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UNITED STATES ATOMIC ENERGY COMMISSION

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IN THE MATTER OF:

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

Docket No. 50-247

(Indian Point Station, Unit No. 2)

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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)	

Tariff Commission,
Third Floor,
8th and E Streets,
Washington, D. C.

Hearing in the above-entitled matter was reconvened, pursuant to adjournment, at 9:15 a.m.

BEFORE:

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

DR. JOHN C. GEYER, Member.

MR. R. B. BRIGGS, Member.

APPEARANCES:

(As heretofore noted.)

C O N T E N T S

WITNESS:	DIRECT	CROSS	REDIRECT	RECROSS
Gerald Lauer)				
John P. Lawler)		7258		
Ronald A. Alevras)		7393		

1

1 P R O C E E D I N G S

2 CHAIRMAN JENSCH: Please come to order.

3 It is observable to the Board that this early

4 hour prevented some of the witnesses from attending at this

5 time, so at this time we will recess to reconvene in this

6 room at 9:30.

7 (Recess.)

8 (9:30)

9 CHAIRMAN JENSCH: Please come to order.

10 The schedule for today, as I recall, is to under-

11 take cross-examination of Dr. Lawler. Is that correct?

12 MR. MACBETH: That's correct, Mr. Chairman.

13 I have just been chatting for a moment with

14 Applicant's Counsel and we would like to take just a moment

15 to raise the question of scheduling next week. If our wit-

16 nesses go on next week, I really must get in touch with them

17 today and start to line it up.

18 The Board has really never clearly indicated

19 whether it intends to sit next week or not.

20 CHAIRMAN JENSCH: We have not done that because

21 we tried to give some consideration to the problems of it

22 being the week before Christmas and that travel schedules

23 will necessarily add to the complexity in that regard. We

24 were going to inquire whether a week in January would be

25 satisfactory, and we would suggest some time during the

eb2

1 week of the 15th.

2 MR. TROSTEN: Well, Mr. Chairman, I'm wondering if

3 we could perhaps start the cross-examination next week,

4 perhaps of Dr. ~~Ainsley~~ Ainsley, and conclude that next week. Then

5 we perhaps could put off the cross-examination of Mr. Clark

6 until a time in January.

7 The problem is if we put that off until the week

8 of the 15th-- Let me consult my calendar for a moment,

9 please.

10 (Pause.)

11 If we were to put Mr. Clark's testimony or cross-

12 examination off until the week of the 15th, Mr. Chairman,

13 this would give or produce a very foreshortened time for

14 consideration of rebuttal testimony toward, for example,

15 the latter part of January if we were to do that.

16 If it were not feasible for us to conclude

17 Mr. Clark's cross-examination the week of the 15th, I would

18 suggest that we do it either -- that we do it the preceding

19 week, the week of the 8th, if that were the Board's desire.

20 CHAIRMAN JENSCH: Well, continuity of the cross-

21 examination might be desirable. How would the last three

22 days of the week of the 8th, that is, beginning the 10th,

23 11th, and 12th, and going into the next week, fit your

24 schedules?

25 MR. TROSTEN: All right, yes.

eb3

MR. MACBETH: Again I would like to be able today to inquire of my witnesses and check. I just have not put those dates to them. I don't have any conflicts in my own schedule.

MR. TROSTEN: When you say that do you mean for Dr. ~~Ainsley~~ Aynsley too, Mr. Chairman?

CHAIRMAN JENSCH: Yes.

MR. TROSTEN: I see.

MR. MACBETH: I think that might make more sense because then the Intervenors' case goes on as a whole in a continuous manner, as has happened with the Applicant.

CHAIRMAN JENSCH: Is it your thought you would be able to accommodate rebuttal requirements in the week of the 15th, having the intermission of the 13th and the 14th?

MR. TROSTEN: I don't think we would be in a position to do that, Mr. Chairman, to put it on just at that particular time. This is something I will have to consult with our witnesses about.

MR. KARMAN: When do you plan to finish with the Staff? There still are some open Staff witnesses.

MR. TROSTEN: That's another matter. Now I suppose what we could do, Mr. Chairman, if it is all right with you, I could continue with Dr. Goodyear next week, if that were satisfactory.

MR. KARMAN: When?

MR. TROSTEN: Next week.

MR. KARMAN: Next week?

MR. TROSTEN: I could, yes. I'd be prepared to conclude with Dr. Goodyear next week. I'm ready to do that.

CHAIRMAN JENSCH: Well, let's just keep this under consideration for the time being. The Board will give consideration to the further suggestions of the parties. In the meantime, the Hudson River Fishermen's Association will inquire about the schedule, if we cannot do something next week for a couple of days, and see if we can't pick up the last few days, that is, the 10th, 11th, and 12th of January.

Let's not make any decision now but let's inquire. We will hear further from the parties later today.

MR. TROSTEN: Thank you.

MR. MACBETH: I also have copies from the Applicant of three of the exhibits from yesterday. Exhibit 2, the large exhibit, is being reproduced in a reduced form for easier handling, and I had asked to be able to put that formally into the record tomorrow, but there are copies of the other exhibits.

CHAIRMAN JENSCH: Please be sure to give copies to the Reporter.

MR. MACBETH: I will.

(Documents handed to the Board.)

CHAIRMAN JENSCH: Have you marked what exhibit

eb5

they are?

MR. MACBETH: Yes.

CHAIRMAN JENSCH: And all parties have been served or are being served; is that correct?

MR. MACBETH: Yes, sir.

I think I am prepared to begin my cross-examination of Dr. Lawler.

CHAIRMAN JENSCH: Will you proceed, please?

End 1

Whereupon,

JOHN P. LAWLER and

GERALD J. LAUER

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

CROSS-EXAMINATION

BY MR. MACBETH:

Q Dr. Lawler, I would like to proceed by going over the outline, the basis for the models, to get it a little clearer in my own mind.

A May I interrupt a moment?

I have been told by Mr. Trosten that the Board and everyone else was here on time and I wasn't, and I must apologize to the Board.

Q I would like to begin by going over the basis of the model, and the general outline of the various factors, inputs in it.

As I understand it, you began by feeding into the transport model data on the number of striped bass eggs in the river that were derived from the Carlson-McCann report.

On page 6 of your October testimony you say the data assembled by Carlson-McCann in the years 1965 through 1968 are used for the striped bass population distribution in the Hudson.

Then again, on page 36, you are discussing the

1 input of the eggs into the model, and you say:

2 "Graphical numerical computational procedures were

3 employed using the actual 1967 Carlson-McCann egg data,

4 Appendix 3-1."

5 Is that correct, the input of eggs is based on the

6 Carlson-McCann data?

7 A That's correct, Mr. MacBeth.

8 Q And then at the end of the model, the transport

9 model, you take the juvenile fish out of the system on the

10 basis of the Carlson-McCann data on where fish in that life

11 stage were.

12 On page 45 you say:

13 "This procedure for computing migration preference

14 can be used for any year's behavior so long as infor-

15 mation relative to abundance of juveniles is available

16 at several points along the river. In transport model

17 runs to date we have used 1967 Carlson-McCann data."

18 Is that correct, that the fish are taken out of the

19 transport model on the basis of the data from Carlson-McCann?

20 A Well, we used the distribution of the fish in

21 those later stages that we observed from the Carlson-McCann

22 data.

23 MR. KARMAN: Will you raise your voice just a

24 little, please?

25 WITNESS LAWLER: Yes.

BY MR. MACBETH:

Q In other words, the model is set so that the fish end up in the river segments that were determined on the basis of the Carlson-McCann data?

A (Dr. Lawler) That's correct.

Q And the analysis of the segments of the river, the way you divided the river, that was also based on Carlson-McCann.

On page 38 you say:

"Consequently, for the present model the river was divided into eight segments between Coxsackie and Three Mile Point as defined in Section B of this chapter. The approximate mid points of these sections correspond to the eight sampling locations described in the Carlson-McCann Report."

A That's right.

Q In fact, I checked the Carlson-McCann on mild points in the river and the mild points for your segments and they seemed to me to be exactly the point. Is that so?

A They probably are, yes.

Q And then you tested the consistency of the model and the accuracy of it by measuring it against the Carlson-McCann data.

On page 68 where you described the testing procedure you say:

1 "Carlson-McCann 1967 data drags early larvae and
2 later larvae early juveniles used in comparison with
3 model results are shown in Figure 16."
4 And then there follows a number of pages in which
5 comparisons are made between the results obtained from your
6 model and the observed data of Carlson-McCann.
7 Is that correct? That's the method by which you
8 tested the accuracy and consistency of the model?
9 A Yes.
10 Q Does that mean that essentially if you did not
11 have the Carlson-McCann Report this model would have no data
12 base, or very little data base?
13 A No, I would not say that. I could have used some
14 of the other data that is available in the Hudson River
15 literature also. For instance, the Rathjen and Miller data
16 of 1955.
17 Q Perhaps I phrased that question poorly. I did not
18 mean that no other data could have been employed, but that
19 the Carlson-McCann data were employed. These particular
20 results, this particular run of model, is based on Carlson-
21 McCann, and if Carlson-McCann were not there you would have
22 to turn to some other group of data. You wouldn't essentially
23 have had to generate a new set of data, or find a new set
24 of data to run your model?
25 A That's right. I need something to have some idea

of whether the things I am asking the model to do are in fact doing the same things that one observes in the river. That's true.

Q Sure. That seems sensible.

I assume you chose Carlson-McCann because you thought it gave you the best analysis of the actual situation in the river.

A Well, I chose it because it was the data I was most familiar with at the time that I started putting this together, and it seemed to have data all along the length of the river, as opposed to some of the other information which was, perhaps, in some areas more complete, but nevertheless did not look at an entire long stretch of the river.

That's one of the basic reasons why I used Carlson-McCann.

Q Do you know of any more complete a report on striped bass in the Hudson, a more complete set of data, than the Carlson-McCann Report?

A Well, I don't know of any single more complete set of data for the purpose that I used it.

Q Now, within that framework of model didn't you then introduce a series of other factors? First, the compensation factor, making mortality density dependent so that as density rose mortality rose, and as density fell mortality fell? This roughly is described on -- well, it's in Figure 9

on pages 24 and following. So that that was a factor that you added into the arrangement of the model?

MR. TROSTEN: Will you back up and read that?

(Whereupon, the Reporter read from the record, as requested.)

MR. TROSTEN: Mr. MacBeth, I think there are several questions there.

MR. MACBETH: I agree. I will rephrase it.

BY MR. MACBETH:

Q Did you put into your model a mechanism so that as the density of striped bass organisms in a particular segment of the river rose the mortality would rise, and as the density of the organisms fell the mortality of the organisms would fall?

A (Dr. Lawler) Yes, that's correct.

Q And is that described on Figure 9 on pages 24 and following?

A Yes, sir. It is.

Q And would it be fair to describe that as, in a sense, a self-correcting mechanism, that the data is put into the model and the compensation factor corrects it? If the density starts to rise this factor will introduce more mortality, and if the density falls, this factor will start to introduce less mortality?

A It will offset to some degree the changes that you

1 are describing.

2 Q And then did you further add to the model three

3 factors which you have described as F factors that try to

4 describe in a more refined manner the activity directly at

5 Indian Point, the first factor being one that describes the

6 distribution of striped bass organisms across the river, east

7 to west; the second one being a factor that deals with

8 avoidance of the intake; the third being a cropping factor,

9 the survival of organisms through the plant itself?

10 A I introduced four factors, one of which I

11 indicated in testimony I have no information to evaluate.

12 But I did introduce factors, the three described and an

13 additional factor.

14 Q Yes. F-3 -- I forget offhand exactly what F-3

15 was, but you introduced it as unity, so that in fact it made

16 no difference to the results of the runs of the model that

17 you made; is that correct?

18 A Right, that's correct.

19 Q Let me go back, then, and try and work over some

20 of these particular elements that went into the model.

21 CHAIRMAN JENSCH: May we ask, Dr. Lawler, will you

22 speak up? I don't think we are hearing you too well.

23 WITNESS LAWLER: Yes, sir.

24 CHAIRMAN JENSCH: Thank you.

25

Q. Now, on page 36 of your testimony of October 30th, you say that graphical numerical computational procedures were employed, using the actual 1967 Carlson-McCann egg data, and those were used, as I understand it, to distribute the eggs through the various segments of the river which are described on table 3, which follows page 36, is that correct?

A. (Dr.Lawler.) That is right.

Q. Could you describe the graphical numerical computational procedure employed in taking Appendix 3-1 and converting it to the figures that actually appear on table 3?

A. Well basically what we did was to use the equation 5, and use the data of Carlson-McCann, and work toward an egg production rate.

What we were essentially concerned with -- not concerned with, but what we were trying to do here is to convert the data of eggs which appears in Carlson-McCann as a ~~standard~~ standing crop, the concentration of eggs in the river at various points in space and in time and convert this to the rate of spawning, or the rate of production of eggs in terms of numbers of eggs per day, per mile, or per segment or per whatever distance element you choose.

And the procedure used is equation 5 can be -- you can take the Carlson-McCann data, which is essentially concentration data, and all those little n's in equation 5 are employed to obtain the P prime bar on the left-hand side

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of the equation.

This is done graphically. Basically you plot the data up and you obtain an error curve and that data will convert in accordance with this equation 5 to the egg production rate.

