offhand.

Q Have you had any experience, done any reports or published any papers analyzing fisheries statistics, either in sports or commercial fisheries?

A Again, not outside this proceeding, or, let's say, not outside of our general work on the Hudson River.

Q What is your biological training?

A My biological training is primarily through courses that I have taken while a student in a variety of what were then known as sanitary engineering programs, all of which included courses on biology and what we call sanitary biology, and focused on bacteriology, and applications of biological concerns in the engineering field.

As you may know, there are a number of treatment processes for water treatment as well as waste treatment, and to involve biological mechanisms as well as chemical and physical mechanisms, and for this reason most classical

sanitary engineering programs include courses in sanitary -- what were called -- sanitary biology courses.

Q Do you have any formal training in the biology of fishes?

A Not outside the programs I just referred to.

Q I was thinking inside the programs. The description you just gave made me feel there was much more emphasis on bacteriology and forms of life lower than fish.

A Right.

Generally the emphasis was there. The role of the fish and their existence, et cetera, was most certainly included in these courses.

Q Dr. Lawler, in your opinion, what percentage of striped bass in the mid-Atlantic area -- and by that I refer to the waters from Delaware and New Jersey to New York -- come from the Delaware River in the sense that they were spawned from the Delaware River or its tributaries?

A I don't have an opinion on that, Mr. Macbeth.

Q Do you have an opinion as to not necessarily the precise number, but a range of numbers.

A In the middle Atlantic catch, commercial fish statistics, if you take those on an average basis, and this is using the data given by Koo -- this is a paper that has been quoted a number of times in this hearing -- you will find that 11 percent of that catch is reported as landings in the

State of Delaware, and that 31 percent of that catch is reported as landings in the State of New Jersey.

Furthermore, if you look at the landings in the State of New Jersey in more detail, you find that some 68 percent of that 31 percent are catches either in Delaware Bay or off the southern coast of New Jersey.

So, taking those numbers together, something like 32 percent of the catch, partial catch as reported by Koo, come from the South Jersey area, Delaware Bay, and the State of Delaware.

I would guess that a substantial portion of this could come from Delaware. Whether it does or not, I think the ~~electrophoretic~~ electrophoretic study that Dr. McFadden referred to yesterday will probably decide this issue once and for all as to where they come from.

Q You say you guess that up to 32 percent, of a substantial portion of that 32 percent could come from spawning in the Delaware River.

Can you be any more firm about it?

A No, sir, I can't.

Q When you say "a substantial portion," what do you mean by "substantial"?

A I said, if you recall, a substantial portion could--

Q I know. I am just trying to get a range of what you meant by the word "substantial". Does that mean between

two percent to you, or fifty percent? That is all I am after.

A. Why don't I answer it this way:

I would guess that there is a good likelihood that all of it could come from either the Chesapeake or the Delaware. What percentage of it could be allocated to the Delaware, I really don't know.

Now, I probably could get a minimum number, although I don't have it at the moment, by simply taking the total catches reported in Delaware Bay. That number is available. I simply don't have it in front of me.

Q Does that mean that you would assign all that percent of the catch in the middle Atlantic States that was taken in Delaware Bay to spawning in the Delaware River and its tributaries.

A I said that one could do this. Whether their appearance in Delaware Bay is automatic evidence that they were spawned in Delaware Bay, I really don't know.

CHAIRMAN JENSCH: Excuse me -- I wonder if we could get the question. I wonder if you missed a question? I think the question was "Does that mean that you would attribute all of this to the Delaware River or the tributaries?" Yes or No.

THE WITNESS: No, sir.

CHAIRMAN JENSCH: Thank you. Proceed.

BY MR. MACBETH:

Q What does that statement really mean? It really means that one could do it, not that you would do it?

A Well, Mr. Macbeth, my point, and I think this is evident throughout this testimony, is that I am not trying to allocate the percentage distribution or percentage contribution of the three areas, Chesapeake, Delaware and the Hudson, to the middle Atlantic catch, and I suggest that, also, I think that the way to do this is the way that Dr. McFadden suggested yesterday.

I am simply suggesting to you that it seems to me to be certainly possible, and possibly even -- I don't know that I want to say "probable" -- but let's say greater than in the realm of possibility that the contribution of the Delaware can be measured as minimum by looking at the fish caught in Delaware Bay.

MR. TROSTEN: Mr. Macbeth, just to put this matter in perspective, you are not suggesting that Dr. Lawler had contributed a percent of Delaware Bay in his testimony, because that is not the case?

MR. MACBETH: He said in light of the above information, Clark's contribution on page 4 must be rejected and the Delaware Bay and its tributary rivers considered as a contributor of striped bass to the Atlantic population.

What Dr. Clark said was that Delaware Bay and

its tributaries was a significant contributor to the Atlantic population. I am trying to find out what kind of contribution Dr. Lawler thinks the Delaware makes. It may be that he and Mr. Clark are not too far apart, if the word "significant" is inserted in Clark's statement, but in order to find that out, we have to probe and see what kind of contribution and what percentage contribution, and the range, Dr. Lawler thinks is appropriate for Delaware.

I haven't foudn a precise percentage figure here. That is one reason I asked the question to begin with.

CHAIRMAN JENSCH: Will you proceed with the interrogation, please?

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BY MR. MACBETH:

Q What studies do you rest your opinion about the percentage from Delaware on?

A I think I indicated a moment ago that I don't have an opinion, a particular opinion, on the percentage in the Delaware.

Q Strike that question.

Your opinion that a substantial portion of Mid-Atlantic fishery could come from Delaware?

A Well, I think what I am suggesting is that just on the basis of -- that the nearness of the locale or the geography of the catches, that the catches in the South Jersey area and in Delaware Bay and in the State of Delaware may very well, at least a portion of them, come from Delaware Bay.

CHAIRMAN JENSCH: Excuse me for interrupting. We are admonished several times to expedite the hearing, and one way to do it, I think, is if the witness would answer directly what the question is. I think the question was "On what studies do you base your conclusions that a substantial portion could come from the Delaware?"

I think your answer is none, is that correct?

THE WITNESS: No, my answer is the commercial fishing statistics.

CHAIRMAN JENSCH: Would you identify the statistics

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Reba 2

you had in mind?

THE WITNESS: I did a minute ago, Mr. Jensch. These are the statistics in Koo's statement by state, from 1930 to 1966, and this is supplemented by the fishing statistics that are published by each state.

CHAIRMAN JENSCH: Very well. Thank you.

BY MR. MACBETH:

Q I will read you a paragraph in the abstract of Chittenden's paper, entitled, "Status of Striped Bass in Delaware River", and in the second paragraph of that abstract, Chittenden says, "Gross pollution of the tidal fresh water area is destroying its potential as a spawning and nursery area. It has resulted in the virtual extirpation of the striped bass from the area and upstream waters, and is the probable cause of the decline of abundance of these species in the Delaware River.

"Major restoration of striped bass would occur if pollution is decreased so that the tidal fresh water section resumes former importance as a spawning and nursery area."

I will show it to you as it is reflected in Dr. Goodyear's testimony of March 1st. I am afraid I failed to bring my copy with me. Are you familiar with Chittenden's paper?

A No, sir, I am not. I am familiar with its existence. I haven't read it personally.

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Q It is a little unfair to ask on the basis of the abstract, but having read that much of the abstract, does that in any way change your opinion about the contribution that the Delaware and its tributaries could have to the Middle Atlantic striped bass fishery?

A Well ---

CHAIRMAN JENSCH: Just yes or no, and then you can explain it in any way you want. The question is, does that change your opinion?

THE WITNESS: No, I don't think it changes my opinion. I think I indicated in my testimony that the river itself was polluted, and this is what Chittenden is talking about, the Delaware River, and I indicated that the role that the river itself plays is questionable, particularly because of the pollution aspect, but I think I also indicated that to some extent the role of the river itself would play would depend on the fresh water runoff in any particular year, since the major pollution is generally in the Philadelphia area, and depending on flows, this runoff may be substantially further downstream than Philadelphia.

In fact, the whole notion of regulation of the Delaware is to keep this below Philadelphia, because of major water intakes in the Philadelphia area.

BY MR. MACBETH:

Q Do you have any knowledge of the condition of the

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Reba 4

striped bass eggs which have been recovered from the Chesapeake and Delaware Canal?

A Do I have knowledge of their condition?

Q Yes.

A I don't recall any commentary on their condition.

Q It is your opinion that Murawski's study which you discuss in your testimony principally on pages 4 and 5 supports your opinion that a substantial portion of the 32 percent of the striped bass catch could come from Delaware, is that correct?

A Yes. I cited Murawski's study because it does indicate that there is spawning activity in the Delaware.

Q It is on the basis of the Murawski study that you put major emphasis on tributaries in the Delaware, and the Delaware itself, is that correct?

A I think I also indicated some evidence that Mr. Hamer of New Jersey suggested as indicative of the role of the Delaware.

CHAIRMAN JENSCH: I don't think that quite answers the question, Dr. Lawler. I think the question was, "And is Murawski's study on which you place your principal reliance that it comes from the tributaries, rather than the Delaware?"

THE WITNESS: I would say so, yes.

CHAIRMAN JENSCH: Thank you.

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Reba 5

BY MR. MACBETH:

Q In your opinion, what percentage of the striped bass in the Middle Atlantic fishery comes from Chesapeake Bay in the sense that they were spawned in the bay or tributaries to the bay?

A In my testimony, I have expressed no particular opinion as to the percentage contribution of the Chesapeake Bay to the Middle Atlantic Fishery. It is my opinion, based on the various literature that has been cited in this hearing and that I have read on this topic, a rather substantial portion of the striped bass fishery of the Middle Atlantic region does come from the Chesapeake Bay area.

Q When you say "rather substantial", what range of figures do you have in mind?

A Well, I have never really had a particular range of figures in mind, Mr. MacBeth. I think that I could provide you with a calculation that would suggest that one could support more of the catch in the Middle Atlantic Region as coming from the Chesapeake.

CHAIRMAN JENSCH: Excuse me just a minute. I don't think that was quite the question. You said you could, as I understand it, that you could work up some figures. I think the question was what is your opinion.

The calculation might be figures which do not reflect your opinion. The question is, can you give us your

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opinion about it, yes or no.

THE WITNESS: Well, I would say that my opinion would be that, again, and I am using the basis that I stated a few moments ago, would be that more than fifty percent of the contribution to the Mid-Atlantic fishery would come from the Chesapeake and very possibly 75, 80, or even 90 percent of the Chesapeake -- of the Mid-Atlantic fishery could come from the Chesapeake.

BY MR. MACBETH:

Q So it is somewhere between 50 and 90?

A I would use 50 as a minimum. I would say more probably in the range of 75 to 90 is more than likely the number.

end

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Q. Now, in the previous testimony in December, Dr. Raney provided us with a long list of papers on which he relied, various analyses that had been undertaken on this issue.

Are you relying on any information or analysis in addition to what is already presented by Dr. RAney or by the STaff and Intervenors?

I realize it is a large body of material, and I don't want you to cite all of it, but if you have something additional --

A. No, I an not relying on anything other than a host of literature and papers that have been referred to in the proceedings so far.

Q. You say on page 7 of the testimony, the purpose of your analysis is to utilize the definitions of mid-Atlantic employing commercial fisheries statisticians, and by Goodyear, and the rivers south of Chesapeake Bay will be considered to contribute nothing to the fishery in the mid-Atlantic area.

That struck me as a somewhat ambiguous phrase.

Are you excluding contributions from the river simply for the purpose of analysis, or is it your opinion that that river does not, in fact, contribute to the mid-Atlantic fishery as defined in the fishery statistics?

A. The latter, from what I can read, the rivers south of Chesapeake Bay probably do not contribute substantially

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to the landings, commercial fish landings in Delaware, New York and New Jersey.

The reason for this statement is that there has been quite a bit of confusion throughout the hearing as to what shall we define as the middle Atlantic region.

Q. Yes, I realize that. I just wanted to get that relation here.

Going on to page 9, I think there is a typographical error here that we might clear up.

In the third full paragraph, you say:

"In Table 1 it can be seen that commercial catch striped bass undergoes periodic cyclical fluctuations, but the general trend has been upward from a low point of 1097 million pounds in 1934 to 9076 million in 1966."

There were two things that bothered me about that. The reference seemed to be Table 2 rather than Table 1, and the figures in Table 2 are given in thousands of pounds rather than millions of pounds.

A. Both points are correct, Mr. Macbeth.

Possibly the easiest way of correcting the numbers would be to simply write them as 1.097 million pounds to 9.076 million in 1966. That would do the same thing.

Q. And change Table 1 to Table 2?

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A. It should be Table 2. You are quite correct.

Q. At the bottom of page 12, in the last sentence, that may be a little black humor, but it looked to me like it was a typographical error.

A. The word "do" I think you are ref erring to?

Q. Yes.

A. I think the word we were using there was "dire."

Q. Thank you.

Now, the same thing, on page 10, in the second full paragraph where it refers to Table 1, that again must be Table 2, is that correct?

A. Yes, that is correct.

Q. Now, in that paragraph 00

CHAIRMAN JENSCH: Which one?

MR. MACBETH: The one on page 10, the one that begins, "Table 2."

CHAIRMAN JENSCH: Thank you.

BY MR. MACBETH:

Q. In that paragraph, you discuss an analysis, which is two years after the increase of fish taken in the Chesapeake, there is an increase in the number of fish taken in the middle Atlantic, and you say that that is consistent with the idea that these fish originated in the Chesapeake Bay, since members of the year class first appear on commercial catches near their spawning areas, and then in

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later years in more distant areas as fish grow older and it seems to me you might be proposing a diagram somewhat analogous to that of the Staff in the Final Environmental Statement in which you would chart the Chesapeake landings against mid-Atlantic landings two years later. And you would have some kind of support that Chesapeake was contributing to the mid-Atlantic.

Now, I realize that Dr. McFadden felt this was an improper thing to be doing. Maybe that is one reason you didn't reproduce such a chart here.

But, have you made such an analysis?

A. Yes, sir, we have.

Q. What did it show?

Did you actually make a chart?

A. Yes, sir, we did.

Q. Do you have that with you?

Could I see it?

A. No, sir, I don't have it with me.

Q. Did you describe what the results were?

First of all, I want to make a request to see the chart. I would like to actually see the thing itself.

But, did you describe the results of that?

What is shown on that chart, and what conclusions did you draw from it?

A. We did the same type of ~~progression~~ regression analysis that

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Dr. Goodyear suggested and performed in the Final Environmental Statement and we found results that were virtually identical to the results that he found, namely that the so-called R-squared factor which was a measure of the variation when the points were done without using running averages as Dr. McFadden suggested was invalid.

We found our squared value of .81. We did a multiple analysis in which both the Chesapeake catches and the Hudson River catches, where the middle Atlantic was correlated to those two catches, and in that case the R-square value was slightly higher.

I would have to dig back to see what we found on the multiple analysis. It was better than the Chesapeake analysis alone.

Q. And you were doing the Chesapeake landings against Atlantic Landings two years later?

That is the first figure that you gave me?

A. That is right. That figure was presented in Koo without any statistical regression analysis.

The chart, itself, is similar to the first chart that Dr. Goodyear presented before he presented his actual regression analysis. That is presented in Koo.

I might note while we are talking about typographical errors, that at the bottom of Table 2, there are two averages given, and they are located under the wrong columns.

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The average designated "68.6" should be moved over one column to the left, and appear under the column entitled "Chesapeake Bay, percentage of Atlantic catch taken from, " which has to be the Bay, and the "12.2 percent" should again be moved over to the left one column and appear under the column entitled "percentage of the Atlantic catch taken from the mid-Atlantic."

Q. Did you have another number to put under the Hudson River?

A. It doesn't look very big. I can get it for you if you would like.

Q. No, I just thought you probably had calculated one.

A. We probably did. It almost looks like the typist made a mistake.

MR. BRIGGS: While you are talking about Table 2, can you tell me where is the end of the Hudson River with regard to the commercial catches?