Q. Some of this mathematics gets a little bit beyond my layman's grasp, but it seemed to me that perhaps one method of determining what percentage of the eggs appeared in any segment at any week would be to take the segment volume that appears on table 5 of your testimony following page 45, multiply it by the appropriate concentration in Appendix 3-1 of Carlson-McCann, and to sum those products and then treat each individual product as a percentage ratio of the total.

And that percentage would mean that percentage of eggs in that segment for that week.

Would that method accurately reflect the Carlson-McCann data?

A. I suppose you can do that. Basically we come out with the same result. I think that is shown in one of the figures in which we describe tests of the model in Chapter 4.

Q. Well I have -- I did that, as a matter of fact, and I discovered late last night I am not really very good at adding.

mm

1 Some of it I found a little difficult to
2 follow.
3 If you look at Appendix 3-1 of Carlson-McCann, for
4 the week of May 14 through May 20, what number do you see there
5 as concentration for the Saugerties sector?
6 A. The Saugerties section shows no eggs during 1967.
7 Q. Well, what are these numbers on Saugerties?
8 A. Saugerties -- oh, I am sorry. The Saugerties
9 data for which -- which week?
10 Q. The second week in which eggs appeared, which I
11 believe was May 14 to May 20.
12 A. The Saugerties data shows .09 eggs per thousand
13 cubic feet.
14 Q. And what is shown for Cornwall ~~at~~ and Peekskill?
15 A. Which week? The same week?
16 Q. The same week.
17 A. .07 and .07.
18 Q. Now in your table 3 for that week, which -- I
19 take it that is the second week of your chart?
20 A. That is correct.
21 Q. Your chart shows no eggs on Saugerties, or no
22 percentage of eggs on Saugerties, and 12 percent at Cornwall
23 and 5 percent at Peekskill.
24 Does that indicate that that graphical numerical
25 method used for conversion to some extent varies from the

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mm4

actual Carlson-McCann data?

A. Mr. Macbeth, there will certainly be some differences; the manner in which we have input the Carlson-McCann, or let me say the manner in which we have input the egg data into the model by comparison to the specific tabular values found in Carlson-McCann.

I think I can best answer your question by referring you to figure 17 on page -- next to page 72 in the testimony, in which the graphical numerical procedure that we referred to earlier, the information gleaned from that as well as the distributional information in table 3, is employed in the model to generate the concentration of eggs in any given week at any one of those segments. And what I show in figure 17 is that the egg concentration data agrees quite well with the Carlson-McCann data as it should.

This is simply, as I have explained in the testimony, what I call a test of the internal consistency of the ~~model~~ modelability. That is a test of the model to perform the arithmetic the way it is supposed to perform it. Because what we have simply done is take the Carlson-McCann egg data, use equation 5, generate an egg production rate in eggs per time, per day, per week, or whatever unit you wish, per segment or per mile, again whatever space you wish, and then insert that back into the model using the same presumed survival parameters and compute the actual concentration of

mm5

eggs at any given point in the model.

You will certainly find, if you go to the Carlson-McCann data, particular days or weeks at particular stations where you don't get precise agreement, and I never intended the model to regenerate Carlson-McCann precisely. That could very readily have been done simply by adjusting some of those distributional coefficients in table 3 to yield better agreement between the reported or observed Carlson-McCann measurements and the model results.

Does thatanswer your question?

Q. Yes, that goes a long way.

I have a few more questions that arise from it.

Are the figures on table 3 the actual figures used in the model?

A. What page?

Q. Preceding page 37.

A. Yes, those are actually used in the model.

Q. Is there any reason in the way in which you developed the figures in table 3, that there should be consistently fewer eggs in any particular segment than there are in the Carlson-McCann data?

MR. TROSTEN: I would ask Mr. Macbeth to rephrase the question. Dr. Lawler has not indicated that he accepts the premise of the question.

CHAIRMAN JENSCH: I think in any case like that he

mm6

should so indicate. But I understood the previous answer was that the actual figures in the model came from Carlson-McCann.

So he says, why are there fewer eggs.

WITNESS LAWLER: Could I have the question repeated? I think I know the answer.

CHAIRMAN JENSCH: All right.

(Whereupon, the reporter read from the record as requested.)

end 3

start 4

WITNESS LAWLER: Let me ask you a question, Mr. Macbeth. When you say consistently fewer eggs, are you referring to table 3?

BY MR. MACBETH:

Q I misspoke. I should have said consistently lower percentage of the total number of eggs for any particular week in a particular segment of the river then shown in Appendix 3-1 of Carlson-McCann.

MR. TROSTEN: I have the same objection.

Dr. Lawler can speak for this, but I have not heard that Dr. Lawler has accepted the premise of Mr. Macbeth's question.

CHAIRMAN JENSCH: I think strictly that premise should be established first, so that the person can establish the premise.

Objection sustained.

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BY MR. MACBETH:

Q. Is it your opinion that your model is so developed that it will not show any lower percentage of the total number of eggs for any single week in one segment of the river consistently over the seven weeks of sampling when compared with the Carlson-McCann data in Appendix 3-1?

MR. TROSTEN: Will the reporter please read that question back?

(Whereupon, the reporter read from the record as requested.)

WITNESS LAWLER: I don't think I need an opinion. All I need to do is refer to page 72, or opposite 72 on figure 17.

Figure 17 shows clearly that in some weeks and in some segments, the concentration of eggs is slightly higher than that reported by Carlson and McCann; and in other weeks and in other segments, the concentration generated by the model is slightly lower than that generated by Carlson-McCann.

I think, Mr. Macbeth, that there may be some confusion between table 3 and the data in Carlson-McCann. Table 3 is not egg concentration. It is egg production. And this is the distribution of the rate at which eggs are spawned or produced as computed via equation 5. You use this information in the model to generate egg concentration.

mm8

You have to distinguish between egg production, which is eggs produced or spawned. This says nothing as to whether they are fertilized, unfertilized or what have you per day or per week per unit -- per mile. Okay?

You take that information, that is a rate, and then that information inserted into the model which looks at mortality and growth and things of this nature as well as transport and yields as its response, as its answer, that concentration of eggs in numbers per thousand cubic feet or whatever units you want to use.

The data in Appendix 3-1 and following is egg concentration data. The data in table 3 is not concentration data, and it is not percentages of concentration data either.

To specifically answer your question, you have to go to figure 17 where it shows very clearly that sometimes the concentrations are slightly lower than Carlson-McCann's and sometimes slightly higher. There is no consistent underestimating of the Carlson-McCann egg data.

BY MR. MACBETH:

Q Let me return now to the point I was making earlier, that if you took the concentrations from Appendix 3-1 of Carlson-McCann and you multiplied them by the volume figures that you give in table 45, and you summed those products for any particular week for the segments in which they appear,

mm9

1 and you then treated the product for any particular segment
2 as a portion of the total for that week, you would then have
3 figures equivalent to yours in table 3, which would be
4 accurately those of Carlson-McCann?
5 A. (Dr. Lawler.) No, absolutely not.
6 The figures on table 3 have nothing to do with
7 concentration per se, or percentages of concentration, or
8 fractional distribution of concentration.
9 They deal with the actual rate, let's say, at
10 which the females are broadcasting eggs. They do not refer
11 to the number of particles or eggs per unit volume, which the
12 data in Carlson-McCann refer to and which you would have if
13 you followed the procedure you just described.
14 Q. Does your equation not apply to the kinds of
15 figures I just described being derived from Carlson-McCann,
16 a study function of decay; so many not being fertilized,
17 so many die the first day and so on?
18 A. This may answer your question, or clarify the
19 issue:
20 What we do with the Carlson-McCann concentration
21 data is to use it in equation 5 when the assumption that
22 only 10 percent of the eggs that are broadcast survive and
23 back compute the number of eggs we would have expected to
24 have seen generated in the river were that assumption
25 correct.

mm10

That would yield the numbers given in table 3. Now that is not done using the model. That is done using the computational procedure given in equation 5, which does not transport the material out of the segment.

We then take the data in table 3, insert that in the model as the manner in which the females are producing eggs, and then also insert in the model the same presumed survival percentage and now the model, which does permit the eggs to ~~groove~~ move around the estuary, because it permits them to transport, operates on that information. Computes -- adds, subtracts, et cetera, and yields the concentration of eggs. That concentration of eggs is data comparable to the data seen in -- or results comparable to the data seen in the appendix you refer to, and also, or as can be seen on figure 17.

The confusion really is between concentration, which is one notion, it is eggs per thousand cubic ~~fee~~ feet -- they are in the estuary at the time you sample -- and production of eggs, which is eggs produced per day, per mile, per cubic mile, whatever volume you choose to use.

Q And your table 3 is giving us eggs produced per day, per mile?

A In fractional units.

Q Yes.

But it is doing that rather than giving us eggs

mm11

per thousand meters, cubic meters or --

A. Absolutely correct.

Q. All right.

Now let me move on to another topic.

A. Let me clarify one point so there is no further confusion.

I indicated a moment ago that the egg production rate could be expressed as eggs per day or per week per unit distance, or per unit volume.

We used it per unit volume. It is the same difference if I end up per unit mile along the river, then eventually at some time or other I am going to have to multiply that distance along the river by whatever cross-section applies to that particular point on the river.

Q. Let's turn to the other end of the model, the migration factors, or the migration peripherals by which the final distribution of the juvenile fish is determined.

You say there that the transport model in the runs to date, we have used August 1967 Carlson-McCann data.

MR. TROSTEN: What page, please?

BY MR. MACBETH:

Q. That is page 45.

Now is that the data reflected on table 5-A, which follows page 46?

A. (Dr. Lawler) Yes, sir, that is.

mm12

Q. Now, how is that table derived from Carlson-McCann?

A. That table is derived by taking the volume distribution given in table 5 and that particular set of migration preferences that were used in the runs referred to here, were obtained by taking the data reported in the AEC's Environmental Statement or Final Environmental Statement. I would have to check the actual figure.

Q. Could we determine what that figure was?

A. I think it is figure 5-12, but I am not certain.

Q. Is it 5-9 on page 5-50?

MR. TROSTEN: Do you want to see it?

WITNESS LAWLER: Yes.

(The document was handed to the witness.)

WITNESS LAWLER: Figure 5-9, that is correct.

CHAIRMAN JENSCH: What page?

WITNESS LAWLER: Page 5-50, Mr. Chairman.

CHAIRMAN JENSCH: Thank you.

BY MR. MACBETH:

Q. I am afraid I missed something in your answer. Could you tell me again what the relation is between table 5 and table 5-A?

A. (Dr. Lawler.) Table 5-A has in it the distribution of -- the percentage distribution of volume of the river. Table 5-A takes information from figure 5-9 in

mm13 the Environmental Statement for the distribution of
2 fish, and multiplies it by the individual volume percentages
3 in table 5, to obtain the distribution.
4 Q In other words, what has been used from table 5
5 to generate table 5-A are the columns headed Segment Number,
6 Location, Segment Volume and Percent of Water Volume in
7 Segment?
8 A. That is right.
9 Q. But not the columns headed Percent of Fish in
10 Each Segment, or headed Migration Preference?
11 A. No, that is correct. Those were used in other
12 runs.
13 Q. Now, how did you move from the chart on 5-50 of
14 the Final Environmental Statement to the Migration Preferences
15 shown in table 5-A?
16 A. Well, what you do is, you take the concentration
17 shown in table 5 -- 9 -- I mean figure 5-9. I would have
18 to check the exact date, but I am pretty sure it was somewhere
19 near the end of July that was chosen to compute the J-1
20 preferences, and somewhere close to the end of September
21 that was used to compute the J-2 preferences.
22 d 4
23
24
25

5 bl

Q Now Figure 5-9 in the Final Environmental Statement shows four segments of the river, each segment combining two others.

Your Table 5-A shows eight segments with variations between the segments lumped together in Figure 5-9.

How did you move from the four segments shown in Figure 5-9 to the eight segments shown in your Table 5-A?

A In Figure 5-9, the stations, the eight stations in Carlson-McCann are lumped two by two and if you refer back to Figure 5 you will see that the volume distribution is not equal from segment to segment, so when you perform that multiplication, you get different numbers for the migration preference even though you use the same number for each set of two stations.

Q So what you did was scale off the abundance shown in Figure 5-9 and multiply it by the segment volume shown in Table 5, and then sum those products and treat each individual product as a fraction of the whole, so that they sum to one?

MR. TROSTEN: Mr. Macbeth, would you tell me what you mean by scale off?

MR. MACBETH: Well, Figure 5-9, for instance, August, Peekskill and Croton, there's a dot there representing the abundance of young-of-the-year. Now in order to get the abundance needed to produce Table 5-A, I assumed that

eb2

Dr. Lawler drew a line from that dot over to the scale on the side and figured out that there would be -- well, I don't know. What do you think? Seven, an average of seven organisms per ~~whole~~ haul? And then he would have a number of organisms per volume and he would be able to multiply by the total volume to produce his Table 5-A.

MR. TROSTEN: I see.

MR. MACBETH: Maybe that is not what he did.

BY MR. MACBETH:

Q Is that what you did?

A (Dr. Lawler) That's generally correct.

CHAIRMAN JENSCH: The question then is still outstanding, having been defined as the term. Do you want the question to be re-read?

MR. MACBETH: Yes.

(Whereupon, the Reporter read from the record as requested.)

WITNESS LAWLER: That's correct.

BY MR. MACBETH:

Q Could you describe how a seine haul is taken?