THE WITNESS: I will have tocheck that, Mr. Briggs. But I am pretty certain it would go all the way down into at least the upper harbor. I don't think it would include beyond the Narrows.

Most of those Hudson catches, though,are landed in the Tappan Zee area and north. I don't know that there is any significant catch in the area below the so-called

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Fairmont Pier, which is about 20 miles north of the Battery and which is the point below the point at which the Hudson begins to narrow and run in very deep water all the way out to the harbor.

MR. BRIGGS: Thank you.

BY MR. MACBETH:

Q. Did you draw any conclusions from the plotting of the charts that match Chesapeake landings to mid-Atlantic landings?

A. No, sir.

Q. Why was that?

Do you think that any conclusion -- I will just stop.

Why was it?

A. I think Dr. McFadden indicated that that was an invalid procedure.

Q. All right.

In the discussion of the tagging studies by Clark, Alperin and Schaefer, you discuss Clark's testimony on Alperin and Schaefer, the fact that he relied on their data but not on their conclusions, and then you go forward and say that it is of interest to note precisely what Alperin and Schefer did include in the studies.

CHAIRMAN JENSCH: What page are you on?

MR. MACBETH: Page 20.

CHAIRMAN JENSCH: Thank you.

end 8
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BY MR. MACBETH:

Q And then you quote roughly a full page of Alperin?

Are you adopting Alperin's conclusions as your own?

A I don't quite know what you mean by that statement.

Q It is interesting to know what Alperin has concluded, but if all you are saying is this is what said, nobody is going to test that; we will assume you proofread this, but are you saying something more than that?

Are you saying thatyou agree with Alperin?

MR. TROSTEN: With respect to what?

MR. MACBETH: With respect to his conclusions as set out on pages 20 and 21 of the testimony of February 5.

THE WITNESS: Sir, I think I made my point quite clear.

CHAIRMAN JENSCH: Just answer the question. I think that would be helpful.

Do you adopt his conclusions, yes or no?

THE WITNESS: I don't think, Mr. Chairman, it is a question of whether I am adopting his conclusions.

CHAIRMAN JENSCH: We will resolve that later. But the question to you is: do you accept his conclusions, yes or no?

THE WITNESS: His conclusions seem quite logical

to me.

CHAIRMAN JENSCH: Do you accept them?

THE WITNESS: Without further analysis of them? Yes, I would accept them.

CHAIRMAN JENSCH: Very well. Thank you.

BY MR. MACBETH:

Q I didn't catch that.

You do accept them without further analysis?

A That is right, because the reasons for putting them in here, as I state on page 20, is that Mr. Clark relied on their work and yet indicated he did not agree with their conclusions. So I felt in presenting this testimony, it would be worthwhile to see and put in the record just what Alperin and Schaefer did conclude. That was the express and only purpose for incorporating this statement.

DR. GEYER: When you say you accept his conclusions, do you mean you agree with them?

I am not sure what the word "accept" means. You accepted them and put them in here. I can see that all right.

THE WITNESS: I don't have any quarrel with his conclusions, Dr. Geyer. I think what I am simply suggesting is that I am not purporting to have analyzed in great detail the work of Alperin, but since

Mr. Clark indicated that he did not agree with the conclusions of these people, I thought that their conclusions ought to be noted for the record.

DR. GEYER: Thank you.

BY MR. MACBETH:

Q How much analysis have you done of Alperin's data and his conclusions?

A I think, Mr. Macbeth, the analysis that was done was simply to indicate, as I have in the testimony here, the percentage of returns from the Hudson River and from other areas, indicating that the Hudson River return included not only the Hudson River, but also the juvenile feeding grounds including the harbor and Jamaica Bay and the western portion of Long Island Sound.

Q Turning to Schaefer, do you agree with Schaefer's conclusions which are set out at pages 22 and 23 of your testimony?

A Yes, in the same respect that I just answered your question on Alperin's conclusions.

I have no quarrel with those conclusions. They seem quite logical, and I am aware of what those conclusions are.

CHAIRMAN JENSCH: While there is a pause, may I ask: Have you set forth all of the conclusions of both Alperin and Schaefer in your quotations?

THE WITNESS: I don't know whether I actually put Schaefer's conclusion in.

CHAIRMAN JENSCH: On page 22, it says "Schaefer concludes from his study...", and I wondered if you put all of them in, or whether you made a selection?

THE WITNESS: No, I don't think I made a selection at all, because I think what I clearly indicated was that their conclusions in the years were abundance was great and the likelihood of the fish in the great south bay where fish whose origin was Chesapeake Bay, and in years in which the abundance was low, there was a possibility of -- and both authors used the word "may" as I recall -- that the Hudson may be the principal contributor of the stock in those light years.

CHAIRMAN JENSCH: You included all conclusions, is that correct?

THE WITNESS: These were their basic conclusions. I made no attempt to eliminate a particular conclusion.

CHAIRMAN JENSCH: Thank you very much.

BY MR. MACBETH:

Q In your opinion, what percentage of the striped bass, middle Atlantic striped bass fishery, is produced by the Hudson in the sense that the fish are spawned in the Hudson or its tributaries?

A Well, my opinion would be that it would be quite

small, and it would have to be the difference between what the Delaware and Chesapeake are contributing, and 100 percent, and I think I have indicated to you what I think the Chesapeake is contributing.

Q Could you give me a range of numbers? I got a range from the Chesapeake, and I had a little trouble getting the range for the Delaware clear.

CHAIRMAN JENSCH: I understand it was 50 on one side and from 75 to 90, and you pick any number in between -- is that about the solution?

THE WITNESS: Well, I would say, if I had to include the Delaware and Chesapeake together, that the minimum number that I would use would be 60 percent and the maximum number I would use would probably be 95 percent. So that the range for the Hudson, then, would range from five percent to 40 percent.

CHAIRMAN JENSCH: Maybe I didn't understand your answer correctly, but I want to be sure you would use that figure. That would be your opinion?

THE WITNESS: Yes, it would.

CHAIRMAN JENSCH: I wanted to distinguish between what you might use for a sigure and what is your opinion?

THE WITNESS: No, I am expressing my opinion.

CHAIRMAN JENSCH: That is your opinion. Thank you.

While there is a pause, is there any witness or any paper presented here so far in this record that is consistent with the opinion you have just expressed? Can you help us on that, Counsel for Hudson River?

MR. TROSTEN: If I may, Mr. Chairman, I think Dr. Raney's testimony -- Mr. Macbeth has questioned Dr. Raney, and Dr. Raney has testified in this respect, and I think what Dr. Raney says is generally consistent with this, yes.

CHAIRMAN JENSCH: Thank you.

MR. BRIGGS: I am a bit confused, because I had the impression that Dr. Raney considered the Delaware and its tributaries to have an insignificant contribution to the mid-Atlantic fisheries. I am well aware of his opinion of the Chesapeake's contribution.

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CHAIRMAN JENSCH: You were going to explain Dr. Raney's testimony?

MR. ~~TROSTON~~ Groeten: I do not believe that Dr. Raney testified as to the percent contribution of the Delaware.

We can determine that.

MR. BRIGGS: No, I don't recall a percent, but I do recall the impression that it was insignificant.

MR. MACBETH: Could I simply read to the Board a paragraph from page 5 of Dr. Raney's testimony of February 5, entitled "Contribution of the Delaware?"

It says:

"Ichthyological personnel have determined for certain areas in the Upper Chesapeake Bay and for the Delaware River, that there was virtually no production of young striped bass in 1972. This, presumably, was caused by the tremendous amount of silt which was carried during and after Hurricane Agnes in June, in 1970. In these same areas there was a very large year class of striped bass. There was determined by our studies of Augustine Beach near Mile 55, Delaware Bay."

And there is a citation for the Ichthyological Bulletin.

So that Dr. Raney's latest statement on the Delaware, it is not conclusive one way or the other, it seems

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to me.

CHAIRMAN JENSCH: My question was, is there anybody who has testified so far in this proceeding who has given figures similar to Dr. Lawler's, and I take it there is none?

MR. TROSTEN: No, I don't think so, Mr. Chairman.

CHAIRMAN JENSCH: He said it was insignificant, but he hasn't used the figures Dr. Lawler has used.

MR. TROSTEN: Dr. Lawler didn't give a percentage contribution for the Delaware.

MR. MACBETH: We can deduce it.

It is going to be 5 to 10. The Hudson is 5 to 40, the Chesapeake is 50 to 90. You add those up and what you have left over is 5 to 10, isn't it?

THE WITNESS: Maybe I should calrify my statement.

First of all, when I used the 50 percent, I said that would be the minimal number that you would want to assign to the Chesapeake based on all of the literature that exists.

That is one.

Two, that the Chesapeake contribution in my opinion is probably in the range of 75 to 90 percent.

When you asked for the contribution of the Hudson, I said the way I would compute that would be to take the

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contribution of the Delaware and Chesapeake combined -- okay? -- and deduct that from 100 percent.

I said if I were forced to do that, I would upgrade the minimum consideration for the combination of the Delaware and Chesapeake to 60 percent, and that is specifically not to say that 50 plus 10 equals 60, because I don't think you can do that.

So I am saying that it would seem to me that from the various numbers that have been -- and documents -- that have been referred to in this testimony, that the minimum number that one could possibly want to talk about as far as the combined contribution of the area exclusive of the Hudson would be 60 percent.

Now, with respect to Dr. RAney's testimony, Dr. Raney indicated that it was his belief that 95 percent of the contribution to the mid-Atlantic fishery came from the Chesapeake, but he specifically excluded the western quarter of Long Island Sound, Jamaica Bay and New York Harbor, which he estimated would come from the Hudson.

So the minimum number that Dr. Raney would be using for the Hudson, it would seem to me, would be 5 percent, and he may have some additional contribution from that western portion of Long Island Sound, et cetera.

When you talk about commercial catches, there isn't much commercial catch out there. So I would say, Mr. Jensch,

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that the numbers that I have suggested are in keeping with the numbers that Dr. Raney suggests.

I would also add ~~furthermore~~ furthermore that if you look at the commercial catch and you break it down by area, you find that of the total mid-Atlantic catch, 59 percent is from the New York area, 31 percent is from the New Jersey area, and 11 percent is from the Delaware area. That is in total.

But, if you take the information from the individual state fisheries statistics, you find that 86 percent of the New York catch is in the eastern end of Long Island Sound, in the ocean, off Montauk Point, and you find that 68 percent of the Jersey catch is in South Jersey, well below the regions that anyone is talking about with respect to a substantial Hudson River contribution.

The net result of all that is that of the total mid-Atlantic commercial fishing catch you find 51 percent from the eastern end of Long Island, 21 percent from South Jersey, 11 percent from the Delaware, or 83 percent from the regions beyond the localized regions that have generally been referred to as the Hudson.

I would suggest that these numbers are at least indicative of the fact that there is very little evidence to confirm that 80 percent of the contribution to the mid-Atlantic fishery is from the Hudson. That is why I am

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using these numbers.

Q. Do you have a document that demonstrates the distinction between eastern Long Island and western Long Island, and northern New Jersey and southern New Jersey?

A. These are the landings reported for each year by the Fish and Wildlife Service out of New York, New Jersey and Delaware.

Q. Wildlife Service.

Would those be sports catches?

A. No, Bureau of Commercial Fisheries. This was before the change. This was before the change.

Q. Could we deduce which change?

A. The Fish and Wildlife Service and the Bureau of Commercial Fisheries were part of the Department of the Interior at one time.

It is my understanding now --

Q. I understand.

A. These are averages from the year 1961 through 1971.

CHAIRMAN JENSCH: Maybe you would like to take a look at it.

This might be a convenient place to take a recess.

Let's recess to reconvene in this room at 11:40.

(Recess.)

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Reba 1

CHAIRMAN JENSCH: Please come to order. Proceed, please.

BY MR. MACBETH:

Q In the break, Dr. Lawler said he would provide me some of the backup material on the distribution of catches, and I may want to return to that, but I have some other questions.

Dr. Lawler, there is one point about this fifty percent minimum from the Chesapeake and the sixty percent from the Chesapeake and the Delaware that I don't really grasp. At one point, I thought you said that fifty percent was a minimum from the Chespake and sixty was the minimum for the Chesapeake and Delaware combined, and then you seemed to say later on that sixty was for everything south of the Hudson, and I couldn't make out whether what you were really indicating was that the ten percent difference was not made up solely of Delaware fish, but of Delaware plus other unnamed rivers.

Will you elucidate on that?

A I thought I did, but I will try again.

What I said was this, that the earlier question simply asked me for an opinion from the Chesapeake, and prior to that, you asked for an opinion from the Delaware, which I steadfastly tried to avoid giving you an opinion for the Delaware, because I don't have an opinion.

Then as you went on, it became of interest to know

Al 11 1 my opinion as to the percentage contribution from the Hudson.
Reba 2 2 So what I said then at that time was that the percentage con-
3 tribution in the Hudson would seem to me to be properly ex-
4 pressed as the differences between 100 percent and the percentage
5 contribution of all other areas south of the Hudson, and I
6 said that as a minimum I would use the figure of 60 percent
7 as indicative of the minimum contribution of all areas south
8 of the Hudson, and therefore I would use a maximum of 95 per-
9 cent.
10 I said, therefore, since I was pressed for an
11 opinion on the contribution of the Hudson to the Middle Atlan-
12 tic fishery, I said that that number in my opinion would range
13 between 5 percent and forty percent.
14 Q Does that leave us ---
15 A That is the best I can express my opinion.
16 Q Does that leave us with at least ten percent assigned
17 to the Delaware and other rivers south of the Hudson, but not
18 Chesapeake?
19 A No, I would prefer not to do that. I think the
20 best thing to do would be to ignore the fifty percent. As I
21 said before, the fifty percent would be the minimum number I
22 would use in just talking about the Chesapeake. We are no
23 longer simply talking about the Chesapeake, but the total
24 overall areas below the Hudson, and I revised my opinion and

25 said that the minimum number I would want to use would be on

Al 11
Reba 3

the order of sixty percent, without saying that that minimum number was made up of fifty plus ten, because that is refining it more and to a greater degree than I think is supportable at this time.

Because I indicated earlier that I think the most proper way of settling this whole issue of the contribution of various spawning rivers to the fishery would be to pursue the study that Dr. McFadden described yesterday.

I might also say with respect to the Delaware, the Murawski study was mentioned, and I took issue with the Murawski study as not being terribly indicative of spawning activity of any major sort in the Delaware.

I think that it is useful to know that Murawski in his sampling procedures didn't really use the kinds of sampling procedures, for instance, that have been discussed at great length in this proceeding.

The sampling was done, with one exception, at the surface, at all times, during the day, and the indications are that we find very few larvae at the surface.

Secondly, the sampling was done from anchored boats or from bridges. You just can't expect to collect the numbers of eggs and larvae by that kind of sampling methodology that you do collect when you do use the more appropriate sampling methodology that has been described in this proceeding.

So I think that is worthy of note.

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Reba 4

Q What conclusions do you draw from that, in relying on Murawski's analysis?

A I think the conclusion I drew from Murawski's analysis that we do expect that there is spawning activity in the Delaware system, and therefore a contribution from the Delaware. I think the estimates using something of the order of 16 percent as a Delaware contribution to the fishery.

Q This is his earlier paper?

A No, this was the testimony in January. His breakdown, as I recall it, was on the order of 80 percent for the Hudson, 16 percent for the Delaware, and the remainder for the Chesapeake. It is really the Chesapeake over which there is the strong difference of opinion.

Q I agree with that. I was just trying to tack down the Delaware portion. One final question on this part of this testimony. On table 1, which appears before page 9, you describe the spawning area in the Hudson as running from Peekskill to Saugerisis. What was the basis for choosing those as the upstream and downstream limits?

A Well, this is generally the area where you find the appearance of eggs. You see no eggs in some years and very few in other years below Peekskill, and so forth.

Q As you know, there has been some discussion as to how far up and down the river it should have been. I just wanted to get the reference there.