A (Dr. Lawler) It is generally taken from shore by extending -- by walking out with a 50-foot net, or not necessarily 50, but that seems to be a standard size, and walking back towards shore and trapping a group of fish.

Q And is it easy to calculate the area from which

eb3

1 those fish were taken?

2 A It can be calculated, yes.

3 Q Do you know whether Carlson-McCann-- Or is there

4 anything in the Carlson-McCann report that indicates they

5 did make calculations of that sort?

6 A I don't know of anything off-hand but they may

7 have.

8 Q Essentially you are relying on the notion that the

9 Staff has made some calculation of these areas so that the

10 figures in Figure 5-9 represent a rate of so many organisms

11 per volume of water. Is that right?

12 A Well, I don't think we have used it in the same

13 fashion as the Staff has used it. We have taken the data

14 and applied it to the various segment volumes as I have

15 described.

16 CHAIRMAN JENSCH: I wonder if that is quite the

17 question. You say you used the data a little differently

18 but the question was are you relying upon the fact that the

19 Staff has made some calculations, I presume of organisms

20 for some volume of water. Did you rely upon that?

21 WITNESS LAWLER: No, we are not relying on that.

22 MR. MACBETH: Could I have the Chairman's question

23 repeated?

24 (Whereupon, the Reporter read from the record

25 as requested.)

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BY MR. MACBETH:

Q You simply assumed then that these seine hauls were giving an accurate indication of organisms per volume of water?

A (Dr. Lawler) Yes, that's true. For the purpose for which this was used, that's correct.

Q Would you describe how a tow is taken such as was involved in computing the number of fish per tow in Table 5?

A My recollection is those were generally trawl hauls and these are taken from the back of a boat, using a trawl net, which is a different procedure than the procedure used for the seine haul.

Q And is that one of the nets where they put a meter on it and there's a certain number of revolutions made and so on, and one can figure from that the volume of water that was going through the net?

A On some of the small nets there might be a meter on them, yes.

Q Can one make a more accurate estimate of the volume of water sampled in a tow than one can by seine-hauling?

A Probably you can.

Q Why did you decide to use the migration preference shown in Table 5-A rather than those shown in Table 5 if it is probable that a more accurate measure of distribution could be obtained by the tows rather than by the seine hauls?

5

MR. TROSTEN: I object to the question, Mr. Chairman. Dr. Lawler has not accepted that premise, nor has he stated what Mr. Macbeth states he said.

MR. MACBETH: I thought the answer to the last question was that you probably could get a more accurate measure of the volume of water sampled by tows than you can by seine hauls.

CHAIRMAN JENSCH: I think the premise which the objection brings in focus is whether the witness used Table 5-A instead of Table 5.

MR. MACBETH: He did. He says --

MR. TROSTEN: No, it isn't that.

Would you read the question back?

(Whereupon, the Reporter read from the record as requested.)

MR. TROSTEN: Dr. Lawler has not stated that a more accurate measure of the distribution could be obtained by the trawls than by the seine hauls.

CHAIRMAN JENSCH: He said "probably."

MR. TROSTEN: No, sir, he was saying probably you could get a more accurate measure of the amount of water that went through, I believe.

BY MR. MACBETH:

Q Wouldn't you have roughly the same accuracy counting the fish in either a seine haul or a tow?

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MR. TROSTEN: Is that your question?

MR. MACBETH: We will build it up. I just thought everyone agreed when you pull the net out of the water you could count the fish equally well out of a seine haul or out of a tow.

MR. TROSTEN: Do you want to rephrase the question?

MR. MACBETH: Well, if you want me to build the premise I will ask the second question that I just asked.

MR. TROSTEN: Would you read it back, please?

(Whereupon, the Reporter read from the record as requested.)

BY MR. MACBETH:

Q Let's turn that around. Can you count the number of fish equally well out of a seine haul as out of a tow?

A (Dr. Lawler) Certainly.

Q Would that indicate that you could then get a better -- that's it is probable you could get a better indication of the number of fish per volume of water from a tow rather than from a seine haul?

A I don't think that would either indicate you could or you couldn't.

Q Well, you have to combine it with your previous answer, that it is probable that you get a better measure of the volume of water from a tow than from a seine haul.

A I don't think the measure of the volume of water

eb7

you get is so particularly pertinent here. I think what is more pertinent is how representative the seine haul is of the distribution of fish in the river. In other words, the question is should you use simply shoal areas or shoal volumes or should you use the whole river?

I think it is a debatable point. I happened to use the entire river volume.

The answer to your question as to why I used this rather than the data in Table 5 is simply because this was 67 data and in testing the model, I was trying to restrict myself to 67 data. The data in Table 5 is 68 data. The model is perfectly capable of using any migration distribution that one wants to insert into it.

Q Okay. We seem to have jumped over a number of the premises, but we will get back to what I was interested in.

End 5

Q What were the flows of the river like in 1967 in the summer months?

A My recollection is that the flow is in the order of 7000 cfs.

Q And how does that compare with the average flows in the summer months?

A It's approximately what you would expect to see in the summer.

Q What were the flows like in 1968 in the summer months?

A I don't recall, offhand. It is certainly easy enough to find out. But I just don't know offhand what they were.

CHAIRMAN JENSCH: I wonder, while there is a pause, if we could go back to this question to which an objection was taken. Applicant's counsel pointed out that your answer was you could get a more accurate measurement of the volume of water from a tow from a boat, rather than a seine haul.

Now, excluding for the moment this difference between '67 and '68 data, but just as a general procedural question, would you likely get a more accurate count of the organisms from a tow collection than you would from a seine collection?

WITNESS LAWLER: If you are referring, Mr. Chairman, to the number of organisms that are actually out in the water,

I suppose you would. It's really hard to say. If you are referring to the ability to estimate a volume strained through the filter as you collect these organisms, it's probably true that you could get a better estimate from the trawl hauls than you can from the seine hauls.

CHAIRMAN JENSCH: Thank you.

BY MR. MACBETH:

Q Now, is it not true that Table 5 shows a larger percentage of fish present in segments 7 and 8 of the river than does the juvenile-1 figure for Table 5-A?

A (Dr. Lawler) Would you repeat the question, Mr. MacBeth?

Q Is it not true that Table 5 shows a higher percentage of fish in segments 7 and 8 of the river than does the juvenile-1 column in Table 5-A?

A Yes, sir, it does.

Q In Table 5 there are somewhat more than 70 percent of the fish in segments 7 and 8; is that correct?

A That's correct, sir.

Q And in Table 5-A there are 36 percent of the fish in segments 7 and 8?

A That's right.

Q So it is about 2 to 1?

A That's correct.

Q And the Indian Point plant is located in segment 7,

is it not?

A Yes, sir, it is.

Q Would that indicate that if the figures given in Table 5 were used in your model, rather than the migration preference as shown in Table 5-A, that a higher percentage of fish would be susceptible to entrainment at the Indian Point plant?

A That's probably correct.

Q And is it also probably correct that the fish shown at the Croton Point segment, segment 8, came into that segment from an upstream segment of the river?

A That is more difficult to answer. I understand your --

Q Well, let me --

CHAIRMAN JENSCH: Let him finish.

WITNESS LAWLER: If I understand you correctly, you are asking where do the fish which appeared in the Croton Point section originate -- is that your question?

BY MR. MACBETH:

Q I'm asking whether they did not originate from one of the upstream segments. I'm not asking which upstream segment, but from one of the upstream segments.

A (Dr. Lawler) The reason why I'm hesitating is because it is not instantly clear that you know the origin of the organisms in any given segment at any given time. They

1 may have -- some of them may have been organisms that were
2 there earlier, and the relative distribution of those that
3 were there and grew up there, and those that came in there
4 after a certain period of time, is computable. But, you
5 know, without going through some --
6 Q Well, this may turn out to be an easy computation.
7 Let me show you the Carlson-McCann Appendix 3-1,
8 and also draw your attention to your Table 3 preceding page
9 37.
10 Now, does that show any eggs being generated in
11 the Croton Point segment of the river, either the Carlson-
12 McCann data or your own Table 3?
13 A No, sir. It does not.
14 Q Would that mean that you believe that the organisms
15 in the Croton Point segment of the river came from one of the
16 segments upstream?
17 A As far as the operation of this model is concerned,
18 yes, that would be true.
19 Q Does that mean they would have either come from
20 or passed through the Peekskill segment?
21 A Well, they could have come from the Peekskill
22 segment itself.
23 Q Yes. I said come from or passed through the
24 Peekskill segment.
25 A By passing through, do you mean they were there

1 originally and then they left the Peekskill --

2 Q Well, maybe they were born up at Hyde Park and

3 made it all the way down to Croton, but they would have had

4 to go through the Peekskill segment?

5 A What I am saying is some of the organisms at

6 Croton could have come from the Peekskill segment, but not

7 necessarily have passed through it, if by "passed through"

8 it means coming from above Peekskill and moving through

9 Peekskill.

10 Q Maybe I didn't make the question clear.

11 I meant to say that they either came from -- in

12 other words, were born or generated in the Peekskill segment,

13 or passed through the Peekskill segment in order to get to

14 the Croton Point segment.

15 A With respect to the operation of this model, yes.

16 And the reason why I'm saying it is, in suggesting, that is

17 not to suggest that you cannot have spawning, and what have

18 you, in the Croton area.

19 Q No --

20 A This particular set of data did not show any.

21 And therefore, in following this particular set of data we

22 also did not show any egg production in the Croton segment.

23 Q Yes. And Carlson-McCann shows no production

24 there.

25 MR. TROSTEN: When you refer to Carlson-McCann

1 showing no production there, which set of Carlson-McCann?

2 MR. MACBETH: Appendix 3-1.

3 MR. TROSTEN: I see.

4 BY MR. MACBETH:

5 Q Then on page 3 of your testimony you say that

6 you are examining the reach of the river between Coxsackie

7 and Croton Point. And then quoting you:

8 "This reach is of major concern in our study

9 since the entrainable stages of striped bass have

10 not been observed outside of it."

11 So I take it from that that it's your opinion on

12 the basis of all the evidence that you have reviewed that

13 no striped bass of entrainable stages have been observed

14 below Croton Point segment? They might be there but no one

15 has ever seen them?

16 A At the time I wrote this testimony that was my

17 understanding. Since that time I have been told that eggs

18 and larvae have been found south of Croton Point.

19 Q Oh? Who told you that?

20 A This information was given me by the people at

21 the Boyce Thompson Institute who were conducting studies on

22 the river at this time.

23 Q Is that in any published form?

24 A No, sir, not that I know of.

25 Q Just a personal communication?

A A personal communication.

CHAIRMAN JENSCH: In any event, you don't rely upon that in any of the studies presented here?

WITNESS LAWLER: That is correct, Mr. Jensch.

CHAIRMAN JENSCH: Thank you.

BY MR. MACBETH:

Q Just to make sure that I have got this clear, and maybe you repeated myself, but it is true that if you had used the migration preferences from Table 5 rather than from Table 5-A, roughly twice as many fish would have been susceptible to entrainment at the Indian Point plant than by using Table 5-A, rather than Table 5?

MR. TROSTEN: I think that question is phrased a little differently than the way you did it before.

Dr. Lawler has not, to the best of my knowledge, computed migration preferences from Table 5.

MR. MACBETH: Well, he has a column there that says migration preference; the last column on Table 5 says "migration preference."

MR. TROSTEN: I beg your pardon.

CHAIRMAN JENSCH: Re-read the question, please.

(Whereupon, the Reporter read from the record, as requested.)

WITNESS LAWLER: I don't want to say that roughly twice as many fish would have been susceptible. I will agree

that the percentage of fish that appear in this segment at the end of the period we are referring to would have been roughly twice the percentage of the total population than was used in Table 5-A.

MR. MACBETH: Thank you.

end 6

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BY MR. MACBETH:

Q. I would like to move now to this question of density dependence of mortality.

If you took data from a population in which, in fact mortality was not density-dependent, and you fed it into your model, would the model treat it as if it were density-dependent?

MR. TROSTEN: Would the reporter read the question back.

(Whereupon, the reporter read from the record as requested.)

WITNESS LAWLER: The model is designed to treat either a density-dependent situation, or a density-independent situation.

I can run the model without density dependence, or compensation if you will, and I can run it with it. And I have done both.

CHAIRMAN JENSCH: I wonder if you would deal directly with the question. If you fed in data that was not density-dependent, would your model treat it as density-dependent, yes or no?

WITNESS LAWLER: It doesn't work that way, Mr. Jensch.

BY MR. MACBETH:

Q. That would depend on whether or not you had in the

mm2 1 model at that time, the compensation factors that you
2 describe at page 24 and following?
3 In other words, if that factor is in the model
4 then any data coming in would be treated as dependent?
5 A. (Dr. Lawler) Maybe I could best answer it this
6 way: The whole notion of density dependence and independence,
7 as far as this model is concerned, is simply concerned with
8 how a structure, the rate at which the organisms die due to
9 natural means.
10 I must incorporate into the model, I feel, a
11 natural mortality factor function. I can describe that
12 natural mortality function as simply directly proportional
13 to the concentration of organisms. If I do, that is known
14 as a first-order reaction, and that is also known as a
15 density-independent case.
16 I can also recognize that biological systems tend
17 to have an ability to offset mortality from one source by
18 a lesser mortality from another source, or, stated another
19 way, a first-order reaction, or the first-order kinetics is
20 simply -- it is a convenient artifact, really in an awful
21 lot of kinetic studies. And really, first-order kinetics is
22 ~~a complete~~ an incomplete description of what is going on in the system.
23 So many times you can represent natural mortality
24 say in biological systems by a first-order reaction, and it
25 does not particularly cause you any problems.

mm3

In this particular system, since I am trying to come back to what happens year after year after year, when I insert simple first-order kinetics, I create what is known as negative feedback in the linear system. And I cause the linear system purely mathematically to continue to spiral downwards.