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Reba 5

A Yes.

Q That concludes my questions on that testimony. I want to move to your testimony of February 20th, entitled "Economic Evaluation of the Impact of Indian Point Unit Number 2" and so forth.

Here, again, I have a few questions on your qualifications. Apart from the testimony in this proceeding, have you undertaken any other analysis which you -- to which you attempt to assign an economic value to a sports and commercial fishery?

A No, sir.

Q Have you supervised any work of that sort?

A No, sir.

Q What is your training in economics?

A Probably similar to most of us in economics. I have taken courses in economics, and I am involved in economics of all sorts, with the daily flow of work.

Q Have you had any experience on trying to assign economic values to certain kinds of activity?

A Other than fishing?

Q Other than fishing?

A I would say yes. I would have -- I had to think about what you meant by that.

Q You said you had had experience in all kinds of economics. I was trying to see how close it came to the

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Reba 6

kind of evaluation that is included in this testimony.

What would you say would be the closest kind of analysis or study that you have made which is closest to the kind of analysis which is included in this testimony?

A Well, what I meant by that, Mr. MacBeth, is that in any of these river studies that we have been involved in, economics is always, or very often, certainly, at the heart of the issue. Whether you are talking about the allocation of Federal or state monies for waste treatment plants, or how such monies should be allocated among towns and municipalities along the river, or whether you are talking about that type of costs associated with the issues in this proceeding, you are always very clearly involved in any of these kinds of studies with what is the economic effect of the kinds of things that are being proposed.

Any one of these things always involves a contention as to shall we, or shall we not improve the environment, river, lake, stream, harbor, or what-have-you, by the following project.

The project always involves certain X dollars, and the improvements involve a certain benefit, and sometimes it is intangible, and sometimes tangible. So I would regard the kinds of considerations given in this testimony to be quite similar to kinds of evaluation one gets in other projects.

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Reba 7

Q Turning to page 17 of the testimony, you discuss the expenditure basis for evaluating recreational benefits, and you discuss this at various levels, the county level, and the fundamental level.

What I would like is a statement of how at the fundamental level you think one should go about evaluating or assigning a value to a fishery.

A I think I describe that in the testimony.

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Q I had a little trouble here. You say that at the more fundamental level one may ask if the fee per passenger on charter boats had been raised by 50 cents per day, how many fewer fishermen would have paid the fee beyond the expenditure, and so forth.

That seems to me -- I mean if I was putting this at the fundamental level, I wouldn't have picked out 50 cents a passenger on charter boats. Maybe that is the most fundamental level, but maybe the best question is how did you come up with 50 cents a day on charter boats?

A Well, I don't think there is any suggestion anywhere in this statement that the 50 cents per day on charter boats has really anything to do with the final set of numbers that are here.

I think that that was simply an example that was used to express the approach we were taking, which is to say, once the fisherman is outfitted and he has all the things that are necessary to fish, then the question is, unless he is not a real inveterate fisherman, he doesn't get too terribly concerned because in a given year or in a given week he didn't catch too terribly many fish, or perhaps caught none at all.

So what we are saying is, his bag, as it were, to use today's colloquial expression, is fishing; and he sets out and outfits himself, and then the question comes,

how much is he willing to pay to be permitted to pursue this particular activity as opposed to pursuing other activities.

The suggestion is made that once one assigns a value to how much the fisherman is willing to pay to pursue his chosen activity, then one can use this approach to compute the value of the fishery simply by knowing the number of fishermen days, the number of days that the fisherman has pursued his hobby, and allocate to those number of fishermen-days the price that presumably he would be willing to pay; and what I am simply suggesting here is that this is an approach that has been used by the Federal Government in assessing the benefit of it, or the supposed benefits, of the project.

Q One of the points you made in the testimony and made again just now is that the actual amount of the catch may not matter a great deal. Are you suggesting that if the word got around there weren't many fish out there any more that that wouldn't make any difference to the fisherman?

A I am suggesting that it has been my experience as a fisherman that my fishing activity is probably the same every year, but what I catch in any given year may be markedly different from what I would catch in the previous year.

It really doesn't have too much of an effect upon

my fishing activity.

Q I am obviously thinking of a situation where it became common knowledge, say, that in Long Island Sound and the south shore of Long Island there were now only 50 percent of the number of striped bass than there had been five years ago.

Are you suggesting that won't make any difference to the value of the fishery?

A Certainly, because I think there is evidence to indicate that the striped bass population is that ~~create~~ great from year to year, and I don't think there is any reduction in activity of the sport fishermen.

Q And if the population -- if the general opinion in the community was that the population of striped bass in those areas remained at this lower level or perhaps went on decreasing, you don't think that would have any effect on the value of the fishery by this method of analysis?

A I would doubt it, because I think they would fish for other things. I am not saying that facetiously.

Q That is true despite the fact that the striped bass is one of the most popular game fishes?

A The bluefish is another extremely popular game fish, and I think if such a thing were to occur, and I am not for a moment suggesting that such a thing will occur, but if this were to be the reduction that you are suggesting

might exist, I would think that the fishermen would turn their activities toward other species.

You know, when you fish for striped bass, very often you are not too terribly choosy as to whether it striped bass that you lure or bluefish that you lure, as an example, and very often you don't even know until you get them in the ~~boar~~ boat which it is.

Q There is probably not too much point in pursuing that, but your position essentially is that the category we are dealing with here is fungible, and it doesn't matter whether it is striped bass, bluefish, or any other game fish?

A I would agree with that characterization of my opinion, yes.

Q Let's say there weren't any fish. Would they play golf instead? You use the analogy of golf here.

Is the real category, say, something like sports recreation? If we didn't have the fish, we would have the golf courses, so there wouldn't be any real loss of economic value?

A I am not quite sure that I follow the question?

Q Well, it seems to me that it is important to draw category lines here. If it doesn't really make any difference between striped bass and bluefish when we are looking at fishing, is it really best to look at fishing, or should we look at sports recreation and realize if these

people weren't fishing they would be playing golf or engaging in horse-raising, or something of that nature; so that there wouldn't be any amount of impact even if all the fish should disappear by some method?

A What you are proposing is, it seems to me, a hypothetical situation of no fish.

I am not sure that the particular analysis proposed here would be appropriate in the circumstances of no fish whatsoever. It doesn't seem --

Q There would be some people who instead of fishing would put their money in a bank. I suppose that is the option really; isn't it? If they don't expend the money fishing, then otherwise they are going to spend it on something else, but if they don't, they put it in the bank and then there has been no economic loss?

A I don't really follow what you are driving at.

What I have suggested a moment ago is that if one were faced with a hypothetical of no fish, then I am not terribly sure that the analysis proposed would be an appropriate analysis. If you ask me what they would do with their money, I don't know what they would do with their money. I don't know how this bears on it.

Q Suppose they spend it on golf and horse-raising. Would that mean there was no economic loss through the loss of the fishery?

MR. TROSTEN: Could you sort of explain what you are driving at, Mr. Macbeth? I must say I am having the same trouble Dr. Lawler is.

Could you kind of put this in perspective and bring us back to that a little more closely?

MR. MACBETH: Well, as I understand it, what we are aiming at here in this analysis is what money is directly expended, and people would expend on fisheries, and associated items, and part of the analysis seems to be that there won't be any real economic loss if you reduced the striped bass quite substantially, because people would fish for bluefish instead.

The economic impact would get out at zero.

Now, it seems to me that the next logical step in that is that if you lose fishing altogether, and then have people spending their money on other things, again it would net out to zero.

So we seem to be moving into a situation that as long as the people spend the money, whether or not the spend it on fisheries, doesn't amount to anything. It doesn't matter as long as people go on spending the money.

THE WITNESS: This is your conclusion, not mine.

BY MR. MACBETH:

Q I am just showing you what the line of questioning is. You are perfectly free to disagree with it.

A The point I would disagree is the notion of the economics coming out to zero.

I certainly didn't suggest that at any point in the testimony.

Q Not explicitly, but I am trying to find out implicitly what is there.

A What I suggest was a significant population reduction in the striped bass population, for instance, using the numbers Mr. Clark has proposed. Then I said that would not eliminate other fisheries, one. Two, we would not eliminate the striped bass fishery, and therefore one could expect the fishermen to continue to fish.

However, whether one could continue to expect him to fish for striped bass at the same level of effort that they fished before is questionable. So we used the number of recreation days and the amount of dollars that they would be willing to pay for those recreation days and showed that the reduction in the striped bass population, if it were to be as severe as Mr. Clark thought it would be. If the reduction is rather small, as the Applicant's figures would suggest it would be, then I am not so sure that it would be appropriate to take any debit, any economic debit, for the reduction; because if the fishing is reduced on the order of five or seven percent, as the Applicant's figures suggest, I don't think the fisherman can tell any difference in that,

and I don't think it is going to make any difference to him, whereas, on the long-term basis, if the figures eight percent to forty percent are correct, then maybe the fisherman could tell.

I use a debit by multiplying the losses as given by Mr. Clark by the present worth of the fishery as computed by the number of fishermen who fish and the number of days they fish, and the number of dollars presumably they would be willing to pay.

Q Let me take up the values of the recreation days. I am afraid I haven't had an opportunity since the beginning of last week to really read these three documents with a great deal of care.

Could you describe to me how those numbers were arrived at? They are set out on page 24.

Al#12 A Which numbers are you referring to?

Q. The general and specialized prices.

A. As you suggested, these are numbers that appear in these federal documents.

We discussed with people in the Bureau of Sport Fisheries, the number that would be assigned to striped bass recreational fishing, and they had no specific number. They said that would depend on the project in question, and as I suggested, a case-by-case analysis.

So, since no such number existed, what we have suggested is that it might be on the one hand that you would categorize it as recreation, and on the other hand, you might categorize it as general recreation.

Q. What I was trying to get at was how these general and specialized figures were derived and developed?

One would go around and ask fishermen up and down the coast, "How much did you pay for going out for one day's fishing,and would you pay another 50 cents to be on a charter boat?"

How did we get these numbers?

A. We did not do that.

We simply took the ranges for -- that had been proposed -- and said that it had seemed to us that the recreation, the form of recreation known as fishing could be characterized as general recreation that the entire populace, regardless of their economic status, could enjoy.

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And on the other hand, certain facets of striped bass fishing would be primarily enjoyed by those who might have a little more money.

So we said on the one hand, you could argue that a portion of the striped bass fishing would be appropriately called general recreation, and another portion would be specialized recreation.

So we chose the borderline value, the high end of the general and the low end of the special.

Q. I am not making myself clear.

What I am interested in is how were these developed in the government documents?

Did the government go out and run surveys of this sort, asking people what they would pay for a day of recreation? Or, did they, in their wisdom simply determine that this is what it all came down to?

MR. TROSTEN: May we have a moment?

MR. MACBETH: Yes.

(Pause.)

THE WITNESS: If I understand the question correctly, what you are asking me is, do I, or can I convey to you the methodology by which the federal government arrived at these numbers?

BY MR. MACBETH:

Q. That is right.

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A. The answer is no.

These are the numbers that the federal government uses for recreation of this form.

Q. And the derivation isn't contained in the three documents, or you don't remember?

A. I don't really remember. There is support, I am fairly sure, in one or more of these documents as to how one -- not how one, but how the government has -- how the government has come up with these numbers.

I am not at all suggesting that I am totally unaware of the foundations of these numbers. I simply don't recall the step-by-step procedure. Whatever that procedure is, this is the set of numbers they propose for use in this method of analyzing the value of the recreation form.

Q. So you don't know whether or not the government followed the method that you described a little earlier on as basically what to do with respect to asking whether people would pay an additional 50 cents?

A. I don't know.

I have the impression that some of that is done in establishing these numbers, that questions of this sort are asked. That would be one way of going about it. It is not the only way.

Q. What is your opinion about accounting for the expenditures associated with fishing, but not absolutely

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necessary for fishing.

Take the obvious examples of alcoholic beverages and food and transportation. Is it your opinion that all these associated expenditures should be excluded from any value assigned to the fishery?

A. Yes, because I tried to distinguish between the word "value" and the word "expenditure."

I feel that the parties making these expenditures are going to make them regardless of whether they go fishing for striped bass. They have to eat, you know.

Q. It is unclear whether they have to drink.

Of course, there are other things that come a little closer here. The expenditures for boats, gear, tackle and transportation. I take it that you feel those should also be excluded from any value assigned to the particular fisher?

A. You are on page 17?

Q. Yes, page 17.

A. Well, if you go th rough my entire testimony, you will see that although I don't believe the figures of this nature should be employed to estimate the worth of the fishery, when I use the approach that Mr. Clark used, I did use the $2 a pound.

I am simply saying the $2 a pound to me, even on an expenditure basis, sounds rather high when you

mm5

consider the fact that on an average expenditure basis, it is 81 cents a pound, and that average, 50 percent of it, or close to 50 percent of it, consists of all these things, not including tackle. You just mentioned tackle.

Q. I was using an example.

One could add tackle in it.

A. Well, no, I won't add tackle.

If I am after the expenditure that a fisherman puts into fishing, I am going to put in tackle, I won't strike tackle out.

I am trying to strike out those things that he is going to spend money for regardless of whether he goes after striped bass, or whether he doesn't.

I mean, these are ancillary costs to fishing, like transportation.

Q. Yes, but this comes back to the question I was driving at before, and that is, where do you draw a line?

It seems to me you could keep going on down and you say they would have spent the money anyway, and therefore, it could be excluded.

You could take all the money spent on fishing and say they would have spent it anyway.

A. No, I didn't.

Q. I am not saying you did. I said you could. I am

mm6

trying to get at the principal by which you made the division.

You could go ahead and say they could have spent the money playing golf or horceracing, rather than having to have the striped bass.

A. I think I made, or drew my line very clearly on page 17, where I said that these expenditures, that is the alcohol, food, travel, et cetera, are representative of 48 percent of the total, and all involve expenditures that would presently be made in one form or other regardless of the population level of any and all species of fish.

But I did not include expenditures for tackle and bait and all these kinds of items, because I think those expenditures would be related, perhaps not linearly, but nevertheless related to the population level of the species of fish which you are after.

Q. Are you really saying that regardless of the population level of fish, the total expenditure made by anybody would remain the same, but that as you saw the population levels of fish change, the categories in which those expenditures are made would change, and that you are trying to restrict yourself here strictly to those categories of expenditure in which there would be changes with the change in the population of species of fish?

A. Let me put it this way.

It would seem to me that the expenditure one

mm7

makes for tackle, and even for bait and fishing licenses and things of this nature, those really also, for the large part, have pretty much, in my opinion, independent of the types of species that the individual is after and also the level of the population -- not wholly. Bait, for instance, you know if you have gear, you are going to need bait to do all the fishing that is there to be done.

Species, all right, there are particular kinds of rods, line and reel that you are going to use depending on what you are going after, to some extent. This would apply to fresh water as well as salt water.

But really, if you were to see the kinds of level of reduction in the fishery that the Applicant has suggested, I don't think that you --

end #13
8365

CR 8365
Al 14
Reba 1

Q I am only trying to get at the principle by which you assign these expenditures. It seems to me that you are doing this largely on where you would see changes in categories of expenditure, where in your opinion there would be changes in category of expenditure rather than on any other basis.

Is that correct? I just find it awfully hard to see quite what principle you are using. That is why I started out with the business about 50 cents a day. You seem to be doing two or three things and then end up using the government's number, the basis of which we don't know. I have a hard time getting down to how you analyze these expenditures

A Maybe it would be more proper to say that in this particular discussion of expenditures it seemed to me that those expenditures which were not directly fish-related, associated with the bait, tackle, licensing, et cetera, payment for charter trips and this kind of thing, would be -- one would question whether that should be included in a figure used for the expenditures for fishing.

True, if a guy gets in his car and drives his car fifty miles to go fishing, he spends a certain amount of dollars for gas, oil, tires, et cetera, and you can allocate that to fishing.

I don't know, for instance, with transportation, whether the miles should be multiplied by five cents a mile, or 12

Al 14
Reba 2

cents a mile or what-have-you. All I did here was suggest that Mr. Clark has the figure of $2 a pound, and there is no description of what the $2 per pound includes.

In the National Survey of Fishing and Hunting, a figure of 81 cents a pound is given, which I think Mr. Clark indicated also in his earlier testimony. So I said "Okay, if I look at the figure of 81 cents a pound, it seems to me some perspective ought to be put on this number."

When the number is used, people ought to realize that at least 50 percent of the number includes costs of the nature that I include. It is not to say that they weren't expended. It is simply to say that in my opinion use of the $2 per pound needs some perspective. So I proceeded to put some perspective on it.

Then, as you recall, I used the $2 a pound in estimating the value of the fishery in accordance with the procedures that Mr. Clark suggested. I did not use ~~41~~ 81 cents a pound.

Furthermore, I suggested that it doesn't seem to me that the expenditure basis is the appropriate way of going about it. It is one way of going about it. It is the way Mr. Clark used, and we subsequently used it with his numbers as well as revisions of his numbers that I thought appropriate as well as the Applicant's numbers, that I also thought were appropriate, and having done that and gotten through each

Al 14
Reba 3

one of those steps, I then said that it seems to me in addition to taking issue with the notion of 39 percent reduction and the notion of how many fish are in the fishery, I would like to take issue with the notion of the expenditure basis.

To do so, I said that it seemed to me an equally good way of looking at the worth, or the value of the striped bass fishery, which is what is in contention, was to use the approach that the Federal Government uses in evaluating the benefits of projects.

Q Let me pick up a few small items.

On page 19, you discuss the figures from Mr. Deuel. It says this appears to be ~~on published~~ unpublished information secured by Mr. Clark and his former associate, Mr. Deuel, and whether it could be considered official Commerce Department estimates of worth is questionable.

Have you or any of your people been in touch with Mr. Deuel?

A Yes, we have.

Q Is there any suggestion from him that the 59 million is an inaccurate figure?

A No. What I am suggesting here is that 59 million appears to be, seems to be based on the Middle Atlantic. A number for the entire Atlantic Coast is given. That number is close to $100 million. I forget the exact number. When one allocates the fishing that took place in the south, middle

Al 14
Reba 4

and north Atlantic by region as designated in that Fishing and Hunting News, or report, you come up with a number that is essentially the $59 million. So I presume that that is where Mr. Deuel got that number.

Q In any case, your conversation with Mr. Deuel has not cast any doubt on the $59 million, this being the figure ---

A I don't recall at the moment a specific question put to Mr. Deuel himself on this particular number. I had several conversations with Mr. Deuel. Most of them were directed at the procedures used by himself and Mr. Clark in taking the Census Bureau information and writing the surveys.

I don't offhand recall a particular discussion with Mr. Deuel on the $59 million. It may have been.

CHAIRMAN JENSCH: The question was, did you derive any information that lent any doubt to the $59 million? I take it the answer is no.

THE WITNESS: Not that I know of, no.

end
Al 14
CR 6365

BY MR. MACBETH:

Q On page 21, you have a paragraph where you say that the estimated linearized and annual cost of this modification, and you refer to the $19,042,000, to the best of my memory that is a new figure to me.

I wanted to know how it was derived?

MR. TROSTEN: Mr. Newman will respond to your question.

Whereupon,

CARL NEWMAN

took the stand as a witness and, having been previously duly sworn, was examined and testified as follows:

CROSS-EXAMINATION, Resumed

WITNESS NEWMAN: This number was based on the number we had previously given as to the total worth of operating cooling towers at the discount rate. Using this discount rate, we calculated the annuity value of the $138,025,000 and we arrived at 19,042,000 per year.

It is simply an annuity calculation based on the total cost of the towers. This was from the years 1977 to the Year 2003.

BY MR. MACBETH:

Q Would you explain to me simply what the annuity value means in relation to the $138 million?

A (Mr. Newman.) If you spend $19,042,000 each

year, the present worth of that -- that is, the sum of those linear expenditures is $138,025,000.

Q Over what period?

A Each year. You spend that and you bring your yearly expenditures back to the present and sum them up and add them together.

Q That is the part -- you said bringing them back to the present. Would you explain how you bring them back to the present?

A By use of a discount factor. Money spent in the future has a certain value to you today. If you have a bank account, for example, and you deposit $1 a day, it is worth probably $1.05 next year. So when we talk about the present worth of money, you are talking about how much has to be invested at a given time to be worth something in the future. Utility companies generally do their calculations on a present worth basis.

Q As you are looking at the value you have, say, a fishery over a similar period of time, do you have to go through a similar kind of calculation to arrive at a variable cost figure?

A That is what we are comparing.

Q If you are comparing the value of the fishery in which you are doing, say, a value of $13 million annually that is being considered against this kind of linearized

annual cost, would you also have to calculate back the present value of that?

A It might be that this would be the best way to compare numbers.

Q Did you employ that method in comparing the value of the fishery?

A (Dr. Lawler.) The numbers used here, $2 per pound, and the $3 per recreation day, have not been inflated for what they may be at some time in the future.

I don't have any idea what they may be at some time in the future.

A (Mr. Newman.) There seems to be a misunderstanding here.

We talk about discount factors. Let us not confuse escalation. There is no escalation involved here. When we talk about this levelized value, that is each year and in future years, if you have an annual cost in that particular year, those numbers are comparable.

What we have done, we have uniform expenditures in the tower program; we bring them back to the present time and spread them forward again on a linear basis so we do have a basis for calculating numbers expended in the future.

Q What you are saying is that if I took the years between 1977 and 2033, which would come out to --

A (Mr. Newman.) 2003.

Q 2003.

That would come out to 30 years, and I multiply 30 times 19042, and I would come out with --

A No, you won't.

First of all, it is 25 years, because the usable life of the turbine --

Q You are right.

I have a feeling it still isn't going to work.

A No, it is not.

Q That is why I am trying to get the other 13 million. Am I right that different methods of calculating these numbers have been used?

A The $19 million expended in 2003 has a much different present worth than $19 million expended in 1977.

Q That is what I was aiming at. We ought to do something about spending $13 million this year and so on, up to 2003.

MR. SACK: Could we confer?

MR. MACBETH: I just don't understand how the costs keep going up as we come back to the present and the fishing costs don't.

Would you describe the different levels of sophistication and see if you could get some comparison that would treat these two as the same?

MR. TROSTEN: May we have a few minutes to break

on this?

CHAIRMAN JENSCH: Maybe we should recess.

MR. TROSTEN: Mr. Chairman, before you set the time, Mr. Newman has come down for cross-examination by Mr. Macbeth. It is really quite important that Mr. Newman get back.

MR. MACBETH: I think two to two and a half hours would take care of it.

MR. TROSTEN: Should we, then, come back at 1:30, because we are breaking here -- you say two to two and a half hours?

MR. KARMAN: How about Dr. Lawler?

MR. TROSTEN: We will interrupt him.

So if you came back at 1:45 -- is that convenient for the Board?

CHAIRMAN JENSCH: I have an appointment. I have to do some Commission business. I think I can get back. Let's try it.

At this time we will recess to reconvene at 1:45 p.m.

(Whereupon, at 12:30 p.m., the hearing was recessed, to reconvene at 1:45 p.m., this same day at the same place.)

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AFTERNOON SESSION

1:45 p.m.

CHAIRMAN JENSCH: Please come to order.

As I understand it, we were to proceed with Mr. Newman this afternoon, is that correct?

MR. TROSTEN: Yes, this is correct.

I believe there was an outstanding question here.

Would you restate the question, please? We had some discussion at the end.

MR. MACBETH: Does the reporter have it?

THE REPORTER: It has already gone to be transcribed, I am sorry.

CHAIRMAN JENSCH: It was about the 13 million.

MR. MACBETH: Essentially I was interested in what difference it would make if you produced a linearized annual cost for the annual net loss. That is one way of putting it.

In other words, putting the fueling costs and the fishery costs more strictly in comparable terms.

MR. TROSTEN: As I understand it, the thrust of your question was the comparability of the cost of the fishery with once-through cooling.

Dr. Lawler is prepared to respond to your question.

That is the thrust of your question, is it not?

MR. MACBETH: Let's start with that question.

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That is a good enough question.

Whereupon,

CARL NEWMAN and
JOHN P. LAWLER

resumed the stand, and having been previously duly sworn, was examined and testified further as follows:

WITNESS LAWLER: Would you repeat it once more?

MR. TROSTEN: I will repeat it.

Dr. Lawler, Mr. Macbeth has, as I understand the nature of his questioning, inquired into the nature of the comparability between the cost of once-through cooling to the fishery and the levelized annual cost of the cooling towers.

Would you care to comment on that?

WITNESS LAWLER: My understanding of these facts is that the levelized cost of cooling towers reflects a $19 million expenditure per year over the life of the plant and the associated costs that I have presented in this testimony as indicative of the possible reduction in value of the fishery, the cost of the fishery, or whatever phrase you want to use, are also yearly annual costs.

One is comparing two annual yearly costs.

CROSS-EXAMINATION (Continued.)

BY MR. MACBETH:

Q. I take it that $19 million is not in fact a yearly annual cost. It is somewhat different? It is the sum

mm3

of all the future expenses in the present, and then treated as the amount that you would have to spend every year to account for that total construction cost at the beginning?

A. (Dr.Lawler) That is right. The total construction costs and all other costs associated with it.

Q. And if you left that procedure with the cost to the fishery of 13 million a year, you would come out simply with a figure of 15 million a year?

A. The 13 million a year is not my figure. It is Mr. Clark's figure.

Q. Yes, but I am talking about the two procedures.

Are you saying they are the same procedure?

A. Yes, because they are comparing the annual expenditures that on the one hand can be expected or associated with the cost of putting up the cooling tower, and on the other hand are associated with the supposed cost of the fishery if the cooling tower is not built.

In other words, one ~~is not~~ was a one-shot cost and the ot her is a cost that takes place year after year after year. They are proposed as an annual cost.

Q. I become somewhat confused with the description of how the cooling tower cost was derived, from Mr.Newman, which led me to believe that the procedure would not go with the 13 million.

You say that is not so?

mm4

A. (Mr. Newman) That is not so.

The difficulty in your understanding as I see it, is that 13 million is expended annually. If you bring it back to the present worth and then spread it forward, it comes out to exactly the same 13 million.

On the other hand, we have a much more complex situation in calculating the 19 million, in that we expend capital for a cooling tower. We then have to carry the capital at an annual carrying charge, something in excess of 13 percent in the present situation.

We then have to replace the energy because of the inability to generate power, using cooling towers that we would with the same capability as we would without cooling towers. This results in a future cost, and that future cost would vary from year to year, depending upon the capacity factor of the station that is going to be used in future years. So that that is not uniform expenditure.

In addition, we have operating costs and maintenance costs for the cooling towers.

Now, what we did in our calculation was to bring all those expenditures which take place in various years back to the present and then perform an annuity calculation and spread them back into the fu ture as a levelized annual cost.

The reason for doing this is that we cannot every year change the rates that we charge our customers, and so,

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for rate-setting purposes, or rate calculations, we come up with what are the annualized costs of any one of our facilities, and we use this in our rate-case determinations.

Does that clarify it?

Q. Yes.

DR. GEYER: May I ask a question to clarify the use of a word here?

In the text at the bottom of page 21, the fourth line from the bottom, the word "linearized" is used and you have been using "levelized."

WITNESS NEWMAN: Both terms are used in the industry.

DR. GEYER: Which do you prefer?

WITNESS NEWMAN: I prefer levelized.

DR. GEYER: That would seem to me to be better, because actually you are counting the same dollars every year.

BY MACBETH:

Q. Mr. Newman, I would like to question you on the redirect rebuttal testimony that was prepared by you and Mr. Schwartz and Mr. Woodbury on restricted operations, Indian Point 2, and I would like to turn first to the discussion --

CHAIRMAN JENSCH: What is the title of the document to which you are referring?

MR. MACBETH: "Testimony on Restricted Operations at Indian Point 2."

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CHAIRMAN JENSCH: Of February 5?

MR. MACBETH: Yes.

DR. GEYER: You don't know the item number, though?

MR. TROSTEN: Yes. Just a moment.

It is item number 18.

DR. GEYER: Thank you.

end #16

CR 8365

A1 17

Reba 1

BY MR. MACBETH:

Q I would like to turn first to the discussion on page 9 and following pages of the plant operating limitations and start with the problem of xenon. I would like you first to state some -- in slightly fuller language what it is about xenon that requires the plant to be incapacitated for periods varying from 7 to 19 hours after it has has been run up to a substantial power level and brought back to zero power level.

A (Mr. Newman) Xenon is a noble gas.

It appears in reactors as a result of fission product decay. Its concentration depends upon several things. It depends upon the rate of fission that has been going on prior to shutdown of the reactor, or at any time in the reactor.

It depends on the amount of fission that has been occurring. It is created, as I said, by fission product decay. It starts the chain with a deuterium 135, which decays to iodine 135. It goes through a second decay to xenon 135, which is a radioactive isotope.

Xenon 135 is itself radioactive and decays to cesium which is a relatively stable element, 135, and it is also consumed by burning and forms xenon 136 which is a stable isotope. Its signifiance in nuclear reactors is that it has a very high cross-section for thermal neutrons, about 3,000 times as high as the cross-section of 235 for fission.

Al 17

Reba 2

That is, U-235. Since it is created by the fission process as the reactor life goes on the ~~build-~~up. When it reaches an equilibrium when the decay by the processes I have described, or loss by burning and by decay, are just equal to the rate at which it is being created.

Now when you shut the reactor down, you then take away one of the processes of decay, namely the burn-up process, and so your point of equilibrium increases and you have more xenon in the reactor than you did during normal operating conditions.

In order to overcome this xenon with its affinity for neutrons, one would have to have more reactivity than we build into a reactor, and so we are delayed on re-start of reactors until the xenon decays.

Now, what we actually do in practice is we have some of our reactivity tied up in the form of boron. It is a neutron absorber, also, and we can by deborating the reactor, or deborating the coolant, and boron is in the form of boric acid in the coolant, we can introduce reactivity into the reactor.

The problem we encounter here is that deborating is a dilution process, and it is accomplished by blowing down the reactor, and then concentrating the boron outside the reactor and replacing the borated coolant water with non-borated coolant water.

Al 17
Reba 3

That is a very slow process, and we cannot in a very rapid way accomplish this introduction of increased reactivity by deboration.

Q Is the speed with which the boron dilution would take place a function of the chemical control systems that you have in the reactor?

A It is accomplished by those systems. Its speed is determined by the cycle life. Early in cycle life we have a high concentration of boron in the reactor, because the core is fresh, and therefore taking out a given quantity of water takes out a higher quantity of boron, until you are down to a very low concentration of boron in the reactor.

Q Could the boron dilution take place more rapidly if you had a chemical control system with greater capacity than the one that is in fact installed in the plant?

A Yes, it could.

Q So that part of this problem of the period of xenon decay is due to the particular design of the chemical control system?

A It is inherent in the design of the plant. It is not only in the chemical control system, but also in the concentrating systems. The Indian Point plant has a capacity for blowdown of 75 gpm, but a ~~concentrated~~ concentration capacity of only 25 gpm. Therefore, if we were to deborate any length of time, we would very soon build up an inventory of non-concentrated

Al 17
Reba 4

water, and we are going to have a storage problem in our particular design.

Q Are there other methods of overcoming the period of incapacitation due to the boron decay besides chemical methods? Are there mechanical methods?

A We do have some reactivity in the control rods.

Q And could the control rods be operated in such a manner as to overcome or shorten the period?

A All of our statements we ~~make~~ made take into account the use of control rods.

Q So that the 7 to 19 hour period reflected in the chart on page 10 assumes the maximum use of the control rods to shorten the incapacitated ---

A I would like to consult with my staff on that.

(Pause)

To the extent that they are available, it has been taken into account in the calculation.