I have described all that in here, and in trying to come to grips with a model that would give as accurate a description of what is happening in the river as I could, I felt it was necessary to not simply use constant first-order kinetics for the mortality of the -- to describe the natural mortality of the system, but to recognize that natural mortality is not necessarily a simple, single-value function of what can change.

Q Let me see if I can break this down into a few simpler pieces.

Are you saying that if you put a factor into the model which would reflect a real-life situation of density independence, the results that you obtain from your model would show a spiralling downward of the population over the years?

MR. TROSTEN: I must ask Mr. Macbeth to rephrase that question. The reference to a real-life situation involving density independence is very, very vague and obscure. I must ask that the question be rephrased.

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CHAIRMAN JENSCH: In what way?

MR. TROSTEN: To clarify what the intent of the question is.

CHAIRMAN JENSCH: Do you understand density independence?

I take it as meaning not density-dependent.

MR. MACBETH: That is one definition of it.

CHAIRMAN JENSCH: A real-life situation might be a reflection of what is real-life outside of the real-life characterization.

I thought if you take a density-independent situation you come spiralling downward.

MR. TROSTEN: Would you care to rephrase your question along the lines the Chairman suggested?

MR. MACBETH: I don't mind striking out the words "reflecting a real-life situation" and just saying:

BY MR. MACBETH:

Q If you put in a factor that indicated density independence, would you then produce results of spiralling downward of population over the years?

MR. TROSTEN: What is the question?

MR. MACBETH: Let's read back the original question, and I will try and strike out the phrase about real life.

(Whereupon, the reporter read from the record as requested.)

CHAIRMAN JENSCH: Strike out "real life."

Do you understand the question, and can you answer it?

WITNESS LAWLER: In striking out "real life," I think what you are asking is, that if I insert in the model a density-independent kinetics, which I have stated is a first-order reaction, is a constant state of mortality applied to the organism?

Then, in this model, if I make the model feed back year after year after year -- now wait a minute, I have to be careful how I answer this.

The way in which this model is structured is that we are trying to evaluate the impact that the plant -- eventually try to evaluate the impact that the plant may have on the river.

So to do that, we said we need some kind of base, some kind of reference condition. The reference condition I have described, or I have chosen to describe ~~as~~ as equilibrium in the system.

You look at it on a long-term basis, and presumed that the system known as the Hudson River and the striped bass population is in some kind of equilibrium. Okay.

Now I can get that equilibrium picture by using a

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1 set of kinetics that does not compensate, and I can get it
2 by using a set of kinetics that does compensate for changing
3 concentrations and mortality as you go on.
4 If I deal with a system where I have structured
5 the thing to operate at equilibrium, in other words the
6 same number of fish are produced year, after year, after
7 year, and they come back and spawn sufficient eggs so that
8 that same number is generated the next year, I will
9 continue year, after year, after year to get the same
10 number of fish regardless of whether I have an independent --
11 a density-independent set of kinetics, or a density-dependent
12 set of kinetics.
13 Now, if I change the kinetics for one stage, for
14 any reason, whether it be due to fishermen or a couple of
15 kids fishing, or some change in the natural mortality of a
16 stage or what have you, and make no other change, the
17 population may spiral upward, or it may spiral downward, but
18 it will just keep growing or decreasing without bound.
19 Okay?
20 That is why I have incorporated the ability of
21 the system to react to that tendency to just go in one
22 direction or the other, once you change one or more, for
23 that matter, of the things that are causing either growth or
24 mortality in the system.
25 That is the reason for doing it. So the answer to

mm7

your question is, it won't go down and it won't go up as long as you keep the same set of numbers that you chose to make it operate at equilibriums. But once you change one of the numbers for any reason, you are either going to drive it up if you decrease the mortality or increase the survival or growth or production. Or, you are going to drive it down, if you have increased the mortality or decreased the reproductive parameters. One or the other.

BY MR. MACBETH:

Q And one factor you could add in, which would increase the mortality and hence drive down the population, would be killing the fish by entraining them through the power plant?

A (Dr. Lawler) Sure, that is one and I have indicated several others.

Q Yes. I just wanted to bring it back a little bit to the matter at hand.

end 7

CHAIRMAN JENSCH: Would this be a convenient place to interrupt your examination?

MR. MACBETH: Yes, it would be.

CHAIRMAN JENSCH: At this time let us recess, to reconvene in this room at 11:05.

(Recess.)

CHAIRMAN JENSCH: Please come to order.

Will you proceed, Hudson River Fishermen's Association?

MR. MACBETH: Yes, Mr. Chairman.

BY MR. MACBETH:

Q I would like to go back and pick up a dropped stitch or two if I may.

Having discovered the basis of Table 5-A -- I have lost the reference to where Table 5-A appears in the testimony -- it's after page 46.

Now, as I understand it, Table 5-A is based on Figure 5-9 on page 5-50 of the final environmental statement, but that chart in turn is based on the Carlson-McCann seine haul data for 1967; isn't that correct, Dr. Lawler?

A (Dr. Lawler) Yes. That's right.

Q Now, let me read you a paragraph from page 25 of the Carlson-McCann Report, where it says:

"Three types of sampling gear are employed to collect young fish: Haul seine, semi-balloon trawl,

1 and midwater trawl. A haul seine 75 feet long, 6 feet
2 deep and 0.25 inch square mesh, knotless nylon mesh,
3 was used to sample the shallow shore areas of the
4 river. The large numbers of variables associated with
5 seine haul including the physical difference in the
6 seined sites prevented the quantitative analysis of
7 this type of data. Therefore, this gear was used only
8 to determine the species composition of shoreline
9 communities throughout the estuary."
10 I will show it to you so you can see it in
11 context.
12 A I have it here.
13 Q Does that raise doubt in your mind as to the
14 validity of using these seine haul data in a quantitative
15 sense to determine the migration preferences, the distribution
16 of the juvenile-1 striped bass?
17 A I think I indicated previously that the seine
18 haul data may not be the best set of data to use. I did use
19 the data shown in Table 5 earlier in constructing this model,
20 and have also used it more recently.
21 As I have indicated, the sole reason at the time
22 at which this particular set of testimony was prepared was
23 I wanted to restrict the use of data to 1967, and that was
24 the reason for choosing this particular run.
25 But I agree that the haul net is perhaps certainly--

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1 well, not certainly -- but quite often could be considered
2 not to be as quantitative as the trawl.
3 Q Would it be fair to say that you have serious
4 doubts as to the validity of using the seine haul data for
5 quantitative purposes?
6 A I don't have serious doubts as to its use in
7 this particular model, because as I have said I have used
8 it, I've used other migration preferences, and my purpose
9 here was simply to test the model to see whether we were
10 getting roughly the kinds of distributions that were seen
11 in the Carlson-McCann data, the report.
12 Q But isn't this a situation where these migration
13 preferences determine where the fish end up at the end of
14 the model, so that if you used the migration preference of
15 Table 5-A you are indicating to the model that it is to
16 produce the fish at the end of the juvenile-1 stage in terms
17 of where their position is dictated by Table 5-A?
18 A That may be so. As I indicated, I have used the
19 same migration preferences that are given in Table 5 also,
20 and I'm prepared to discuss that whole question whenever you
21 want to get to it.
22 Q Well, I'm really concentrating on the differences
23 between 5 and 5-A, and what the accuracy of one or the other
24 is.
25 I take it that you felt it was very important to

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use '67 data so you would have a complete cycle of 1967 data throughout the entire report and you would be able to see one population of fish in one year moving through the river and through its whole first year of life?

A I don't know that it was the most important thing in the world. You will see at several points in the testimony where I indicate the difficulty in explaining various pieces of the '67 data.

For example, I use mortalities in the larval stage that are probably somewhat higher than you would normally expect -- I'm sorry -- survivals in the larval stage, rather than mortalities -- that are probably somewhat higher than you would expect to see. Had the egg data been more abundant, if I had more abundance of eggs, I wouldn't have had to do that.

In discussing this whole question of Carlson-McCann with a number of people, it seems there is some question as to how -- let me put it this way:

We talked about relative abundances yesterday. All of this stuff is relative abundances. Yet a model does not really generate relative abundances. It generates absolute abundances based on a given egg complement, egg dropping production.

Now, if it turns out that the relative abundance of eggs, or the ratio of the observed abundance of eggs to

1 the real -- "abundance of eggs" is somewhat different than
2 your ratio of the real -- of the observed abundance of larvae
3 to the real abundance of larvae. You are not going to be
4 able to get the two to coincide in a model, and I pointed
5 that out in the testimony at a number of points.
6 And a similar comment could be made about the
7 latter stages, the early juveniles we're talking about.
8 Q Yes. I just really wanted to sort of --
9 A I don't want to say --
10 CHAIRMAN JENSCH: Let the witness continue.
11 WITNESS LAWLER: What I don't want to imply here
12 is that we absolutely had to use '67 data throughout to do
13 any kind of testing of the model. But on the other hand,
14 there was a certain consistency in using the '67 data because
15 once you go into another year then, you know, you introduce
16 another degree of uncertainty in what you are doing.
17 And what I'm trying to do at this point is simply
18 see how able the model is to reproduce what was seen, and
19 I've described how that was done.
20 MR. MACBETH: Thank you.
21 BY MR. MACBETH:
22 Q Now, if you took the two runs, the best current
23 "f" estimates maximum and the maximum "f" values that you
24 reproduced in Table 24, which precedes page 79 of your
25 October 30 testimony, and you made only the change of

1 inserting the migration preferences of Table 5 for those of
2 Table 5-A, would there be a difference in the results, the
3 percentage reduction of one-year olds, five-year olds, and
4 ten-year olds -- excuse me -- the percentage reduction after
5 years of operation, one year, five years, and ten years?
6 MR. TROSTEN: Would you read the question back?
7 (Whereupon, the Reporter read from the record, as
8 requested.)
9 WITNESS LAWLER: The answer to that question is
10 there would be very little difference for the conditions
11 which you have stated.
12 CHAIRMAN JENSCH: I think the question was: would
13 there be a reduction in percentage. As to the measurement
14 of how much it is wasn't really the question, but would
15 there be a reduction?
16 BY MR. MACBETH:
17 Q I think I phrased it: Would there be a change in
18 percentage reduction on Table 24, preceding page 79. The
19 columns are headed "percentage reduction after years of
20 operation."
21 What I was asking was: Would there be a change in
22 the percentage of reduction?
23 A (Dr. Lawler) Those percentage reductions on Table
24 24 are rounded values, and there would be no change in those
25 numbers for the conditions you have stated.

1 Q Thank you.

2 Let me return to the compensation question.

3 On page 24 of your testimony you say:

4 "What we are saying is that on the long-term

5 basis, exclusive of the plant's effect, we are

6 considering the estuarine juvenile striped bass

7 population to have reached saturation or equilibrium

8 level."

9 Now, I assume that's really the underlying

10 assumption for the issue we were discussing before the break;

11 is that correct?

12 A Not quite. That's not really the underlying

13 assumption.

14 This statement here was trying to describe Figure

15 9. What I'm saying is, "Look, the way I want to operate this

16 thing is to avoid having to have a very substantial dependence

17 on this notion of compensation."

18 So to do that I said, "Well, let's posit that in

19 the estuary -- the organisms, whatever they may be, are in

20 some kind of state of balance, recognizing the numerous things

21 that take place in the estuary, both man made and natural."

22 And I said that they will kind of oscillate about that

23 position.

24 And that's what I was trying to do there, was to

25 describe this very extensive plateau in Figure 9, and that

1 plateau corresponds to a case of density-independence.

2 Q Density-independence?

3 A Yes, density-independence from a numerical or

4 kinetic viewpoint.

5 If you look at this plot, I plot here on the

6 ordinate, the vertical axis, a factor which is called "K"

7 and it has the units of reciprocal days, and this is the

8 first order decay or mortality rate that I described earlier.

9 Or let me put it this way:

10 This is the mortality rate.

11 Now, when that mortality rate is constant, fixed,

12 I have the case of first-order kinetics or density-independ-

13 ence. So as long as I am operating in that plateau, for all

14 practical purposes I have a fixed mortality rate. And

15 therefore, I had, in essence, a density-independence situation.

16 What I'm trying to say here is that I have

17 constructed this kinetics so by and large that's where I

18 operate.

19 Q Maybe I've become confused in the testimony. In

20 fact, in the runs you did use a density-dependence situation,

21 did you not? Isn't that perhaps indicated by Figure 10?

22 MR. TROSTEN: What page, please?

23 MR. MACBETH: It follows page 26.

24 WITNESS LAWLER: If you refer to equation 1 on

25 page 23, that's the expression, the equation, that describes

the kinetics or mortality function used, and that is described graphically in Figure 9 and Figure 10.

The only point I'm making is that when you are operating near the concentration described as N_s that second ~~curve~~ term is very small by comparison to the first.

So for all practical purposes it drops out, and when you have a situation where only the first term is describing, killing your organisms from a natural standpoint, then you have effectively a density-independence situation.

What I'm trying to do here is I'm not trying to rely heavily on compensation. You know, it could have been structured otherwise, but I'm trying to say that we don't know enough about compensation to rely very heavily on it. But on the other hand, I have the dilemma of if I don't rely on it at all, yet I still want to be able to come back year after year after year, then I have a real problem, not only with the plant -- with anything.

Actually, what we are using here is called non-linear kinetics in virtually any physical or biological system. The non-linear -- you simply use a linear description of it because it's simple. It makes the mathematics easy, but it gets you into trouble.

end 8

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That is the problem here. I want to be able to cite it over the years so as to get some notion of the impact.

Q. I don't want to emphasize this section of your testimony more than is in there, but just to be clear, you have done runs with at least some compensatory mechanism in the model which would indicate that there is some density dependence, is that correct?

A. Yes.

And while we are on that topic, I should indicate that this same mechanism exists with or without the operation of a plant. You don't incorporate this just when the plant is operating. This mechanism is my description of the natural behavior of the system, so therefore it operates regardless.

Q. Yes.

Now to come back to this other situation that I got a little confused on earlier, that real situation that the model -- this factor of the model represents, is this state of saturation or equilibrium of the young striped bass, is that correct?

A. Well again, maybe balance is a better word.

I am simply saying that I will operate this model so that in general concentrations that I am dealing with will put me on this plateau. This is really what I am saying.

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Q Putting you on that plateau, does that indicate a population -- strike that.

Putting you on that plateau,does that reflect the population which is in the state of saturation or equilibrium?

MR. TROSTEN: I object to the question, Mr. Chairman.

First of all, it is a double question.

Secondly, it assumes the equivalence of saturation and equilibrium.

MR. MACBETH: Let's take it at --

CHAIRMAN JENSCH: The question is considered withdrawn.

Proceed.

BY MR. MACBETH:

Q Does putting yourself on that plateau reflect a population which is in saturation -- excuse me, let me phrase the last to say, at a saturation level?

(Pause.)

A (Dr. Lawler) Are you ready for me to answer?

Q Yes.

A I am sorry.

Maybe I can best express what I am driving at here by just reading from the testimony at page 24, how I look at this.

At the bottom of page 24, I said that, "We are

1 considering the estuarine juvenile bass population ~~every~~ to have reached some
2 'saturation' or 'equilibrium level.'"
3 I ~~use the word~~ used quotes there because I don't
4 want the word misinterpreted. And I go on to say, "This
5 does not imply that the estuary can never support more
6 life." It simply says that for the total existing set of
7 background conditions, which incorporate just a multitude
8 of things, the river is in balance, or supported that
9 level of life which it is capable of supporting considering
10 all the external factors good or bad, that exist.
11 I don't know what else I could tell you.
12 Q. Well maybe we can start by having you tell me
13 how the meaning of saturation is changed by putting
14 quotation marks around it?
15 MR. TROSTEN: Are you asking the witness what
16 he meant by the term saturation?
17 BY MR. MACBETH:
18 Q. In quotation marks, as opposed to saturation
19 without quotation marks.
20 A. (Dr. Lawler) I think I just described that.
21 It is in the last sentence on the bottom of page 24. I
22 said I am not saying that there can never be a situation
23 where the estuary cannot support more life.
24 We know that it supports more life from one
25 year to the next. It varies.

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1 CHAIRMAN JENSCH: Well you just told us what
2 it doesn't mean.
3 What does it mean?
4 You said it does not apply to this. Well, what
5 does it mean? I think that is the question.
6 WITNESS LAWLER: I said that it simply says that
7 for the existing set of background conditions, that is to
8 say conditions both natural and manmade that exist prior
9 to the operation of the plant -- and you could even
10 strike prior to the operation of the plant, if you wish.
11 I am talking about the situation today, the river is in
12 balance, or is supporting that level of life which it is
13 capable of supporting once you consider all the multitude
14 of things that impact on the river, from the upland runoff,
15 the meteorology and the pollution, the tides, the salt, all
16 of these things that go into causing whatever happens to --
17 in this case, the striped bass population. But the notion
18 would be applicable to any other various life structures
19 that exist in the river.
20 BY MR. MACBETH:
21 Q. Would it be fair to say that by "saturation"
22 with quotation marks, you mean the saturation level under
23 presently-existing conditions?
24 A. (Dr. Lawler) Okay.
25 Q. And again, for "equilibrium level" in quotation

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marks, you mean at an equilibrium level under presently existing conditions?

A. Okay.

You have to recognize that existing conditions themselves vary.

Q. Yes.

I think I have got it now. I wasn't really sure what those quotation marks amounted to.

What data base do you rely on for the assumption that under presently existing conditions, the population is at "equilibrium level?"

A. I don't really think I need a data base to rely on. I think I am trying to describe how I view the condition of the river at this time.

Q. Well presumably one might have a collection of data indicating populations over the last 10, 20, 30 or 40 years, and from that arrive at the conclusion that there was an equilibrium, or that changes in it could be -- changes in the population could be accounted for by some change in the conditions of the river.

Just building these railway bridges, such as you describe --

MR. TROSTEN: Excuse me, the witness has said that this is an assumption. You don't need to have a data base for an assumption.

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MR. MACBETH: All right.

Let's be perfectly clear about that. There is an assumption, and there isn't any data base?

Will you stipulate to that, Mr. Trosten, if the applicant wants to stipulate to that?

WITNESS LAWLER: I would rather not do it that way. Maybe I can explain what I am trying to suggest here, in this fashion.

The whole object of this is simply to try to get some idea of the possible impact of the plant. Okay.

Now you recognize that there are so many things going on in that river, that the most appropriate, the most accurate way to evaluate the whole thing is to take every one of these things into consideration as they actually affect the bass population.

And if you were able to do this, you would have a tremendous fluctuation from year to year.

I can make the model generate a random kind of variation, but I cannot at this moment -- well, I actually could, but I haven't here, chosen to present this as a model that is capable of responding to all of the various fluctuating changes that take place in the river. I have described this as a deterministic kind of thing, and for that particular reason, because all I am trying to say is, look, we have the condition today and the condition tomorrow,

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which is after the plant would begin to operate.

And all I am describing here is the background against which I am trying to evaluate the operation of the plant. I have chosen to describe that background as a set of conditions which presume the river to be at some kind of balance.

I will say that that is an assumption that the river is in some kind of balance.

BY MR. MACBETH:

Q And when you say the river is in some kind of balance, you mean also the populations of fish in the river?

A (Dr. Lawler) Yes, that is right.

Dr. Lauer made a point. He pointed out to me that one of the things you are saying here is rather than describing the river as either in a growing situation, which it very well may be, or in a declining situation, which it probably isn't based on the best evidence, we have chosen to describe it as a balanced situation.

And again the reason for doing this is to make the evaluation of the impact of the plant simple.

Q Yes.

All I really wanted to get clear was that it was a choice and that it was not the end result of examination of vast quantities that are referred to here, and I think that

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mm8 1 is coming out, and I am prepared to move on to something
2 else, if you will just give me a minute to pull it
3 together.
4 (Pause.)
end 9 5
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I'd like to turn to the other factors, the F factors by which you define the models for predicting effect of the operation of the plant.

Now in dealing with factor F-1 which involves the distribution of the fish across the river, you discuss various quadrants, upper west, upper east, lower west, lower east, and I would just like to be clear in my own mind as to where those quadrants fall.

In front of the plant, are the quadrants divided so that the division from east to west is halfway across the river and the vertical division is halfway down the water column at the point halfway across the river?

A Generally, the way I have defined the quadrants is in terms of the surface, mid-depth and bottom sampling that has been made by various investigators. In other words, the upper quadrant, the upper east quadrant is between the surface and the mid-depth samples and it is betweeen the mid-channel, if there was a mid-channel, and the east bank.

My point is that it is not necessarily in terms of computed F factors --

CHAIRMAN JENSCH: A little louder, please.

WITNESS LAWLER: It is not necessarily a fixed depth as far as the computation of the F-1 factor goes because the different investigators,-- depending on the ~~transit~~ transect or the location of the river ~~transit~~ transect, may have been at

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different depths of water. Dr. Lauer described that yesterday.

And in computing the F-1 factor I have said that the upper east quadrant would be that quadrant defined by the surface sample at the top and the mid-depth sample at the bottom, the east-side sample as far as the lateral dimension is concerned.

Q Well, does that indicate that the quadrants have rather fluid boundaries, that what we have are tows on two sides of the river, and quadrants could be thought of as -- well, from east to west as radiating out from those tow lines, and the vertical water column being divided through the middle at the mid-depth sample?

A I don't know what you mean by "radiating."

Q Well,I'm trying to find in terms of the river east to west where the division is between the quadrants on the west and the quadrants on the east.

CHAIRMAN JENSCH: Excuse me for interrupting. Would it be helpful to ask the witness if he will go to the easel and see if he can draw us a diagram?

(Witness Lawler at the easel.)

WITNESS LAWLER: If I sketch this as a typical section, cross-section in the area, the water is moving downstream in this direction (indicating) -- or let me say that the water is moving downstream out from the paper, so this

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would be east over here, this would be west over here.

Now the notion, the conceptual notion is simply to say that it's something like this (marking at easel). As far as the computational procedure is concerned, it depends on the particular data you're dealing with.

If I have a set of data in which there is a transect in the east and a transect in the west, and a surface sample, a mid-depth sample, and a bottom sample, then I define the east quadrant in terms of the water between the surface sample and the mid-depth sample, for computational purposes I will use the east transect data.

If I have three transects, if I have an east transect, a mid-channel transect, and a west transect, then for computational -- and let's assume surface, mid-depth and bottom, which I did in applicable cases, in this case the upper east quadrant calculation will involve-- It was done in two ways.

One, I weighted the calculation by ~~suing~~ using the mid-depth value -- I mean the mid-channel value to compute the concentration or density in this section and well as in this section (indicating).

In other words, in computing the concentration in this section I averaged this with this (indicating), and also, similarly, this and this (indicating), and in computing the computation for the upper west quadrant I again

eb4

1 used this, and this time the mid-channel sample would be used
2 with the west transect sample in precisely the same
3 manner as it was used over here, and I used the term weight-
4 ing for that.
5 Then in these situations I also computed what I
6 called the non-weighted-- I made an unweighted calculation
7 and there, if I had three segments instead of looking at it
8 as a quadrant I looked at it in sixths. There I did this,
9 then I did this and this (marking on easel), and here my
10 east sector was computed using the transect east and there
11 was the mid-channel sector using the transect here (marking),
12 the west sector using the transect here.
13 Okay? Does that answer your question?
14 MR. MACBETH: Yes, I think that's getting at it.
15 BY MR. MACBETH:
16 Q Are the volumes of water in the various quadrants
17 always the same?
18 A (Dr. Lawler) Do you mean flow-through volume or
19 static volume?
20 Q Well, let's take static first.
21 A Probably not.
22 Q Do you think there is a wide range of values?
23 A Well, you would have to sit down and compute what
24 it was. I simply said that it seemed to me that the volume
25 of water that the plant had to withdraw for all practical

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eb5

1 purposes would be presumed to be coming from this segment,
2 this segment, regardless of the particular definition of it
3 for computational purposes, whether it was 20 feet or 25 feet.
4 There was enough water in here so that as far as the water
5 that was going through the plant is concerned, that water
6 can be presumed to be coming from this east segment.
7 MR. TROSTEN: Dr. Lawler, would you please draw the
8 intake there schematically on the east sector?
9 WITNESS LAWLER: The intake would run from the
10 surface down to a depth of approximately 26 feet, and I have
11 drawn it slightly below the mid-depth line because the aver-
12 age depth of the river at this section is about 40 feet so
13 that the average mid-depth would be about 20 feet.
14 What I am saying is that most of the water is
15 going to be drawn from this section.
16 BY MR. MACBETH:
17 Q Did you correct the figures that you used in con-
18 centration to take account of the varying volumes of the
19 quadrants?
20 A (Dr. Lawler) No, there was no need to do that.
21 I'm simply saying that the amount of water that the plant
22 has to withdraw, there is more than adequate water in this
23 segment, regardless of whether we're dealing with the 20-
24 foot or 25-foot deep segment.
25 Some of the transects went from zero to 25 to 50

eb6

feet deep, so in that situation I'm dealing with a 25-foot depth to the mid-depth sample. Others went from zero to 40 feet. In that situation I'm dealing with zero to 20 feet, in the upper quadrant, if you will.

All I'm saying is that it seems to me that as far as where the plant water comes from, there is more than adequate water in this segment to permit me to not be terribly concerned as to the actual linear dimensions of the segment.

Q Does that mean it doesn't make any difference if, say, for a particular location on the river, the volume of water on the two eastern quadrants is twice as much as the water on the two western quadrants, you can calculate the "f" value without making any correction for the fact that the river geometry produces twice as much water on the east side as on the west side?

A Well, the more water you put on the east quadrant, the more conservative my calculation is.

Q Well, obviously we can just turn it on its head and put it over to the west.

What I'm asking is if there are these variations of river geometry that we have described, to be accurate you have to make some correction in your "f" values to take account of the varying volumes of water in particular quadrants.

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MR. TROSTEN: Are you asking for what the "f" factor would be if the plant were located at some different point on the river? Is that your question?

MR. MACBETH: No. I'm asking--

Well, would the Reporter read the question back? I thought it was quite clear but maybe it is vague.