Q If the rector were run at, say, 30 percent of full power and you then moved the power level up reasonably rapidly, say in the course of 20 minutes or half an hour to 90 percent full power, and after a period of a few hours at that rate moved it down again to 30 percent of full power, would you then have xenon decay problems if you wanted to go to full power shortly thereafter?

A That is a complicated question, and we would have

Al 17
Reba 5

to do an analysis, but generally, yes.

Q Would you ---

CHAIRMAN JENSCH: Let the witness finish.

THE WITNESS: The problem is less pronounced in early core life and more pronounced in late core life when we have practically run out of excess reactivity in the core.

That is what determines this.

BY MR. MACBETH:

Q Do you have an estimate of the types of incapacitation that you would have if you used 30 percent of full power as your baseline and went to 90 percent of full power from that point?

A I have not performed that calculation. It is a hypothetical situation. I assume we would use the reactor even under the mode you are postulating, if we did, we would want to use it as peak diurnal situation here. So we have not gone through the calculations that you are postulating.

Q All I was really asking was an estimate of the time. Would we then be talking about an incapacitated period of twenty minutes, or five hours?

A We are talking about hours.

Q What if you operate a plant with a baseline at 50 percent of the full power and fluctuated the power level from 50 to 90 and back. Would you have the same problem?

A Again it depends upon the time in the core life.

Al 17
Reba 6

We would have that problem -- you used the specific numbers of 50 to 90. We would have that problem after about the 16th month of the first core.

Q And how severe would be -- would the problem be after the first 16 months?

A I don't know how to measure severity.

Q I mean in the sense of the length of the period of incapacitation. Would you then have an incapacitation of two hours, or 15 minutes?

A The sort of thing we looked at is operate 8 hours and off for 16. We find that the total shutdown start-up cycle becomes greater than the 16 hours that is available to us. Using a reactor limitations, there are also some transient limitations in the rate of power that can be accepted.

Taking it all into account, we find we cannot operate in that kind of cycle because of thermal limitations, and because of the xenon override problem in the reactor, and I believe in my testimony I alluded to some possible pellet-inter ~~impeller~~ action ---

Q Would xenon decay be the limiting factor in running the plant from 50 to 100 percent after 16 months?

A You use the words "xenon decay." I prefer to call it a xenon override problem.

Q It is the same problem?

A Yes, that is the problem.

Al 17
Reba 7

Q On page 11 of the testimony in the last sentence of the first paragraph, you state that Indian Point 2 can be operated as a load-following unit in accordance with the provisions of the radiological specifications. What kind of operation would that involve?

A You said on page 11?

Q It is the last sentence in the first full paragraph starting "However, Indian Point", and so forth.

A Excuse me just a minute.

Q Yes.

A Let me answer your question. We are talking about generally following the fringes of the control system. We are not talking about wide maneuvering. The unit would be disprogrammed as a baseload unit, and we generally follow the minor fluctuations. These are very small percentages.

Q What kind of percentages are you talking about?

A Less than ten.

Q So the plant is capable of rapid changes within 10 percent of its power?

A I didn't say rapid, I said variations, but not necessarily rapid.

Q Let me ask you: How quickly could the plant vary within ten percent of its power in a load follow operation?

A In the order of magnitude of a few percent per minute. It is a very small range that we are talking about,

Al 17

Reba 8

less than ten percent. It can't sustain this over wide ranges from zero on up, or from 50 on up.

Q Does the inability of the plant to fluctuate rapidly, and by rapidly I again mean the few percent per minute, from 50 percent of full power to 90 percent of full power depending on the number of times you make such fluctuations?

A The inability does not depend upon the number of times you do this.

Q So that the numbers, the increasing periods of incapacitation that are shown on the chart on page 10 are functions simply of the number of hours that the core has been used to produce power, and not the mode in which the power was produced from the core?

A These are simply a measure of where we are in core life.

end

Al 17

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Q. Which would be the number of hours --

A. That is correct.

MR. BRIGGS: Could I ask a question here to make things a little clearer for me?

As I understood you, you indicated that the differences between base load operations and load following operation was only roughly 10 percent in power, is that right?

WITNESS NEWMAN: I indicated that they are essentially the same.

MR. BRIGGS: The reason I asked the question, it seems to me in the analysis of the heat load on the river, Applicant's consultants looked at the extent to which the plants would be operated through one week, for instance, and they came out during the night and on weekends that the plant might be operated at two-thirds load or some load like that.

That doesn't seem to fit into the idea of base loading. Is it consistent, or is it not consistent with the base loading idea?

WITNESS NEWMAN: It is consistent. We would base load during the week.

Our situation is such, our capacity factor is such that possibly at night and on weekends, we would have to curtail the dispatch from these units. Our load just drops off to that extent. We would not want to shut down our

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stations now -- excuse me.

This is an area that Mr. Schwartz is much more competent in than I am.

MR. BRIGGS: So then you would be operating at something like two-thirds power?

WITNESS NEWMAN: Yes, we would.

MR. BRIGGS: Thank you.

DR. GEYER: May I ask why you can't run at full power all night?

Certainly the base load at night is morethan the capacity of this plant?

WITNESS NEWMAN: We have a group of reading stations that constitutes about 50 percent of our capacity. Shutting them down completely would thermocycle them to an extent that we would not wish to --

DR. GEYER: So you want to keep all of this going?

WITNESS NEWMAN: We want to keep some load on those units which would curtail the load on these units.

DR. GEYER: Thank you.

CHAIRMAN JENSCH: Proceed, Mr. Macbeth.

BY MR. MACBETH:

Q. Let me just be sure that I have this clear in my mind.

You are saying that if the plant were operated in

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the restricted periods from -- proposed restricted period -- from the first of December to the beginning of March and in June and July at a base point of 50 percent of the full power, you would then after 16 months come to a time when the period of incapacitation would be more than 16 hours, and you would be incapable of being able to fluctuate the plant on a daily cycle?

A. That is correct.

Q. Am I correct, and this may be something again that I should ask Mr. Schwartz, but let me put the question and you can defer it if it seems better.

Is it correct in analyzing the pattern on which the plant would be called on to produce power in the restricted periods under the proposal from the Hudson River Fishermen's Association, that you have not made a setting and chosen the actual day to day pattern of use?

In other words, across the summer there would be cycles of two hours per day for so many days, and then a period we would not need that, and another period of four hours. But rather what you have is a study which gives you the total amount of time the plant would be needed in the summer and winter period, and from that you constructed a typical average day of operation, which is reflected in Table 1 on page 22?

A. I can't specifically answer your question.

mm4]

Q. But in any case, the effect of this period of incapacitation on the ability of the plant to meet demand depends, at least to some extent, on whether or not that kind of daily cycle of fluctuation is required of the plant or not?

A. Required by what, sir?

Q. Well, I understand, obviously, that if the plant is responding to forced outages in the system, you can't make any predictions as to when they would call in a 16-hour incapacitated period. But whether or not the plant would be able to respond to anticipated fluctuations and load does depend on whether or not there is that kind of constant diurnal cycle through the periods of restricted operation, or whether, in fact, you would have, say, in the months of June and July, three weeks when the weather in New York would be sufficiently cool so that the plant would not be needed and another three weeks in which the weather would be at such a temperature that you would have to have the plant operating every day to produce power for the customary area?

A. We didn't approach the problem that way.

We approach the problem with a hypothetical study in which we put an upper limit on the discharge water temperature and calculated the amount of heat that would be rejected to reach that upper level of temperature based on a five-year examination of river water entering temperatures,

mm5

and we simply calculated what the restriction would be in arriving at the numbers that appear in my testimony.

Q. I am not sure I really follow that.

Would you explain that a little further ?

In deciding when the plant would have to operate, you looked at the water temperature?

A. We did not do a day-to-day analysis because we cannot predict what the weather is going to be from day to day.

Q. Yes. I realize that.

My question went a little further. Do you agree that the importance and significance of these periods of incapacitation depends certainly to some extent on whether or not you, in fact, would have a constant diurnal cycle through the restricted period, or whether you would have a situation where I used the hypothetical example that you would not need the plant in, say the month of June because the temperatures in the city would not demand it, and there wouldn't be that pressure on the power load, while you might need it constantly th rough July? And that the ability of the plant to react to the demand made upon it depends on that pattern of consumer use of electricity?

A. As it actually turns out, yes.

Q. Yes, so that there might well be a situation where the plant could effectively be -- say there was a cool June

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and a hot July, just to take a broad, simple example. There could well be a situation in which the plant would not be needed at all in June, and would be needed constantly in July, with the result that the importance of these periods of incapacitation would be much less than if you had a situation of daily fluctuation?

A. If it is going that way, or it could turn out just the opposite.

Q. Yes, this is strictly a hypothetical. I just wanted to establish that much.

Turning now to the testimony on page 11 on mechanical reaction between the Zircaloy on the fuel rod clad and the outside of the fuel pellets, what would be the parameters there that would create the mechanical problem which you discuss?

A. The expansion of the fuel pellet would interfere with the clad, and if sufficient transient time were not allowed, the clad would not have time to expand and relax around the pellet.

Q. Is that essentially the matter of the speed with which the plant would be run from one power level to another?

A. That is my general understanding, yes.

Q. Would it make any difference if the plant were run at a constant load of 50 percent of full power and then fluctuated from 50 percent to 100 percent?

mm7

Would this -- would the significance of this problem change in those circumstances?

A. As compared to what?

Q. As compared to the situation reviewed in the testimony, which is running from zero to, I guess, 90.

A. The problem would be diminished, but that was not taken into account.

Q. I realize that.

A. It is just a qualitative statement in my testimony.

Q. Yes.

I am just trying to ask about a different situation and trying to see that.

Would it be significantly changed? In a sense it seems to me it might be a difference --

A. We haven't seen it as a significant problem.

Q. Is it a significant problem?

A. No.

Q. Then we can drop it right there.

Now, turning to the turbine discussion which follows on pages 11 through 14, on page 13 there is a short table on the kinds of different activities that would be needed to take the plant from zero to 90 percent of power, and the total of 120 minutes is set out there.

I take it that at least 40 minutes of that time are very low power, up to 5 percent.

mm8

Do you know how much time from the turbine constraint would be imposed on fluctuating the plant from, say first 30 percent of power to full power?

A. I am not sure I understand your question. Can you repeat it?

Q. If the plant were running at 30 percent of power, and were then fluctuated back and forth to full power, what would be the restraints imposed by the turbine on the rapidity with which that fluctuation would be made?

A. I haven't brought that data with me. That is manufacturer's data and I would have to examine it.

end # 18

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A1 19
Reba 1

Q Would it be a period significantly less than the 80 minutes needed to go from zero to ninety percent?

A Yes, it would.

Q So that, again, most, or a very large part of that 80 minutes is in the lower power levels as the turbine is being heated up?

A The length of time that you have to hold is dependent upon how much the turbine has cooled off, rather than the rate at which you are loading. In our assumptions here, we had an 18 hour off the line period which decayed the temperature of the turbine to 200 degrees. If you are running at some significant load, you use the number 30 percent, your temperatures are very much higher than the 200 degrees Fahrenheit, and therefore the time required to increase to full load is very much reduced.

Q Now on page 14 you discuss the effect of cycling on the life of the turbine, and you say that cycling from no load to full load to no load could reduce the life of the turbine from 10,000 cycles to less than 2,000 cycles.

Again, are the major stresses here at the load power levels?

A The major stresses are caused by going from low temperature to high temperature, and the low temperature is determined by how long the turbine has been off load because of steam passing through it.

Al 19
Reba 2

Q At what power level would you reach high temperatures?

A Essentially zero power with steam passing through the turbine.

Q So that this particular effect could be avoided if steam were passed through the turbines without any power production?

A If one could operate a turbine that way, yes.

Q Can one? I was a little surprised that you were getting all that steam in there, but I thought you were suggesting something to me that had some practicality.

A No, one would not want to return the turbine floating with no power production. It is not good for the turbine, it is not good for the generator.

Q If you want to put this in terms of the total heat load passing through the turbine, is there some way of associating that with the kinds of temperatures that would avoid this kind of thermal stress?

A What we are discussing here is rapid load pick-up then and rapid load pick-up creates a rate of temperature change in the turbine which induces thermal stresses into the turbine. To understand what happens in the turbine, you have to understand something about the pressure variation and the temperature variation through a turbine.

Let's start with high loads. At high loads, you

Al 19
Reba 3

have an almost linear pressure variation through the turbine from the front end to the back end.

You have condenser pressure at one end and the steam generator pressure at the other end, and steam flows from the high end to the low end, decreasing in pressure as it goes. At very low loads, the pressure at the front end of the machine, at the high pressure end, is again the steam generator end, and very rapidly drops down so that most of the turbine is under vacuum, very similar to that of the condenser.

If you accelerate or increase loads from very low loads to high loads rapidly, you have a very rapid temperature change throughout the turbine, even though you are introducing steam of almost the same temperature in the front end of the turbine.

This rate of change is reflected in thermal stresses throughout the turbine blading, rotor, nozzles, and this thermal cycling is what decreases the allowable number of stress reverses in the turbine.

Q In order to avoid that kind of thermal stressing, what rate of power increase should the turbine experience first between, say, zero power and 30 percent of full power, and then from 30 percent to full power?

A I would have to consult the manufacturer's data. I haven't committed all this technical data to memory. It is available to us.

Al 19
Reba 4

Q Fine. If now or later that could be provided to me, I would appreciate it.

Am I right in assuming, then, that looking at the major problems of operating the plant in a fluctuating mode that are set out on pages 9 through 14, that the problems associated with turbines are essentially ones of the rapidity with which the power is increased, particularly the low power part of the increase, and the mechanical interaction, which is not a significant problem, and it is the xenon decay, or xenon override problem that is really crucial to the ability to move the plant up and down?

A They are the physical problems of maneuvering that plant up and down, xenon override, pellet interaction, and thermal transients in the turbine.

Q And am I also correct in concluding that the thermal stress in the turbine is essentially the problem of rapidity with which the plant is moved up and down, and in that way it is like the xenon problem?

A And also it depends on the length of the time that the plant is idle.

Q Yes, and particularly it is that cooling below a significant power level that imposes an inability to move up again rapidly?

A As far as the turbine is concerned.

Q Yes, speaking only of the turbine.

Al 19
Reba 5

Assuming, as you said, there is not a significant problem, that really means it is the xenon override that incapacitates the plant if it were run at some significant power level? That is, and then fluctuated up and down?

A The problem is that we cannot get the plant back to critical because of the xenon override problem.

Q Yes.

A The plant goes subcritical, and we cannot get it critical again, until the xenon has decayed or we have been able to deborate, and at the end of the core life, we do not have very much control tied up in boron, and therefore it is just a matter of waiting for decay.

Q I think you are just saying what I was trying to put in less precise language. You said those are the physical problems with that mode of operating the plant, as if you were thinking of other kinds of problems. Are you thinking of -- well, what else are you thinking of?

A I am thinking of economic problems. And also of alternate sources of generation, leading to air pollution problems.

Q I believe that on the economic questions that Mr. Schwartz and I should address ourselves to that.

A Yes.

Q Let me turn to the environmental considerations set out on page 16, and first there is what I believe is a

Al 19
Reba 6

typographical error in the middle of that first full paragraph where you say that the pollutant increases beyond an order of -- and then skip a line, "21,000 tons of nitrogen." Shouldn't that be "nitrogen oxide?"

A Yes.

Q What effect will there be on the people of New York City and of the surrounding area from the emission of 4800 tons of particulates, 13,000 tons of sulfur oxide, 21,000 tons of nitrogen oxides?

A I don't think I can answer that question.

Q Is there anyone on the panel who can answer it?

MR. TROSTEN: No. It depends on the sense in which you are asking the question. Are you asking for a medical effect on people?

MR. MACBETH: Well, any effect. It would seem to me that to understand what these figures meant, it would be necessary to relate them to some kind of an effect. It could start with people and move on to animals and plants, and I think any other kinds of effects that might be involved. But we can start with people.

MR. TROSTEN: I don't think there is anyone on the panel who is prepared to address in detail the specific environmental effects on people of these particular quantities of materials.

MR. MACBETH: How about plants and animals and

Al 19
Reba 7

buildings and other things?

MR. TROSTEN: I don't think there is anyone here qualified to answer that question. We are providing information quantifying the releases in the best way we could.

MR. MACBETH: Do you want to supply witnesses to answer this question, or is the company taking the position that it doesn't know?

MR. TROSTEN: We don't know, really, whom we could supply as a witness in the company, or for that matter from elsewhere, who could quantify this thing from the standpoint of the medical effects.

Perhaps the EPA has someone available, and perhaps the Atomic Energy Commission Staff could direct this question.

MR. MACBETH: At any rate, you don't intend to offer anyone who could answer that question?

MR. TROSTEN: That is correct.

BY MR. MACBETH:

Q Now, of course, these figures are given over an eight year period, and there have been two other suggestions about the period in which the alternate cooling system could be built. Do you know how those figures would change if an alternate cooling system was installed at Indian Point?

Let's take, first, a period of two and a half years from the time when the license was received.

MR. TROSTEN: Do you know?

Al 19
Reba 8

THE WITNESS: I have an opinion that it would not be significantly changed.

MR. MACBETH: Do you want me to repeat the question? If we reduced the period from eight years to two and a half years, the numbers would not be significantly changed?

THE WITNESS: I wasn't aware that was the form in which you were asking the question. I meant the rate.

MR. TROSTEN: Let us take a brief recess, and perhaps we can supply that.

MR. MACBETH: Certainly.

CHAIRMAN JENSCH: What time do you suggest?

MR. TROSTEN: Let's take ten minutes.

CHAIRMAN JENSCH: We will recess at this time to reconvene in this room at 2:55.

(Recess.)

end
Al 19
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Al 20
Reba 1
CR 8635

CHAIRMAN JENSCH: Please come to order.

Are you ready to proceed, Hudson River Fishermen's Association?

MR. MACBETH: I am. I think there is an outstanding question that Mr. Newman was consulting on.

THE WITNESS: You had asked me concerning the production of pollutants, emissions, as a result of a change in possible scheduling of cooling tower installations. If one could change that schedule, these emissions being essentially linear with time, the pollution would be reduced.

BY MR. MACBETH:

Q Is it true that if Con Edison were operating Indian Point 2 as a peaking unit in the manner prescribed in this testimony that it would meet all the legal requirements for the control of air pollutants emerging from its own stacks in the City of New York and in Westchester County?

A Yes, that is true.

Q So that the figures of particulates, sulfur dioxide and nitrogen oxide, given on page 18, would not cause the company to violate any city, state or Federal clean air regulations?

A Not as they exist, no.

Q Turn now to the section on scheduled outage on pages 4 and 5. At various times I have seen from the company schedules of scheduled outage which look six and nine months

Al 20
Reba 2

into the future. How much flexibility is there in the scheduled outage?

A At the present time there is very little flexibility in scheduling outages.

Q So that with a plant like Indian Point 2, the company's policy is simply to run it until you have used up the core and then at that point turn it off?

A Essentially, yes.

Q And refuel?

A Our policy is to schedule it so that turn-off is at the proper time of the year, in the spring or the fall, rather than at summer or winter peak.

Q But that would indicate that you have considerable ability to plan the outage for some particular time of year?

A Within reason, yes.

Q When you say "within reason", what ---

A Once the core is designed, we are pretty much committed.

Q You are committed to the length of the cycle?

A The length of the cycle, yes.

Q At Indian Point 2, what would the length of the cycle be?

A That would vary with the core. I believe our first cycle is 18 months followed by succeeding cycles of one year -- 12 month cycles.

Al 20
Reba 3

Q So that you could set the schedule for -- scheduled outages at the plant -- to fall 18 months from the beginning of substantial power production and then annually after the end of that 18 months?

A Well, depending on when our first start-up is. We would adjust subsequent designs to put us out in the spring or fall refueling. There is some day in the yearly cycle. We can lengthen that by a period of a month or so, or shorten it to make us fall off our peaks.

Q And you would do that by using the plant at greater or lesser amount of ---

A No, by changing the enrichment in the fuel.

Q In the last few years, how many megawatts have been scheduled for outage between the 15th of December and the 1st of March?

A I would have to consult our company records. I don't know.

Q Could you do that and report the number back, please? For that matter, do you know if there are plans for next year and, if so, what profile of scheduled outages that would show?

A I know there are plans.

Q If I could have, just, say, the last 3 years and whatever you have gone into the future for that period between the 15th of December and the 1st of March, and the

Al 20
Reba 4

last two are usually broken down on a week-for-week basis.

That would be very helpful if you can do that.

In the paragraph at the bottom of page 4, you discuss the refueling schedule. When you are down to the last month or two for the refueling, before the refueling is scheduled, how much flexibility does there remain with respect to delaying or speeding up the time of refueling?

A That depends upon what the availability of our other units is. All discussion of how much flexibility we have has to take into account what our current experience is in forced outages as well as our scheduled outages, not only in our system, but on the interconnection as well.

Q Let me try and put it to you in hypothetical terms. Could you dealy the refueling time simply by turning the plant off in that situation?

A Obviously, yes.

Q And what if for one reason or another you wanted to move the period for the refueling forward? Do you have much flexibility in being able to do that?

A Physically, yes. We can take the fuel out. Economically, we pay the penalty for underburn.

Q In other words, short of buring the core out essentially, there is no way of moving the refueling time forward without an economic penalty?

A An economic penalty and also a penalty on future

Al 20
Reba 5

cores. It reflects itself in the poorly designed next cycle, in that we have underburned. Let me explain that a little more elaborately.

We have multiple regions in the core, and we only refuel a portion of the core at a time.

Q Roughly a third?

A Correct. Now, the new third that goes in has to be designed to be compatible with the amount of burned that exists in the two-thirds that are left in the core. So that if for any reason we underburn on a particular region, the new core has to be designed to accomodate that.

There is a lead time required for design of the replacement, and when you get us down in your hypothetical example in from one to two months, we don't have very much flexibility to underburn other than within the tolerance of maybe ten percent or so, because our core design for the next refueling is already fixed.

end Al20
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Q. Do you know the total amount of megawattage and the percentage of the total part of the system that is in plants designed to be peaking units?

A. Plants designed to be peaking units?

That would be our gas turbines, and that is roughly 20 percent of our system.

Q. Do you know the rate at which the base load fossil fuel units can be brought on line?

A. We attempt to keep them on line. I don't know quite how to answer your question. I am not sure what it implies.

DR. GEYER: Do you mean new plants, or the existing plants?

MR. MACBETH: No, the existing plants.

BY MR. MACBETH:

Q. In other words, if you have a fossil fuel plant, taking first one that is simply turned off and then the equivalent of hot standby, how fast could you bring it into full power service?

A. If it is totally available and ready to go?

Q. Yes.

All you have to do is fire it.

A. Oh, in a matter of -- depending upon how long it has been shut down again, two to three hours, or possibly less if it is hot.

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Q. At the bottom of page 16 and the top of page 17, you haveprovided a set of what are now levelized annual costs for replacement fuel operations.

If an alternative closed cycle cooling system were installed at the Indian Point 2, first after a two and a half year period, and second by January 1, 1978, what changes would that produce in both the annual cost for your given and the total $70 million figure given for the eight-year period?

A. These numbers were prepared by Mr. Schwartz?

Q. All right.

On page 20 of the testimony, figures are given for the amount of pump operations that would be required for hot standby, and I would just like to try to fill that out with figures for the 30 percent power level and the 50 percent power level.

If the plant were operated so that it was possibly at 30 percent of full power, and fluctated from that level, how many pumps would be required for the cooling of the steam?

A. At less than half load, we could, although we would not want to. We could operate three pumps.

Q. With three pumps?

A. Circulating water pumps. There are additional pumps.

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Q. Yes, circulating water pumps.

A. Anything above half load would require the six-pump operation.

Q. So that covers the 30 percent and the 50 percent?

A. Yes.

Q. Above the 50, you would go to six?

A. Yes.

Q. If the plant were operated at 50 percent of below -- well, let's take it at 30. If it was operated at 30 percent of full power with six pumps, and they are recirculating water system, the system used in the winter, do you know what the delta T across the condenser tubes would be?

A. I could calculate it.

Q. Would you do that at some point? I don't have to have it right now, but I would appreciate having that figure.

A. Yes.

Q. And the same question for a 50 percent power level operating with the recirculating water system every six months.

MR. SACK: Would you repeat what the conditions are?

MR. MACBETH: Yes.

First, you are operating the plant at 30 percent of full power with six pumps in the recirculated water system, and then you are operating at 50 percent with six

mm4

pumps.

MR. SACK: Does that mean 50 percent of power, and six pumps?

MR. MACBETH: Yes.

The question is both cases, what the delta T across the condenser tubes is.

BY MR. MACBETH:

Q. If the plant were operated with six pumps at full flow, no recirculating water system, would the delta T be roughly proportional to the total power level being produced?

In other words, at 50 percent, would it be a delta T of about 7 1/2?

A. No, sir. Because there is a change in thermal efficiency at reduced load.

Q. Then let me add a question in that situation with six pumps, what would the delta T be at 30 percent?

MR. SACK: 100 percent power?

MR. MACBETH: No, 30 percent power and 50 percent, six pumps, full flow, what is the delta T?

MR. SACK: Others were reduced flow?

MR. MACBETH: Yes, and the last is with three pumps at 30 percent or 50 percent.

MR. SACK: 30 percent at full flow?

MR. MACBETH: 30 and 50 percent at full flow, and 30 and 50 percent with three pumps.

mm5

MR. SACK: Both at full flow -- reduced flow and full flow and then what?

MR. MACBETH: Three pumps.

MR. SACK: Three pumps.

All right.

MR. MACBETH: That completes my questioning of Mr. Newman.

I should say to the Board that I have discussed some questions that would be give to Mr. Schwartz, and we have agreed, and the answers are rather straightforward, that we will try to submit something in writing to the Board rather than have Mr. Schwartz come down. There are only two or three.

MR. KARMAN: We have no questions of Mr. Newman.

MR. BRIGGS: Mr. Newman, you may have answered this question, but I am not quite sure.

I believe you have indicated that it would be impractical to use the Indian Point 2 plant as the topping unit, is that right?

THE WITNESS: As the topping unit?

MR. BRIGGS: I am sorry, peaking unit.

THE WITNESS: Yes, I do.

MR. BRIGGS: I believe the counsel for the Hudson River Fishermen's group has suggested that the plant might be operated for, say a week at a time, maybe two weeks in the

summer and two weeks in the winter to supplement the other plants on the system that would be operated at full power, and then would be shut down the rest of the time.

The question is, would it be impractical to operate in this manner at a week during the summer which there was a demand, a large demand on the system, that Indian Point Unit 2 would be operated, say, in the daytime at 100 percent power, and night time at 50 percent power for that week, and be shut down during the rest of the time?

THE WITNESS: I can address the physical restrictions, but I think Mr. Schwartz should address the system considerations.

Physically, yes, you can do it.

But whether this is practical from a systems standpoint, I am not sure.

MR. BRIGGS: When you say practical from the systems standpoint --

THE WITNESS: Whether he can predict the need for the plant sufficiently in advance to permit startup.

MR. BRIGGS: Does Con Ed contract with a company that predicts weather in advance?

THE WITNESS: I think he does have a weather consultant. He has people on his staff who try to do this.

MR. BRIGGS: Does he have a pretty good record?

THE WITNESS: It depends who you ask.

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MR. BRIGGS: But the hot weather doesn't just come all of a sudden like this.

(Indicating.)

You do have some warning, do you not?

THE WITNESS: It is a function of not only temperature, but the amount of overcast and the time of the day, what units break down on the system due to being pushed very hard at that period.

Our problem is not so much in forecasting a load, as forecasting the availability of the units.

end 21

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Reba 1

MR. BRIGGS: But so far as demands on the equipment are concerned, this would be possible?

THE WITNESS: Yes.

MR. GEYER: How long is the shutdown ---

THE WITNESS: It is planned to be an April shutdown.

MR. GEYER: This could be in the spring, to avoid the spawning period?

THE WITNESS: Either the spring or the fall is the period when we would schedule it. We have a winter peak and a summer peak and off-peak conditions in the spring and fall.

MR. GEYER: I would like to ask the biologist whether this would be an advantage or a disadvantage to have this off during the spawning season.

Whereupon,

HARRY L. WOODBURY

xxx

was recalled as a witness, and, having been previously duly sworn, was examined and testified further as follows:

CROSS-EXAMINATION (Resumed)

THE WITNESS: I think some clarification in your first question maybe is in order. When we speak of the spring as far as the system load is concerned, we are talking about the period up to about the 15th to the 20th of May.

When we speak of a spawning season in the river, we are talking about generally the first week in May until the

Al 22

Reba 2

first week in July, or thereabouts.

So spring and spawning season are not co-terminus.

MR. GEYER: Although that doesn't include ordinarily the peak periods during the year, even if you went up in July? The peak summer period is after that as a rule, is it not?

WITNESS WOODBURY: That is a matter of probability. If you are talking about energy output that is one thing. If you are talking about capacity, demand at any one-hour period. That is something else again. With respect to peak demand, that can occur from the end of May through the 22nd of September, I guess, was the worst conditions we had when we had to jettison a substantial amount of load back in 1970.

The answer to your second question, however, if the plant were shut down during the period that bass larvae are subject to entrainment, then whatever larvae would have been entrained need not have been entrained, and whatever damage might have occurred to them would not have occurred to them at Indian Point, and whatever mitigation that has against the adverse effect would be realized.

MR. GEYER: Would the change in the whole temperature regime be significant one way or the other?

WITNESS WOODBURY: In the temperature regime of the river?

MR. GEYER: Yes.

WITNESS WOODBURY: Significant to the fish in the

Al 22

Reba 3

river?

MR. GEYER: To the ecology.

WITNESS WOODBURY: In our opinion, at that time of year it would not, sir.

MR. GEYER: You could run the plant, and it wouldn't make much difference as far as what went on in the river itself was concerned?

WITNESS WOODBURY: That is correct. There would be no discernible differences that you could measure. I don't mean to imply that there would be a discernible difference in the population of the striped bass in the 13-year cycle of life, either.

MR. GEYER: That is not the question.

MR. BRIGGS: Was that all of the questions you had of Mr. Newman, or all on just that one paper of his?

MR. MACBETH: Yes. I have just one or two more that grew out of the last questions you asked, if this would be a convenient time to put them.

MR. BRIGGS: Go ahead.

(Witness Woodbury Temporarily Excused.)

BY MR. MACBETH:

Q Could you describe, Mr. Newman, the system by which Con Edison gets its weather predictions and makes on a short range basis its decisions or estimates of power demands?

All 22
Reba 4

A (Newman) No, I cannot. That would be in Mr. Schwartz' area.

CHAIRMAN JENSCH: You have no further questions?

MR. MACBETH: No.

MR. BRIGGS: Mr. Newman, on your testimony on the alternative closed cycle system at Indian Point 2, the testimoney of February 5th, and there was one question also on your previous testimony to clear up a number included in the $138 million for the total cost of the alternative.

I might ask that question first. It may be necessary for you to look up something and it may not. But under Item 2-D, under that cost estimate, it says, "Charges on Additional Capital for Replacement Turbine Capability, A Carrying Charge of 14.3 Percent." What is meant by that?

WITNESS NEWMAN: That is the carrying charge on the amount of capital that would have to be expended to replace the capability within the system either in our system or somewhere else to create the capability that we would lose.

MR. BRIGGS: But you also have an item in here, item C, cost of purchasing deficient power for $28 million 902,000. Does that cost not include the cost of the turbine that provides that replacement power?

THE WITNESS: That is what I understand. One is an energy charge and one is a capacity charge. I can verify that, but that is what I understand those to be.