WITNESS LAWLER: The answer to your question is:

If I had or if I suspected much more of the water was flowing through here (indicating) than is flowing -- than is proportionally suggested here, then I would have to take it into account. In reality, if anything, more of the water is flowing through this segment.

CHAIRMAN JENSCH: I'm always bothered about that phrase, "take it into account." The question was, would you have to put some corrections-- Would you answer it in the light of would you have to make some corrections if the dimensions were as you last described in your answer.

WITNESS LAWLER: If there was a greater volume of water on the west side, then I would probably make a correction, but in reality there is probably a greater volume of water from the mid-channel to the east side than there is from the mid-channel to the west side.

11

BY MR. MACBETH:

Q Now yesterday after the end of the hearing, you and I discussed briefly some of the typographical errors in

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1 these charts 9, 10, and 11, which deal with the f_1 factor.
2 Just so the record will be clear, perhaps we can agree to
3 make some changes in those now.
4 Is it not true that on Table 10, the word "Eggs"
5 in the title should be struck out?
6 A (Dr. Lawler) Excuse me. I don't have the page,
7 Mr. Macbeth.
8 Q Well, it's a tough problem with pages.
9 If follows Table 9, which follows page 52.
10 A Right. I have it.
11 Do you want me to describe for the record the
12 changes that you and I discussed off the record?
13 Q Yes.
14 A On Table 10, the title should strike the word
15 "Eggs." It should be "Determination of "f_1" Factor for
16 Striped Bass Yolk Sac Larvae."
17 In Table 11, again in the title, a similar correc-
18 tion should be made. The Word "Eggs" again should be struck.
19 And in Table 11, there appears to be a typographi-
20 cal error in the entry of three pieces of data. Underneath
21 the column entitled "West," the mean, upper west quadrant
22 value should be 67.2 rather than 9.30.
23 CHAIRMAN JENSCH: Excuse me.
24 MR. KARMAN: Is this on --
25 WITNESS LAWLER: This is under "Night Sampling"

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at the bottom of the page.

CHAIRMAN JENSCH: And it should be what?

WITNESS ~~LAWLOR~~ Lawler: It should be 67.2 rather than 9.30. There is a clear typographical error here.

The mid-depth sample immediately appearing underneath the words "mean, upper west quadrant" should read 46.33, just as it does immediately above the words "mean, upper west quadrant."

CHAIRMAN JENSCH: Strike out 16.72?

WITNESS ~~LAWLOR~~ Lawler: Yes.

CHAIRMAN JENSCH: Will you tell us first the figure that you want to change? That will enable us to identify it.

WITNESS ~~LAWLOR~~ Lawler: All right, Mr. Chairman.

Then immediately below the change that was just made, the figure 36.38 should be changed to 79.33.

Now I would like to make a statement here. I have not had the opportunity to look at my original, handwritten draft of this where the correct figures exist, so the 79.33 value, although I am 99 percent certain it's correct, was back-computed by me using the mean values.

I will check that point. If it turns out that it is not correct, I will so note, but I am virtually certain of the numbers I have just introduced on the record.

CHAIRMAN JENSCH: Does that constitute the extent

eb10

of your changes?

WITNESS ~~LAWLOR~~ Lawler: That's correct, isn't it, Mr. Macbeth?

MR. MACBETH: Yes.

CHAIRMAN JENSCH: Will Applicant's Counsel undertake to correct the originals filed with the Commission in the Public Proceedings Branch so the record will be correct?

MR. TROSTEN: Yes, Mr. Chairman.

BY MR. MACBETH:

Q Now these "f_1" factors on Tables 9, 10, and 11 were developed from the 1971 NYU data that I discussed with Dr. Lauer yesterday, were they not?

A (Dr. ~~Lawlor~~ Lawler) Yes, Mr. Macbeth, they were.

Q Unfortunately I don't have the transcript in front of me so I cannot refer properly to pages of Dr. Lauer's testimony, but let me try to recall some of the points that I think Dr. Lauer brought out.

As I remember it, Dr. Lauer indicated that the sampling gear had not been very effective at collecting yolk sac larvae, that the larvae seemed to be straining through the net, and that accounted for the fact that --

CHAIRMAN JENSCH: You will have to speak a little louder.

BY MR. MACBETH:

Q That accounted for the fact that there were lower

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concentrations of yolk sac larvae than there were of either eggs or later larvae.

Does that raise some doubts in your mind as to the accuracy of Table 10 in reflecting the real-world situation?

MR. TROSTEN: Dr. Lauer, do you accept Mr. Macbeth's recollection of your testimony yesterday?

WITNESS LAUER: I think I responded to that by indicating that the smaller yolk sac larvae may be passing through the net, which could be one of the reasons why the yolk sac larvae abundance appears to be lower than either the eggs or the later yolk sac stages.

But I also mentioned that there were other possible factors involved, including the life length of the yolk-sac stage compared to the post-yolk sac larvae which would have some effect on how long you saw -- how long a net would see that particular stage in the river and therefore would be able to collect it.

There are a number of factors that could affect the numbers, one of which is the efficiency of the net for collecting that size of an organism.

CHAIRMAN JENSCH: There's a question pending. This creates some doubt. Could we have the question read, please?

(Whereupon, the Reporter read from the record as requested.)

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MR. TROSTEN: Mr. Chairman, should the question then be rephrased "Does Dr. Lauer's testimony raise some doubt as to the accuracy of Table 11 -- or Table 10?" Is that not the correct question?

MR. MACBETH: I would be willing to rephrase it that way and pursue it from there.

WITNESS LAWLER: No, the data here-- The presumption is that whatever the relative efficiency of the nets or whatever the explanation, I think the explanation Dr. Lauer has given in terms of length is important but irregardless, the presumption is that the efficiency in catching these organisms is the same at the various depths and at various locations and at various times.

I'm not particularly concerned with the actual number. I'm concerned with the relative distribution so the presumption is that the efficiency of sampling is the same from top to bottom and from side to side.

BY MR. MACBETH:

Q Did you make any determination of the statistical significance of the distinctions between the west-side stations and the east-side stations, the upper-quadrant stations and the lower-quadrant stations?

A (Dr. Lawler) No, sir, I didn't. I operated on means only. The data here are all in terms of means that were reported by Dr. Lauer. The same kind of computational

procedures could be applied to the confidence limits that Dr. Lauer may apply to this data. I have not done that. Maybe it could be done.

My opinion is that it would show relatively the same results.

Q The same results as what?

A As I have shown here for the "f_1" factor using the means of all of the samples that were taken.

In other words, when these samples were taken, you have a whole bundle of samples on the west side and the east side and the top and the bottom and the mid-depth, and for the other investigators similarly. And what I used in the computational procedure was the mean -- the reported mean average for each of the various sets of samples, and each of those means have associated with them confidence levels within which the true mean of the distribution falls.

What I'm simply saying is that I could take those confidence limits, either the upper limits or the lower limits, or somewhere in between, and apply a similar computational procedure and I would expect to get similar results, assuming I was consistent, whether I used the upper limit if I'm going to use the upper for the west, and if I'm going to use the lower I'm going to use the lower.

Q If those confidence limits-- I'm not sure I'm going to phrase this right, but if those confidence limits

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1 indicated a very low confidence level in making the distinc-
2 tion between collections in the various quadrants, would
3 that indicate that there is very low confidence in their
4 being a difference in the real world between the upper east
5 quadrant and the other quadrants?
6 MR. TROSTEN: Mr. Chairman, I must object to the
7 question simply because the witness has been asked whether
8 he ran any tests of the statistical significance. He said
9 he did not.
10 Mr. Macbeth is now asking him a question as to
11 what would be the result, what would be the implications of
12 statistical tests which the witness has just said he did not
13 run, and I think it is improper to question under these
14 circumstances along that line.
15 MR. MACBETH: I was simply asking him what dif-
16 ference it would make to his data if such a result was
17 obtained by mathematical calculations. I think it is impor-
18 tant in the case of the Intervenors where the other parties
19 make such calculations that we have some opinion from the
20 witness as to what difference certain results might make.
21 MR. TROSTEN: I think if the Intervenors want to
22 make these calculations, they may do so.
23 CHAIRMAN JENSCH: I did not get that that was the
24 question. I thought the question was, what is your confidence
25 level in something, and I think the predicate for that would

b15

1 necessarily be some calculation, as Applicant's Counsel
2 indicates.
3 Your explanation is what would be the effect of
4 this calculation. I don't know how he can express that with-
5 out making the calculation.
6 MR. MACBETH: I asked him to assume a certain kind
7 of result.
8 CHAIRMAN JENSCH: May we have the question re-
9 read, please?
10 (Whereupon, the Reporter read from the record
11 as requested.)
12 11
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MR. TROSTEN: Should we speak to this?

CHAIRMAN JENSCH: Yes.

Was the question completed?

MR. TROSTEN: Yes.

It is a question that proceeds on a premise that there is a predicate established that has not been performed. There has been no statistical evaluation made. Hence you cannot respond as to what the deviation would be, or what the confidence limits are unless you have performed this kind of an evaluation.

MR. MACBETH: I have not asked him to give me confidence limit. I am giving him a hypothetical situation in which I have suggested that if these results were obtained, what would it mean?

CHAIRMAN JENSCH: I didn't understand the question that way.

The objection is sustained. Will you restate your question.

BY MR. MACBETH:

Q If, as a result of calculating the confidence limits associated with the various figures on tables 9, 10 and 11, one discovered that one had a very low level of confidence, a very low confidence level associated with those numbers, would that indicate that in the real world -- strike in the real world -- would that indicate a very low

mm2

level of confidence in there being a distinction in the real world between the upper east quadrant, and the other quadrants?

MR. TROSTEN: I object.

Lack of foundation, Mr. Chairman.

Let the intervenors come forth with such a calculation and present it to Dr. ~~Lauer~~ Lawler, and then ask for his opinion with respect to it.

MR. MACBETH: Mr. Chairman, we have not yet been provided with all the data which breaks out the various data in tables 9, 10 and 11 station by station.

Dr. Lauer told us yesterday that he would provide us that information. Until we have the information we cannot do the calculations. Now we can wait and we can do the calculations, and we can then come back and we can put this question to the witness.

It seems to me that we might save some time if we had this answer to this hypothetical now, and we can see whether it applies in the end.

I would ask the Board to allow this question to be answered subject to correction.

MR. TROSTEN: Mr. Chairman, I might add ~~to~~ as the first instance that we have supplied Mr. Macbeth with all of the data that he desires. I am perfectly prepared to have a question put to Dr. Lawler, based upon a statistical

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evaluation that the intervenors have made, and ask him what his opinion is with regard to such a statistical evaluation.

If they choose to do so, that will be fine.

CHAIRMAN JENSCH: You will have a right of recalling this witness. Perhaps that might be better when you get these data to which you adverted.

The question will be considered deferred.

MR. MACBETH: Thank you.

CHAIRMAN JENSCH: It can be renewed again.

MR. MACBETH: Yes, sir.

BY MR. MACBETH:

Q. Dr. Lawler, yesterday I questioned Dr. Lauer about the part of the water column that was represented by the bottom sample. And it is my recollection that he indicated that one would expect to find a heavier concentration in the few feet directly above the bottom, not an even gradient concentration from the upper areas through the mid-depths to the bottom.

Now perhaps I should check with Dr. Lauer as to that.

Is that not an accurate summary of your statements of yesterday? Is that a fair rendition of your position?

A. (Dr. Lauer) I don't think -- well, I don't think it is precisely accurate. What I indicated was that I

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would expect that there may be a considerably higher still population of these organisms between the two feet off the bottom location, and the bottom.

That would not necessarily be represented by extending a straight line down to the bottom.

I did not, on the other hand, indicate that because of this, that this would indicate that there would be any other such type deviation from somewhere about a straight line drawn from the surface to the middle to the two feet off the bottom location.

Q. In light of Dr. Lauer's summary of his testimony, do you feel that the data presented in tables 9, 10 and 11, in any way unduly weights the lower quadrants, which include the bottom samples?

A. (Dr.Lawler) If I understood Dr. Lauer's comments correctly, I think what he is saying is that if anything, the bottom quadrants are underestimated.

If that interpretation of what he has said is correct, then the "f_1" factors that I reported here would be smaller if you had presumably more representative bottom samples.

In other words, if you add concentration to the bottom, these "f" factors that have been computed are going to be lower, rather than higher.

I know there is a concern. The bottom is a problem

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to get a good sample from. A lot of people feel that the bottom samples are underestimated. AT least this is what I am given to believe.

I did not get too particularly concerned about that, because it simply meant that the "f_1" factors would be lower rather than higher.

Q. I may wish to return to that, but let me move on, for the time being, to "f_2."

We discussed the foundation basis with Dr. Lawler and Dr. Lauer yesterday. It is table 19, following page 60.

MR. TROSTEN: The bottom of page 60?

MR. MACBETH: Following page 60.

MR. TROSTEN: Thank you.

WITNESS LAWLER: May I make one comment on the "f_1" factors?

MR. MACBETH: I am not opposed to a comment.

WITNESS LAWLER: The only comment I would like to make is that in these "f_1" factors, I think we have quite a good degree of confidence in them subject to, for instance, the kind that I just made on the bottom sampling, because what we have done is take as much information as we could find. Not simply a set of data we focused on in the last few minutes, but several sets of data for different years. And you come up -- and we have looked ~~it~~ at in

mm6 1 several different ways. It has been weighted in several
2 different fashions.
3 And no matter what way you weight it, or
4 what set of data you look at, you invariably come up with
5 numbers that are rather closely clustered around the
6 .4 value that I have generally used.
7 BY MR. MACBETH:
8 Q. Let me proceed on that for a moment.
9 Now, in the NYU data you have seven samplings
10 taken; A and B upstream from Indian Point. How far
11 above Indian Point are stations A and B?
12 A. (Dr. Lawler) Station A is probably several
13 thousand feet upstream. It looks to be approximately four
14 to five thousand feet upstream.
15 Q. And how far downstream are stations F and G?
16 A. They look to be about six thousand, maybe even
17 eight thousand feet downstream.
18 Q. How do you think the water moves downstream
19 from -- say water that started out at station A, how would it
20 move downstream to the general area of the transect of the
21 river marked by stations F and G?
22 MR. TROSTEN: I am going to ask Mr. Macbeth to
23 clarify his question. What do you mean, how would it move?
24 BY MR. MACBETH:
25 Q. What would its course through the geometry of

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the riverbed be?

A. (Dr. Lawler) I think that is difficult to say, Mr. Macbeth.

These samples are all within a tidal excursion. That is why they were used. I thought rather than simply use the stations in the immediate vicinity of the plant, that stations within a tidal excursion of the plant should be used.

But to say the exact part of it that moves down-river or up the river for that matter, is really difficult to say.

Q. But isn't part of your analysis that no substantial quantity of the water on the west side, in the area of stations A and B, would be on the east side in front of the Indian Point plant, and conversely, that no substantial amount of water in the area B, would be on the west bank at Indian Point?

A. I don't know whether I said that.

Q. No, I don't think you said it in so many words. But isn't that an implicit assumption of the kind of averaging of stations that you performed?

A. That is probably so, yes.

Q. Is the flow of the water downstream influenced by where the channel is in the river?

A. I suppose it is.

Q. Where is the channel in part of Indian Point, on the east side or the west side?

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A. The channel, in the general vicinity of Indian Point, tends to be more on the east side than on the west side --well, it is hard to say. It is pretty deep water all along.

Q. What about the channel of the area of transect A and B -- of tow sites A and B?

A. Well beyond, or east of B you begin to get to the shallow area of Peekskill Bay.

Q. And that is on the east side?

A. That is right, Mr. Macbeth.

end 12

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Q So there the channel is more on the west side of the river?

A I must admit that I would have to look at the precise cross-section of the river where you are describing.

Q I hand you this map of that part of the river.

MR. TROSTEN: Where was that map taken from, Mr. Macbeth?

MR. MACBETH: May I confer?

(Pause.)

MR. TROSTEN: Is it a USGS map?

MR. MACBETH: It would seem to be in the lower-left quadrant of a map entitled "C&GS Map 282."

MR. TROSTEN: May I show the witness the original? It is difficult to read the reproductions.

MR. MACBET: I am afraid the original has markings on it, but I don't think they will interfere with the witness' perusal.

(Document handed to the witness.)

CHAIRMAN JENSCH: And the question is, where is the channel for stations A and B, is that correct?

MR. MACBETH: That is correct.

WITNESS LAWLER: Well, the channel is at stations A and B. Both appear to be in the channel. As to all of the remaining stations that are shown on figure 15 --

CHAIRMAN JENSCH: I think the question is, where is

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1 the channel reference at the site of the river, closer to
2 the west side, or --
3 WITNESS LAWLER: Not really. As I indicated before,
4 the channel, which on these Coast and Geodetic Maps, is
5 normally a white area, pretty much encompasses the whole
6 river with the one exception of Peekskill Bay.
7 But as you move down the river, the channel
8 extends for all practical purposes, across the entire river.
9 BY MR. MACBETH:
10 Q. Perhaps I am meaning something different by channel
11 than you are.
12 If you took the line of deepest water at the area
13 of station A and B, what side of the river would that be on?
14 A. (Dr. Lawler) The deepest water in the area of A
15 and B, is on the west side of the river.
16 That is really hard to say, too. There are a few
17 soundings here. There is an 84-foot sounding in what appears
18 to be reasonably close to the general vicinity of A, and there
19 is a 74-foot sounding not too far from the vicinity of B. It
20 is really hard to say, Mr. Macbeth.
21 You know this business of the river channel in
22 here, as I have indicated really extends from -- I won't say
23 from shore to shore, because obviously there is some shallow
24 area, but it certainly is not anything close to the situation
25 at Haverstraw Bay, where you have substantial shallow water

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areas. But in the section from -- well, all the way up from Peekskill Bay -- I mean, from Newburgh Bay down to Haver-Straw Bay that channel is effectively most of the river.

Q And in the area between stations A and B, and F and G, is that a straight stretch of the river or are there curves in the river geometry there?

A. There are curves.

Q. Will you describe those curves?

MR. TROSTEN: Describe them in what sense?

BY MR. MACBETH:

Q. Well, is it an S-bend starting at A?

Well, perhaps it would be simpler to say those curves are indicated on figure 15 in your testimony of October 30, which precedes page 50, isn't that correct?

A. (Dr. Lawler) That is correct, Mr. Macbeth.

Q. Now, taking into account that there are these curves in the river, and there are some changes of river geometry from that A-B transect and F-G transect, you have considerable confidence that water on the west side in the A-B area would be on the west side of C-D area, and water on the west side in F-G area would want to move northward upstream with the tide and would be on the west side of the C-D area, is that correct?

A. I think that is generally correct, Mr. Macbeth.

Q. Now, I think that Dr. Lauer said yesterday that the

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tows were taken at a variety of tidal stages going against the tide. Sometimes at ebb.

Is that correct?

A. (Dr. Lauer) Yes.

Q. And we can treat the stations, for practical purposes, as having samples over which the tidal stages have been averaged, is that correct?

A. The array of data which would go into calculation of the seasonal mean, would represent samples that were taken on virtually all phases of the tidal cycle. I think that is what you asked.

Q. Yes.

So, for practical purposes, we can take the data as being tidal averaged?

A. As an approximate evaluation, I think so.

Q. In that situation, Dr. Lawler, wouldn't it be more accurate to consider only stations C and D, or perhaps stations C, D, and E in calculating the "f_1" factor?

A. (Dr. Lawler) No, I don't think it would, Mr. Macbeth, if for no other reason than for the fact that this use of the "f" factor is, of course, from the model. And if you recall the model, or the plant operates on a segment of the river that covers this entire area.

Q. Well I am not sure I follow that.

I thought that the point of the "f_1" factor was to

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1 narrow us down below the segment to the part of the segment
2 that more accurately reflected the water that passed through
3 the plant.
4 Is that not so?
5 A. Yes. That is true.
6 But the fact still remains that the model is what
7 is known as a segmented model, and by and large the impact
8 that the plant has on the river, as seen in the model, is
9 first seen in that segment known as the Peekskill segment.
10 Q. I must be missing something here.
11 I seem to understand you to say that we have a
12 segmented model. Indian Point is in the Peekskill segment.
13 You then introduce the "f_1" factor to refine the analysis
14 within the Peekskill segment, so that we more accurately
15 focus on the water withdrawn from the river by the plant.
16 And then you say in measuring that water we should look at all
17 the sampling stations in the Peekskill segment.
18 Is that what you said, or where did I go off the
19 track?
20 A. I will do my best to clarify this point.
21 The fact that we introduce an "f_1" factor or any
22 "f" factor into the model does not say that the model is going
23 to function any differently in its basic operation.
24 Basically, it is drawing water from what I have
25 designated as segment 7, or the Peekskill segment. So what I

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1 am simply saying here is that it seems to me that it is
2 bringing some kind of data to bear on what the plant is likely
3 to see, and it seems to me that I ought to be using, or at
4 least looking at as much of the data on the distribution of
5 the organisms in question, and that exists in this segment,
6 and this is why I hve used the upstream data as well as the
7 downstream data.
8 Q. Well let me try it again.
9 I thought the point of the "f_1" factor was to
10 give us a refinement of analysis, taking into account the
11 peculiar conditions around Indian Point, rather than the
12 general conditions in the Peekskill segment, is that correct?
13 A. In the sense that we are concerned with whether
14 or not -- the model basically predicts what I call an area
15 average concentration, and the area average concentration is
16 the concentration across the entire cross section.
17 Okay?
18 And rather than use that, I have indicated that I
19 don't feel that this is what the plant sees. So since we have
20 indicated that, we have set about trying to distinguish between
21 what the plant probably sees and what the model, in its basic
22 operation, as a mathematical tool, predicts.
23 And it is there -- that is where I am using the
24 "f_1" factor, simply saying, look, I don't think the plant
25 should be -- I will use the word operating, on the overall

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average concentration that the model is predicting in that area. But rather, I think it should be operating on what it probably sees in terms of the apparent distribution of the organisms from top to bottom.

Q. And from side to side?

A. And from side to side.

So this is the purpose of the "f_1" factor.

Now what I am saying is, knowing how the model operates, there are slight differences in the concentration in each segment as you move from one end of the segment to the other. But by and large, the impact of the plant, as far as the model is concerned, is first on this segment 7, and then is felt on other segments as they feed into whatever losses are taking place in segment 7.

I am simply saying that I believe the best way of approaching the "f" factor is this distributional analysis, is to take the complete set of data and go through the computational procedure that I used through established "f_1."

I mean it is possible, of course, to take -- to go back to all of Dr. Lauer's data and find out all of the phases of the tide on which these things were taken, and then to somehow or other factor that into the computational procedure.

I really don't think it would yield any better estimate of the number that I am trying to focus on, than the estimate I have obtained using the procedure that I have employed.

Q You said that what you were trying to do was to correct the results the model produces for the segment to indicate what it is that the plant actually sees in terms of distribution east to west and top to bottom.

Now, isn't what the plant actually sees in those distributions the differences between stations C and D as far as east-west distinction goes, and then some distinctions between the bottom, mid-depth and surface?

A I think that you are putting too much of a local -- if I may use that term -- focus on the way in which the model operates.

I think to start to distinguish between a section immediately outside Indian Point and one at some point within a tidal excursion above or below the plant is -- I just don't think it's a good idea in the context of the way this model operates. I think it is a refinement that is really not justified.

Q But it is justified to include the tow results of Tow B, 6000 feet -- or whatever it was -- north of Indian Point, and those at G, 6 or 8 thousand feet south of Indian Point, to weight the averages on what the plant would see at Indian Point, but not include the tow at C, the west, which is in fact much closer to the plant. Is that correct?

MR. TROSTEN: Dr. Lawler, do you accept the premise of the question?

1 Would you read the question back, please?

2 (Whereupon, the Reporter read from the record, as

3 requested.)

4 WITNESS LAWLER: Well --

5 CHAIRMAN JENSCH: I wonder if you could start out

6 with a direct answer, and then you can explain it in any

7 way you desire.

8 WITNESS LAWLER: I've indicated that I don't

9 think it is, no. I suppose that what one could do is to make

10 computations based on the transect C and D. My thought here

11 is that in my judgment the best way of interpreting this

12 data for the purpose to which it has been put is to do it

13 the way in which I have done.

14 I have not done what you have suggested. If I

15 had done it I would --

16 BY MR. MACBETH:

17 Q Let me understand. I thought you had taken the

18 results of the 1971 NYU tows at at least stations B, D and G,

19 and treated them as making up the samples for the east side

20 in your tables 9, 10 and 11, and that you had taken tows

21 A, C and F and treated them as making up the data for the

22 west side in the same tables, 9, 10 and 11.

23 Is that so?

24 A (Dr. Lawler) That's correct.

25 Q So, in describing what it is at Indian Point, which

is right off tow D seas, you have included in your calculation tows B and G, but not tow C?

A That's correct, in the upper east quadrant. C is included. C appears in the west segment.

Q Yes, but C is distinguished as being in another quadrant from the quadrant from which Indian Point draws its water. C is included on the west quadrant.

A That's right. C is included in the west quadrant.

Q And B and G are included in the east quadrant?

A All I'm saying is that tides washing back and forth, and material seen at B probably is seen at D, and the material seen at G is probably also seen at D.

I don't know whether material seen at C is in fact seen at D. So what I did was to say, okay, I will use the means that were given for the top, middle and bottom of each of these stations on the east side of the river in computing the east quadrant values, both the upper and lower values, and I will use transects A, C and F on the west side.

If you are asking me do I know that water that is described by segment C will be exposed to the plant, what I'm saying to you is that in my judgment C, which also represents the tidal average behavior, will probably not contribute to the plant to the extent that stations at G and B will.

That's what I've said.

CHAIRMAN JENSCH: Do you know whether what is at

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1 B and G will be seen at the plant?

2 WITNESS LAWLER: B and G? Oh, yes, stations B and

3 G, I feel, should be seen at the plant just on the basis of

4 tidal movement.

5 BY MR. MACBETH:

6 Q And to put it another way, you feel that stations

7 B and G will be seen at D and not at C?

8 A (Dr. Lawler) Right. That's what I'm saying.

9 And of course I indicated earlier that I am not

10 trying to describe here that no particles of water from

11 station C will ever be seen in the vicinity of the plant or

12 in the plant intake, and furthermore, that all particles of

13 station B, or therefore G, will be seen at the plant.

14 I'm not suggesting that at all. In fact, what

15 I've suggested is that on this quadrant analysis it seems to

16 me that there's more water available in the quadrant than is

17 actually necessary for the plant. So the plant probably

18 won't see all of what B and G are purported to be exposed to.