Al 22

Reba 5

MR. BRIGGS: Don't you have a charge for a boiler in here somewhere, then, that replaces ---

THE WITNESS: In the capital charge, the entire unit cost is included. We use the word "turbine", but it is for the unit. The capital charge is for the replacement of installation. Whether it is a gas turbine, or whether it is -- what I am sticking on is that I don't recall if this is a gas turbine or whether it is a boiler and turbine combination.

MR. BRIGGS: I will say it is just not clear to me.

THE WITNESS: I am sure now as I look at the carrying charge that it is a gas turbine. That is 14.3 percent. We have both categories. We have purchased power and we have generated power that are replaced. In particular one item refers to gas turbine replacement power and the other item refers to purchased power.

MR. BRIGGS: The purchasing of deficient power, is that done for just particular times, or does this extend over the entire 25 years?

THE WITNESS: We try to purchase economy power when it is available to us. If we cannot purchase economy purchases, then we have to generate with gas turbines.

MR. BRIGGS: I don't believe it is shown in the actual testimony, but could you at some later time send us information on how these two numbers are derived?

THE WITNESS: Yes.

end 22

MR. BRIGGS: On the schedule that you show for the Indian Point number 2 cooling tower, this was in your February 5 testimony, it follows page 11 and is entitled, "Exhibit 1."

You show here a period of time for conducting environmental studies, a period of one year, and as I understand it, parts of your studies are needed because the cooling tower is as tall as it is.

I also recall seeing that some of these studies are to be studies that are made with balloons, and of reading that there was a Weather Bureau station at Peekskill Academy in the early 1930s.

Do you know whether they ran any studies with balloons at that time?

WITNESS NEWMAN: No, I do not.

MR. BRIGGS: You don't know whether they did run any studies with balloons?

WITNESS NEWMAN: No.

MR. BRIGGS: I believe the Applicant depends to some extent, or has used to some extent, measurements of temperature and wind directions that were obtained there.

WITNESS NEWMAN: Our principal deficiency as far as our meteorological data is concerned are temperatures at this location, plus winds at the 400-foot level.

MR. BRIGGS: Do you have information on winds, but not wetbulb temperatures at the 410-foot level, is that right?

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WITNESS NEWMAN: Our present tower is 100 feet tall. I believe it is -- let me say, I can't answer your question specifically.

MR. BRIGGS: The present tower, is that the Indian Point 3 tower, is that what is referred to?

WITNESS NEWMAN: Yes, it is at the Indian Point site. Thatis a 100-foot high tower.

MR.BRIGGS: It seems to me there was another tower at the site that was a 300-foot tower, and was set at the 100-foot elevation,and that there are many measurements from that tower.

WITNESS NEWMAN: My staff tells me there was a tower back in the 1950s. It was dismantled in 1959, and there is data available from that tower.

MR. BRIGGS: Wind direction data and temperature data, but not wetbulb data?

WITNESS NEWMAN: That is correct.

MR. BRIGGS: ARe there no reasonable methods for taking wetbulb temperature data at lower elevation and by calculation or extrapolation, judge what the wetbulb temperatures would be at the higher elevations?

WITNESS NEWMAN: There are atmospheric models that can be used.

MR. BRIGGS: Burns and Roe, I believe, prepared a report in which they discussed alternatives and gave some

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discussion of what they thought the environmental effects would be.

Is that right?

WITNESS NEWMAN: Yes, they did.

MR. BRIGGS: As I understand it, the Applicant doesn't completely agree with the conclusions.

Is that also correct?

Is that the reason for the needs for more data?

WITNESS NEWMAN: They had no data. They simply made qualitative conclusions.

It is our opinion that such qualitative conclusions would not be acceptable to the state for permit purposes, that they will require data gathered at the site.

This is particularly true with respect to studies of plume duration, salt plume effects, et cetera.

MR. BRIGGS: Would there be much risk involved in ~~during~~ doing the preliminary engineering of the cooling tower before one got his environmental information, and essentially designing the tower before he had any additional environmental information and using the environmental information just as a check on the design he had made?

WITNESS NEWMAN: The purpose of gathering this information is not so much to design a tower as to get permission to build the tower. We are proceeding with the design of the tower installation. That is circulating water

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systems, modification to the structure, foundations, et cetera.

That shows as nodes 1, 2 and 3. That work is underway. It concludes on 4-1-74.

The Environmental Studies are nodes 4, 5, 6 and 7, which conclude on 5-1-74, at which time we submit to the state and federal agencies.

So, to answer your question specifically, we do not feel limited by lack of data as far as the design is concerned.

Now, when you are talking about the design of the tower itself, that is done by the contractor who erects the tower. We have prepared a specification, and will be reviewing it with potential suppliers to see how it fits the commercial designs that are available.

MR. BRIGGS: Yes.

Have there been any state or federal or local agencies that have indicated that a cooling tower should not be built at the Indian Point site, to your knowledge?

WITNESS NEWMAN: Not to my knowledge.

MR. BRIGGS: Have there been agencies other than the AEC that have indicated that they thought the cooling tower would be appropriate at the Indian Point site, to your knowledge?

WITNESS NEWMAN: I would like to confer.

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Not to my knowledge.

CHAIRMAN JENSCH: If there is anything further, you may supply it, because you want to leave.

Proceed.

MR. BRIGGS: Have you considered the possibility of requesting a preliminary evaluation by the state and federal agencies before the environmental studies were completed in order to cut down the 15-month period that you show here and some other times in your schedule?

WITNESS NEWMAN: I have considered it.

We have gone so far as to request a review of blowdown for a general review, and we have had specific installations to talk about, we have been told we should submit it.

MR. BRIGGS: But the specific installation really isn't dependent on completing the environmental studies, isn't that right?

WITNESS NEWMAN: That is correct.

I just illustrate the attitude of the state licensing people. We can certainly apply for a blowdown. But until we come to conclusions on salt plume, I don't think we can apply.

MR. BRIGGS: On salt plume?

WITNESS NEWMAN: Yes, sir -- ~~dirft~~ drift.

MR. BRIGGS: So you have made this one request

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that you haven't --

WITNESS NEWMAN: -- that we haven't pursued.

end #23

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Al 24
Reba 1

MR. BRIGGS: Your schedule here indicates that Indian Point 2 could be back in service by 9-1-80. I guess maybe we have asked the question before, but with reasonable cooperation on the part of state and federal agencies, do you see any real problem in cutting out at least a year of the time that you show here for evaluation?

THE WITNESS: It depends on the definition of reasonable ~~regional~~ cooperation.

MR. BRIGGS: I have no further questions.

CHAIRMAN JENSCH: Let me ask Mr. Newman. Perhaps this is somewhat repetitious of previous discussion we had. As I recall the inquiry that I had and we discussed sometime ago, you made a comparison, for instance, between Palisades and your estimated costs for a cooling tower at Indian Point.

As I recall it, and the problem I have is the possibility of double counting of expenses, you took a total figure from Palisades and then you said, "Now, over here, at Indian Point, we will have excavating costs which are going to be XY dollars, and other items."

THE WITNESS: Yes.

CHAIRMAN JENSCH: As I understand the presentation by Palisades, that figure which you took at Palisades embraced several categories of accounting classifications which included, excavation, design, planning, all the preliminary steps, so when you added your cost, you added it to the excavating

Al 24

Reba 2

costs that already had been incurred at Palisades.

To that extent, you doubled the excavating costs. I wonder if it is possible at a later time to prepare strictly just a cost comparison according to accounting classifications, not some totality for Palisades and then a separate classification for Indian Point.

What I have in mind is this, that I have the impression from just general literature that your costs for a tower are somewhat in excess of what has been indicated in the general literature. Of course, that depends upon the kind of tower you are going to build and your design, all of which would make some variations certainly, from what the general literature portrayed.

Let me ask you: When do you expect to discuss the situation with bidders? You say you are making some general design programming now.

THE WITNESS: That should be within the next three months. We will discuss our tower specifications with potential bidders.

CHAIRMAN JENSCH: Do you expect responses within three months?

THE WITNESS: We are not asking for bids now. We are discussing the technology for a tower of this capacity. This is going to be the largest single tower that has been built to date, probably.

Al 24
Reba 3

CHAIRMAN JENSCH: Are you fully committed to that program, a single tower?

THE WITNESS: That is what we want to see, if the technology can support a single tower.

CHAIRMAN JENSCH: Have you examined the mechanical draft tower situation?

THE WITNESS: We examined the mechanical draft at another site, which is a very similar problem. We are very much discouraged by our examination from the physical standpoint.

CHAIRMAN JENSCH: Why?

THE WITNESS: Because of the space required, the number of cells and the spreading of the cells. Again, we get into the difficulties of this particular installation of the towers of any type, and mechanical draft requires dispersion on site and a multiplicity of pipes, all of which have to be buried in trenches.

It runs our costs up for piping considerably. We were also discouraged by our initial discussions of low level plume emission.

CHAIRMAN JENSCH: Well, I don't know ---

THE WITNESS: We think that is going to be a considerable problem. Also, the proximity to the residences would lead us to believe that we would have noise difficulties. Part of our environmental program is the noise study, prediction

Al 24
Reba 4

of noise levels from these towers.

CHAIRMAN JENSCH: Your statement contrasts most severely from what I heard not too long ago about Vermont's. They have one next to a school building, a thousand feet or more, and the testimony was almost uniform, no n oise levels at all, they had windows open, windows closed, children in the school and in the playground.

THE WITNESS: I am not sure the children sleep in school.

CHAIRMAN JENSCH: They have houses nearby, and they checked that phase of it, too, in the house, out of the house, windows open, windows closed. No significant adverse impact.

So I am having a little problem about this. I understood the excavation situation wasn't quite as extensive for mechanical towers. If you could give us something on that, I would appreciate it, and this piping, well, you might have to flatten out more of a ridge along the river where you are located.

As I understand it, you have a sort of a hill that you climb from the location of your Indian Point plants up before you get out onto the main highway. Isn't that correct?

THE WITNESS: That is correct.

CHAIRMAN JENSCH: Wouldn't that constitute some shield, not only for a plume, but also for noise?

Al 24
Reba 5

THE WITNESS: The plume would, if it goes in that direction, would rise over the hill.

CHAIRMAN JENSCH: Well, if it rose over the hill, it would be beyond the housing. Assuming it comes up the side of the hill and kept on going up, it may not -- what do they call it, looping or lassoing, or something, that comes down to the ground? It is infrequent, that looping arrangement, but I wonder whether you have, and I say this without having a number of factual situations, but whether you are really designing the more expensive systme with a fantastic tower that might have esthetic problems in contrast to a lesser expense, less excavation, and insignificant noise, and no bothersome plume?

I don't know what the situation was, but I wonder if you could give us some results of the preliminary study you have made over mechanical draft towers, because your cost presentation to me seems somewhat higher than I think an examination of other plants would indicate.

THE WITNESS: I am certain it is.

CHAIRMAN JENSCH: Yes, and it can't all be due to excavating problems.

THE WITNESS: No, there are several other indices that we brought to bear, labor productivity, labor pay rate.

End 24

CHAIRMAN JENSCH: Yes.

Have you considered the possibility of a devaluation causing a depression in our country?

That is an index that Barrons is indicating could be useful.

WITNESS NEWMAN: We do that on a three-month forecast.

Our view does not see a change in the foreseeable future. It was somewhat higher on our predictions.

MR. BRIGGS: Was that like the weather report?

CHAIRMAN JENSCH: 60 percent chance of this and 20 percent chance of that.

I appreciate your indices, and they do develop in very interesting calculations, and calculations sometimes are like the weather report, as I think Mr. Briggs has indicated.

So I wish that you could give us something a little more realistic based upon what actually is being constructed and experience that has been indicated.

They have run the Vermont mechanical tower, so it isn't a calculation up there anymore. They have had towers in operation, they have the decibel counts taken, they have had measurements from the plume, from the cells, the mechanical cooling cells.

If you want to buy your spirits up about these things, talk to the Vermont Yankee crowd, and they will tell

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you that the mechanical towers are wonderful, and they have an absolute and complete endorsement of the program.

It is amazing to hear you say you are going to build a large tower because it has the greater cost and it is worst aesthetically, and we are not quite sure it would work anyway.

So I wish you could give a better presentation on the cost at least. Could you do that sometime later?

WITNESS NEWMAN: I might say that the problem has not been overestimated.

It has been underestimated.

CHAIRMAN JENSCH: That may be because not so much of your estimating, but maybe it is something to do with quality assurance that sometimes the valves get stuck, and you know your original estimate assumed a perfect performance, and understandably, with some defects and so forth, your costs do go up, and I am sorry to hear about it.

WITNESS NEWMAN: I was referring to our corporate practice rather than specifically Indian Point.

MR. TROSTEN: Mr. Chairman, there has been an estimate placed in the record of the cost of mechanical draft cooling towers.

CHAIRMAN JENSCH: I was referring to the presentation that Mr. Newman made, I think it was in December, in which he, I felt, duplicated a lot of categories of accounts,

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taking a total cost from Palisades and then giving us a kind of overburden of his cost from excavation, when excavating -- well, he dubbed it up rather than separately classifying the expenses.

WITNESS NEWMAN: The point was that we were making our December presentation -- the point we were making there was that there was virtually no excavation on the Palisades job.

Our estimate of the actual excavation was about $100,000 compared to something more than $8 million.

CHAIRMAN JENSCH: I don't know what the figures were in Palisades, but if they didn't excavate, they must have had to pound steel piling down, because it is a sand pile out there, as I recall it. So they must have had a cost similar to that of excavation.

WITNESS NEWMAN: We have 300,000 yards of the hillside to take out in order to get the plane on which to build anything. This is the fundamental difference inthe sites.

CHAIRMAN JENSCH: Yes, I understand. But when they started from a plane, they were a standard plane, and they had to, I think, put steel pilings in. It may have cost them $8 million, too, so you would start even if that were correct.

So, you see, I don't know that you have really

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separated by accounting classification, the different accounts that are involved, in a project of this kind.

You have lumped the Palisades and then separately classified yours. If you could separately identify those accounts --

WITNESS NEWMAN: If we can obtain that information.

CHAIRMAN JENSCH: Very well, thank you.

MR. TROSTEN: Mr. Chairman, Mr. Woodbury had a comment to offer in response to one of your questions.

CHAIRMAN JENSCH: I want to be sure we get done with Mr. Newman.

MR. TROSTEN: Excuse me, I thought you were.

CHAIRMAN JENSCH: Are there other questions of the gentleman?

Thank you, Mr. Newman, you are excused, unless you had redirect?

MR. TROSTEN: I would like to confer with Mr. Newman about that.

end 25

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CHAIRMAN JENSCH: Proceed, Mr. Woodbury.

Whereupon,

HARRY L. WOODBURY

was recalled as a witness, and, having been previously duly sworn, was examined and testified further as follows:

CROSS-EXAMINATION (Further)

THE WITNESS: I would like to state that Con Edison has no objection to the construction -- or any objection to the construction of mechanical draft cooling towers than they do to natural draft cooling towers, if indeed cooling towers are found to be necessary, and certainly if the Atomic Energy Commission felt that the mechanical draft cooling towers were to be preferred, and over the natural draft towers, we would, of course, abide by whatever decision they made.

It is our view, however, at this point in time, that the environmental disadvantages of mechanical draft towers would be so severe in the Hudson River, and would impose such a burden on the people west-east of the Hudson River, that this is a burden that we feel, based on the information we have, that we should not ask of them.

Like you, I have visited the plant at Vermont Yankee. When I was there, they had not been above 50 percent power level with the towers. That is like 300 megawatts, or a very small percentage of what the emissions would be at full load at Indian Point from Indian Point's 2 and 3 combined,

Al 26
Reba 2

which is the kind of an alternative that we have to ultimately look at.

The prevailing wind in the winter time, and that is its experience that they have had now, is away from the building, so that the plume, when there is a plume, drifts across the Connecticut River and then over woodlands, not over the town.

If that same plume were to drift across the town, the reaction of the townfolks might be quite different. We have visited a plant at Shawnee in Pennsylvania, not a nuclear plant, but a fossil plant, where mechanical draft towers have been installed, and have caused such local disruption that they are being replaced with natural draft towers.

So it was on this basis that in spite of the added costs we felt that the environmental benefits from the natural draft towers offset the added costs that were incurred by construction of natural draft towers.

CHAIRMAN JENSCH: Have you run any smoke tests to see what it would be like if you ran up some sort of a plume of smoke from your shoreline on the Hudson River to see if in fact the topography of your area wouldn't be to your advantage in the sense that once it started up the hill it would keep on going, it wouldn't go over the town?

THE WITNESS: Yes, our low level meteorology studies at Indian Point would provide information that would

Al 26
Reba 3

permit that sort of an evaluation.

CHAIRMAN JENSCH: You haven't run the smoke tests?

THE WITNESS: No, sir, we have not run smoke tests at Indian Point.

There are two other things that need to be taken into account, I believe. The mechanical draft towers at Vermont Yankee are operating on a fresh water stream, and there is no salt water makeup, and therefore, no salt drift downstream, and the other observation I would make is that -- we were talking yesterday about public values.

People's sense of value differ from location to location. It isn't very far from Vermont Yankee to where a pump storage plant has been proposed, designed, built and placed in operation.

CHAIRMAN JENSCH: You are talking about Northfield?

THE WITNESS: Yes.

CHAIRMAN JENSCH: They finally got it in operation?

THE WITNESS: Partial operation. The attitudes of the people on the Hudson River are quite different.

CHAIRMAN JENSCH: You don't want us to get into that again today, do you?

THE WITNESS: No, I just want to point out that attitudes differ from place to place.

CHAIRMAN JENSCH: As I understand it, the interrogation of the Hudson River Fishermen's Association, you

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Reba 4

haven't got opposition to the cooling tower?

THE WITNESS: We haven't rustled it up.

CHAIRMAN JENSCH: Could you do that?

THE WITNESS: I feel we could.

CHAIRMAN JENSCH: We are interested in three months. Maybe this case will still be going on in three months, and we will hear what the tentative conclusion is. When they talk about the technology of your single tower, they may give you something on price, too.

If we happen to be in session, you could send the word through. It would be useful.

Isn't that an outfit by the name of Morley or something?

WITNESS NEWMAN: Morley, and Eckedyne.

CHAIRMAN JENSCH: No indication of price on either one of them?

WITNESS NEWMAN: Oh, yes.

We are talking about a total cooling tower project. The price of the tower in itself is, as I recall, we have had quotes of from $8 to $11 million. That is the sort of number that appears in the literature.

People think that is the entire project. That is not. That is just the cost of the tower on the foundation.

CHAIRMAN JENSCH: I think that is an interesting start, though. If you could give us what you believe the

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Reba 5

cost of the tower is and then separate it according to the kind of activity and excavations, and I think, leveling it, or whatever.

WITNESS NEWMAN: I believe we have already submitted that.

CHAIRMAN JENSCH: You don't need to do it now, but later. Are those figures you have previously submitted the figures to which you have now referred?

WITNESS NEWMAN: Yes, they are.

MR. TROSTEN: We will summarize this for the Board.

CHAIRMAN JENSCH: Sometime. He wants to get away. If there are no further questions for the gentleman?

MR. TROSTEN: Let me confer.

CHAIRMAN JENSCH: We will recess, to reconvene in this room at 4:04.

(Recess.)

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CHAIRMAN JENSCH: Please come to order.

MR. TROSTEN: Mr. Chairman ---

CHAIRMAN JENSCH: Excuse me, we don't have Staff counsel yet.

REDIRECT EXAMINATION

XXX

BY MR. TROSTEN:

Q. With respect to the availability of meteorological data from studies performed in the past, do you have any additional comment to offer concerning Mr. Briggs' question?

A. (Mr. Newman.) Yes, although we did have a tower back in the 1950s, that data, after it was analyzed, was discarded and is no longer available to us.

MR. BRIGGS: Not even through the reports of NYU?

WITNESS NEWMAN: It is not available.

All we have is the analysis.

MR. BRIGGS: I see.

CHAIRMAN JENSCH: Go ahead.

BY MR. TROSTEN:

Q. Mr. Newman, Mr. Jensch raised the question about the comparison of the excavation costs of Palisades and Indian Point 2.

Do you have any additional comment to offer concerning the comparison that appears in your testimony and the basis for that comparison?

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A. Yes.

In my testimony on page 7, and this is the ~~December~~ February 5th testimony, we noted that Palisades was a sand foundation with little or no excavation, that there were no special structural features such as steel piling.

CHAIRMAN JENSCH: You are not suggesting that there were not some steel piles driven, were you?

WITNESS NEWMAN: As far as we have been able to determine, there were no piles.

CHAIRMAN JENSCH: It is your understanding that this is set in a bed of sand?

WITNESS NEWMAN: That is correct.

CHAIRMAN JENSCH: Would you check that?

I have some concern about the accuracy of that.

WITNESS NEWMAN: I have information that says the excavation cost was $87,000, which for purposes of reconciling the millions that we were looking at at that time, we said was negligible.

The same situation obtained at Vermont Yankee, where there were no piles. Again, the site was flat. The cost of excavation at Vermont Yankee was $32,000.

CHAIRMAN JENSCH: And you procured those figures from each of the companies?

WITNESS NEWMAN: These are oral communications with the companies.

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CHAIRMAN JENSCH: I wish you would ask them to give you a copy of what the record shows.

I suppose the Federal Power Commission records would show that.

WITNESS NEWMAN: We will attempt to obtain that.

CHAIRMAN JENSCH: Their recollection might not be in accordance with the record. That is what I had in mind.

MR. TROSTEN: We will attempt to obtain the official records on that.

CHAIRMAN JENSCH: Would you do that, please, and also the piling, I would just, you know, I wonder if they would build the towers on sand.

WITNESS NEWMAN: Sand is usually an excellent foundation material.

CHAIRMAN JENSCH: My guess is that there are steel pilings.

I would appreciate it if you could check that.

Thank you.

MR. BRIGGS: When you said that the only information thatyou had was in the reports, these are the reports in Appendix C, D and E of your Environmental Report, is that right?

WITNESS NEWMAN: The reason I am vague is that, as you know, I don't have much continuity here.

MR. BRIGGS: Yes.

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WITNESS NEWMAN: The answer to the question is, yes.

CHAIRMAN JENSCH: Does anybody have any further questions?

If not, thank you Mr. Newman. You are excused.

(Witness excused.)

CHAIRMAN JENSCH: I think this morning there was some suggestion that we might adjourn a bit earlier and maybe make up the time tomorrow.

Was that your thought?

MR. MACBETH: Yes, Mr. Chairman.

CHAIRMAN JENSCH: Do you want to finish with the other witness today?

MR. MACBETH: No, I had two brief items.

One was a response to the response about other state and federal agencies, and their conclusions on cooling towers, that I wanted to draw the attention of the Board to, from the Federal Environmental Protection Agency, which is at page 15 of volume 2 of the Final Environmental Statement, where they say that we agree with the Atomic Energy Commission that the potential for severe environmental effects exist for this facility. And they propose a cooling tower system at the earliest date practicable.

There is a letter from the Department of the Interior which begins at page 45 of volume 2 of the Final

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Statement, and on page 48 there are a series of proposed license conditions. And the second one is the Applicants shall construct and place in operation at the earliest possible time, and in no case later than July 1, 1975, the closed cycle cooling system required in stipulation number 1 above, and number one describes that.

Then, finally, there is a discussion of closed cycle alternatives in the comments submitted by the Attorney General of the State of New York which began at page 88 of the Final Environmental Statement.

That set of comments does not directly propose that cooling towers be built, but I think that this shows the tone is certainly that the Commission should certainly seriously consider cooling towers, and the impression left is that the Attorney General has no opposition to cooling towers.

Having looked at the second volume of the Final Statement, I don't know of any agency that wrote in opposing cooling towers. There are, of course, a number of other agencies that wrote and commented on different aspects of the plant, but I know of none that opposed it, and there are two, counting the Attorney General, three, that support the cooling towers at the plant.

It might be worth remembering, too, that of course at that time, the Staff analysis indicated much less

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environmental impact on the aquatic biota of the river than is reflected in the Final Environmental Statement.

MR. TROSTEN: I don't know why Mr. Macbeth has rehearsed through what is perfectly available to the Board by simply looking at volume 2. Those comments speak for themselves.

I think the Board should bear in mind that the draft report, the matter that was being commented on by these various agencies, was very, very different from the Final Environmental Impact Statement. There was no recommendation for cooling towers at any particular time. And so the situation was really considerably different, and the context in which these things were being raised was different.

Nobody was proposing cooling towers, and therefore, someone who was opposed to cooling towers would not be inclined to write in, I suppose, and criticize the Atomic Energy Commission's report for proposing cooling towers.

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CHAIRMAN JENSCH: That was my impression from the interrogation this morning on the point of whether there had been objections. I wondered if the original draft recommended that, if it didn't, there won't be any comments filed about it.

MR. TROSTEN: That is correct.

CHAIRMAN JENSCH: Do you have something further?

MR. MACBETH: The other matter was the letter distributed this morning, from Mr. Hall. Would this be a good time to handle that?

MR. TROSTEN: Certainly. I would like, Mr. Chairman, to offer this letter in evidence at this time. This is a letter that was received by Mr. Woodbury yesterday. It was prepared by Mr. Hall, the Chairman of the Hudson River Policy Committee. Here is another copy of it for you.

CHAIRMAN JENSCH: Will you identify the Hudson River Policy Committee again? Is this the utility group?

MR. TROSTEN: No, sir. The Hudson River Policy Committee is a group that has been identified in this proceeding as a federal and -- excuse me. It is a body composed of representatives of Federal and state agencies that is exercising technical oversight and general oversight over the studies that are being made at Indian Point.

The function of the Hudson River Policy Committee have been described in a letter which is in evidence in this

Al 28
Reba 2

proceeding which responds to the request for a statement of function from the Policy Committee.

CHAIRMAN JENSCH: You desire to have it incorporated in the transcript as if read? Is there an objection?

MR. MACBETH: There is a question I have. What does Con Edison intend to rely on this letter to show? It is a discussion of the research program. It doesn't seem to me that the letter indicates that Mr. Hall or the Policy Committee are trying to make a judgment as to whether or not research programs should go forward and cooling towers should not be -- alternate closed cycle cooling systems should not be imposed until the end of that research period, and it seems just a general statement being in favor of the research without considering those alternatives.

I would just -- just so there is no ambiguity about that on the records, I wanted to know whether that is also Con Edison's reading of the letter, and what this is being offered for.

MR. KARMAN: I have a problem with that last sentence as well, Mr. Chairman.

MR. TROSTEN: Mr. Chairman ---

CHAIRMAN JENSCH: Let him go ahead.

MR. KARMAN: Wherein the Chairman of the Policy Committee indicates that if the once-through cooling is shown to have detrimental effects construction of an appropriate

Al 28
Reba 3

closed cycle system will be undertaken without delay. I am not sure what comes first, and who has control over whether or not the closed cycle system will be put into effect.

It is a little ambiguous to me as to exactly what the very purpose of this letter is, over and above the support for the research program.

CHAIRMAN JENSCH: Is this the gentleman, Mr. Hall, the fellow who occupies a wooden building on the site?

MR. TROSTEN: No, sir, he is with the State of New York, Department of Environmental Conservation. His office is ---

WITNESS WOODBURY: His office is in Albany, sir, and he is head of the Fish and Game Department, Fish and Game Bureau, rather, of the Department of Environmental Conservation.

CHAIRMAN JENSCH: Has that division filed any comments on what they think the open cycle operation will do to the fish and game in the Hudson River Valley?

WITNESS WOODBURY: That department commented, sir, on the Environmental Statement at length, and their comments are included in appendix 2, sir.

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CHAIRMAN JENSCH: Very well. We will have an opportunity to review it again.

He didn't say at that time that he thought they ought to have closed cycle operations, is that correct?

WITNESS WOODBURY: That is correct.

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Reba 4

MR. TROSTEN: That is correct.

CHAIRMAN JENSCH: Who was going to arrive at the conclusion, I wondered, if once-through cooling is shown to have detrimental effects? Is he going to make a recommendation one way or the other about that, could you know, based upon studies?

WITNESS WOODBURY: The attitude of the Policy Committee has been that we are to make available to them the data that we have collected, and our recommendations. They will review the data and make an independent analysis of that data and reach their own conclusions.

CHAIRMAN JENSCH: That is what I was wondering. They don't have any conclusions now based upon the data that are available to them.

WITNESS WOODBURY: The Policy Committee has not expressed in writing any conclusion that I am aware of, sir.

CHAIRMAN JENSCH: Very well.

WITNESS WOODBURY: The minutes of their last meeting, at which time I understand they took this action I haven't seen, so what is behind what other conclusions might have been expressed in those minutes, I am not sure, but I will look those up, sir.

CHAIRMAN JENSCH: Thank you.

MR. BRIGGS: Who is responsible for taking care of the data to make sure they don't get thrown away, like the

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data from the meteorological tower?

MR. TROSTEN: Which data are you referring to?

MR. BRIGGS: The data on the studies that have been in progress on the Hudson River and are part of the experimental program you are talking about.

WITNESS WOODBURY: All of the data, both from the present study that is underway, and from the two preceding studies, that is, the two preceding parts of this study, the Raytheon effort and the Carlson-McCann effort, that data is already reduced to a computer type data and is in the hands of the Texas Instruments Company, who are conducting the present study.

The responsibility that these data be retained is mine, sir.

MR. BRIGGS: So you are responsible for seeing they don't get lost somewhere?

WITNESS WOODBURY: Yes, sir. We do not at this time handle that data in the same way that we handle our customer accounts, for example, where we have duplicate sets stored at different places, and under different fireproof conditions and that sort of thing.

This data is -- I am not sure what the difficulty would be in retrieving it if we had a major fire, for example, in a specific location. We haven't studied that. Perhaps this is something we ought to look into.

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CHAIRMAN JENSCH: I think what he has in mind, I think Mr. Briggs is indicating where, as Indian Point 3, we found some of the earlier meteorological data had been destroyed, and he hopes there will be no repetition, and under your supervision, we feel assured.

Is there any other matter we can take up before we recess for the evening?

MR. MACBETH: I don't think we resolved the letter.

CHAIRMAN JENSCH: Is there any objection?

MR. MACBETH: I would like to know what it is offered for.

MR. TROSTEN: The point of the letter is to show the views of the Hudson River Policy Committee concerning the research program that is being proposed, the value of that program and the utility of that program.

That is the reason why -- that is the relevance of this offer.

MR. MACBETH: Does it -- do you contend it has any relevance as to the decision which must be taken in the initial decision as to whether a closed cycle cooling system would be imposed on the plant on some set schedule?

MR. TROSTEN: Yes, I would say it is relevant to that, certainly.

MR. MACBETH: Then I object to the admission until such time as I can have a voir dire of the author to determine

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what his position is. The last sentence is, I think, very ambiguous.

I simply don't know what that sentence stands for. I would object to the admission of the letter so long as it contains the last sentence, or until I have voir dire of the author.

CHAIRMAN JENSCH: Would it be convenient for you to ask Mr. Hall to come down?

MR. TROSTEN: I think the best circumstance here, Mr. Chairman, is to defer the ruling on this until we can consider this further.

CHAIRMAN JENSCH: Very well. Is there anything other than that that we could take up this evening? If not, in view of the arrangement that was suggested this morning in order to accomodate one of the attorneys, we will endeavor to make up the time at some succeeding session. If there is nothing further at this time, we will recess, to reconvene in this room tomorrow morning at 9 o'clock.

(Whereupon, at 4:25 p.m., the hearing recessed, to reconvene at 9:00 a.m., Wednesday, March 7, 1973.)