19 Q And further -- and this gets back to a sort of a

20 second round of the questions -- you also feel that a more

21 accurate picture of what the plant sees is provided by

22 weighing B, D and G against A, C and F, rather than simply

23 weighing D against C?

24 A That's correct. That's exactly what I've said.

25 I feel that a more accurate picture of what the plant sees is

weighing B, D and G against A, C and F, or B -- I might point out that the plant is heavily weighted, or the east quadrant is weighted, by samples taken on the east side, because you have transect E as well, which is quite close to the plant. So there is an additional weighting there.

Q I was just going to check that. You did use E, and you used it as an east side tow?

A Absolutely.

Q Well, I think that makes the situation clearer all around. At least it does to me.

MR. MACBETH: Would this be a convenient time to break for lunch, Mr. Chairman?

CHAIRMAN JENSCH: Yes. This is a convenient time to recess. What time would be convenient to --

MR. MACBETH: Would 2:15 be appropriate?

CHAIRMAN JENSCH: At this time let us recess, to reconvene in this room at 2:15.

(Whereupon, at 12:22 p.m., the hearing was recessed, to reconvene at 2:15 p.m., this same day.)

end 15

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AFTERNOON SESSION

(2:15 p.m.)

CHAIRMAN JENSCH: Please come to order.

MR. TROSTEN: Mr. Chairman, I understand that we will probably later on in the afternoon be returning to the matter of scheduling. In that connection I would like to issue an invitation to the Board and, of course, to the other parties to visit the Indian Point site next week, or at a suitably convenient time.

I think it would be helpful, Mr. Chairman, from the standpoint of appreciation of the situation if the Board would have an opportunity to see the intake and discharge structure, the screens, the traveling screens, the screen cleaning procedures, for example. There has been a considerable amount of interest expressed in this matter; it certainly is a significant aspect in this case.

We would be very pleased if the Board and, of course, Dr. Goodyear and the other parties as well would come up to the Indian Point site and inspect the facility. We could also at the same time show you the Verplank Laboratories, the facilities that the Applicant has set up to perform the research that is going to take place.

So we most cordially invite you to come and inspect the facilities.

CHAIRMAN JENSCH: We certainly thank you for the

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1 invitation. The Board will give it consideration.

2 Perhaps the other parties would be interested in

3 knowing whether or not the Board did or not. I don't know

4 whether this Board has looked at the facility but I think

5 some members of the Board have on occasion gone over to the

6 facility.

7 MR. KARMAN: We made an official visit,

8 Mr. Chairman, the first day of the hearing.

9 CHAIRMAN JENSCH: At Indian Point Number 3, we

10 went through the meteorological phase of it very thoroughly,

11 as I recall.

12 MR. TROSTEN: The significant problem here,

13 Mr. Chairman, in this proceeding involves the intake-discharge

14 structure. It is this aspect-- I know of course that the

15 Chairman has seen the facility many times. Really, though,

16 prior to the time that the Commission's jurisdiction altered,

17 the usual inspection had to do with the nuclear portion of the

18 facility. This has to do with the intake and discharge

19 system.

20 MR. MACBETH: Mr. Chairman, could I just make a

21 comment?

22 I of course have no objection whatsoever to the

23 Board's visiting the site. I would of course request to be

24 given notice, and I would like to have an opportunity to work

25 out with the Applicant, before the site visit, what the Board

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in effect would see, and under what conditions.

Obviously, if the Board does take the opportunity to make on on-the-site inspection, I think it is important that there be some understanding in advance of what will be inspected. I only say that because I think obviously that is a form of taking evidence and it is important to our interest that there be a full inspection and a fair one. And I certainly have no objection at all to a visit to the site.

MR. TROSTEN: We would certainly be pleased-- We would be delighted to have the Hudson River Fishermen's Association and Staff Counsel. You have always had an outstanding invitation.

MR. MACBETH: And we have been to the site a number of times. I thank the Applicant for their gracious hospitality.

MR. TROSTEN: I think the Board should be free to see what ~~should be seen~~ it chooses to see.

MR. MACBETH: Mr. Trosten, I'm going to stand firm on the position that if the Board visits the site that it should be done at a time when Counsel for -- certainly for the Intervenors can be present.

MR. TROSTEN: Of course.

CHAIRMAN JENSCH: I certainly think it has been the policy of all Boards of the Atomic Energy Commission that whenever they make a site inspection or a view of the plant

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without the opportunity of all parties to be present--
In fact, I know of some occasions where Boards have refused to look at the site because some members of the intervenor groups were not able to be present. I think it is almost an assumed understanding about that.

If you have any thoughts about the time of the tidal flow or the rolling of the screens and that sort of thing, we would not want to not see those portions you think we should see.

The Board has, just for this moment, considered the invitation and the Board would like to accept it. We don't know when it can be done. It probably will be after the first of the year.

We certainly would have it understood by all parties here that we will not go until the opportunity is extended to all parties.

MR. MACBETH: Thank you, Mr. Chairman.

MR. TROSTEN: Thank you, Mr. Chairman.

One thing, I am very pleased that the Board will be able to come. If we could have an opportunity to confer with the Board about this, we would appreciate it because there may be some schedule problems with Indian Point 1 going down for regular maintenance. It will be very important, of course, that the facility be operating.

CHAIRMAN JENSCH: Very well.

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Would two days next week serve any great purpose?

MR. TROSTEN: It would. May I offer this to the Board?

I am prepared to resume and conclude cross-examination of the Regulatory Staff. I feel quite confident that I can do that in two days, Mr. Chairman.

As far as the Hudson River Fishermen's Association is concerned, I think probably we could get through Dr. ~~Ainsley~~'s testimony in two days. I expect that it would take considerably longer in order to conclude with Mr. Clark.

MR. KARMAN: Mr. Chairman, in the ordinary course of events, the Regulatory Staff would have been the last to be cross-examined. We worked out an arrangement with the Applicant and the Intervenor and the Board, of course, to allow cross-examination to commence out of turn for the Regulatory Staff while some of our Staff members were going to be in a shorter hearing. Some of them are still there.

At this particular time, however, the Regulatory Staff would request of the Board that if possible, we have the continuation or the final cross-examination of the Staff be postponed until after the Intervenor has -- after the Intervenors' witnesses have been cross-examined. We did go out of turn, and for this particular purpose.

CHAIRMAN JENSCH: I believe that's a better procedure, to have the Staff cross-examined afterwards.

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A Mile Point 40.1 should be, I would guess, just south of the ~~90~~ Stony point, which is that little bit of land that juts out from the west shore below Station 15.

I could check-- Well, 40.1 should be about three miles below Indian Point.

Q Could you check and tell us precisely where 40.1 is?

A Well, question one is your mile point reference measured from the battery?

Q Yes.

A Figure 1 shows Mile Point 40--

Q -- just north of the Lovett plant, doesn't it?

A Well, Mile Point 40 is not north of the Lovett plant because the Lovett plant is less than three miles below Indian Point. Indian Point is within plus or minus a half a mile of Mile Point 43.

You know the scale on this map is not clearly perfect.

Q Well, let's go back to --

A You had a big map before. You had a U. S. Coast and Geodetic Survey.

Q Yes.

(Document handed to the witness.)

A Well, if I take Indian Point as Mile Point 43, then Mile Point 40 is, as I indicated, just south of Stony

and then with the Staff, and then rebuttal. Let's think about that overnight.

Are you ready to proceed with Dr. ~~Lawlor~~ Lawler?

MR. MACBETH: Will you proceed, please?

Whereupon,

GERALD J. LAUER

and

JOHN P. LAWLER

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

CROSS-EXAMINATION (Continued)

BY MR. MACBETH:

Q Dr. Lawler, would you turn to Figure 15 following page 49, the figure we were discussing earlier?

Could you indicate on that map where the Lovett plant is?

A (Dr. Lawler) Can you give me a clue as to where Figure 15 is?

Q Yes, following page 49.

A Where the Lovett plant is?

Q Yes.

A The Lovett plant is just north of Station triangle 15, located on Figure 15.

Q And where would Mile Point 40.1 be?

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MR. MACBETH: I cannot say at this time, simply because I have not been able to contact Dr. Ainsley in the course of the last 15 or 18 hours, most of which I have spent in this room, whether or not he can be available easily for -- I assume now we're discussing Monday and Tuesday. I would like to be able to contact him this evening and see whether he can be available Monday and Tuesday, and report on that to the Board tomorrow if the Board feels that would be advantageous in moving the proceeding along.

CHAIRMAN JENSCH: Yes, we would.

MR. TROSTEN: I might add, Mr. Chairman, in regard to what Mr. Karman has said, I don't have any objection in principle to cross-examining the Staff at the end. I think the Chairman's point is well taken, but the only problem is we seem to be running into just a little schedule difficulty here. Mr. Macbeth does not desire to have his witnesses broken up, which I can understand, and I don't think we could conclude with all of the cross-examination of the Hudson River Fishermen's Association in two or three days next week.

So that sort of leaves a ready opportunity to conclude the cross-examination of the Staff, which is the reason why I made my suggestion.

CHAIRMAN JENSCH: Well, it might be better to hold the whole thing over and have one continuous session starting some time in January, starting with the Fishermen's witnesses,

MR. MACBETH: Of course the Applicant cannot always control when the plant operates.

MR. BRIGGS: Can you tell me when the pumps were tested last year, Mr. Trosten?

MR. TROSTEN: The Indian Point 2 pumps?

MR. BRIGGS: Yes, when they had to be shut off.

MR. TROSTEN: They were tested in February, I believe.

MR. BRIGGS: So February is a very good month to visit the plant.

(Laughter.)

MR. MACBETH: It depends on whether it's before or after they're shut off.

MR. TROSTEN: I think from the standpoint of your question, Mr. Briggs, during the cold weather, from the standpoint of the impingement problem, I would say it would be a good time for the Board to visit the site during the cold winter months, December, January, or February.

CHAIRMAN JENSCH: It may well be that it will have to be after the conclusion of all the evidence, although I think it would be advisable to have some sort of a session after, in case anybody wanted to make any comment about what was observed.

Thank you. We'll give it consideration. We are still considering what can be done for a couple of days.

eb10

1 Point which, on Figure 15, is the piece of land on the west
2 side that juts out into the river below the station marked
3 Station 15.
4 Q You said earlier that Mile Point 43 was assigned
5 to Indian Point. Did that indicate some question in your
6 mind as to whether in fact it was Mile Point 43?
7 A Oh, no. I just don't recall whether it is 42.8
8 or 43.2. You know, it's that close.
9 Q Do you know of any maps that accurately represent
10 the mile points used by Carlson and McCann in their study?
11 A Well, to the best of my recollection,-- Are you
12 asking me whether I know the datum Carlson and McCann used,
13 or the precise station that Carlson and McCann used, the
14 location of the precise station, or the precise location of
15 the station? Let me put it that way.
16 Q The precise location of a station that is deter-
17 mined as being at Mile Point X?
18 MR. TROSTEN: May I ask for clarification of the
19 question?
20 Are you asking Dr. Lawler if he knows that the
21 precise location of the station was that was used by Carlson
22 and McCann? Is that the question?
23 MR. MACBETH: Yes.
24 WITNESS LAWLER: To the best of my knowledge or
25 recollection, the stations and mile points used by Carlson

bll

1 and McCann are given in a map in their report entitled
2 "Hudson River Fisheries Investigation," 1965 through 1968.
3 MR. TROSTEN: May I interject, Mr. Macbeth?
4 MR. MACBETH: Yes.
5 MR. TROSTEN: If you refer to Figure 1 in the
6 Carlson-McCann study, it does give mile point locations. I
7 do not know whether these are the precise locations.
8 MR. MACBETH: Well, that's the problem. They
9 produce something, for instance, marked "Peekskill 45.5,"
10 but there is no real indication, within a few miles, of
11 where they thought 45.5 fell in the river.
12 Would you not agree that that's the map of the
13 very roughest scale?
14 WITNESS LAWLER: My interpretation of the Carlson-
15 McCann mile points has always been that they have been
16 referenced to The Battery, and it was my judgment that the
17 stations that they took existed in essentially the area where
18 the mile point designation was made.
19 BY MR. MACBETH:
20 Q So when you determined the position of Mile Point
21 40.1 in developing a chart such as Table 8 in your testimony,
22 you would have drawn Mile Point 40.1 where you showed it to
23 me on the large map, as slightly south of Stony Point?
24 A (Dr. Lawler) That's right, yes.
25 Q And that transect of the river would fall-- how

b12

would it fall in relation to Stations F and G of the 1971 NYU data?

A That would be, as I recall, right in that general vicinity. The point where I pointed on Mile Point 40 on the Coast and Geodetic Survey map, Stations F and G would be just-- Well, roughly, the southern end of Stations F and G is approximately where I drew Mile Point 40 on the Coast and Geodetic Survey.

Q All right.

Let me move on to topic "f_2."

Do you know whether there was a difference in the velocity of the net relative to the water in the tows that QLM made on July 25th and the velocity of the water through the net in the intake where NYU was sampling fish on July 25th, 1972?

A Do I know whether there was a difference?

Q Yes.

A There was an attempt to keep those velocities approximately the same. However, that is extremely difficult to do, so that at any particular phase of the tide the velocity of the net relative to the water would vary by comparison to another phase of the tide unless you were to change the boat speed to correct for that whereas, on the other hand--

Well, there is even an observed variation in the

b13

velocities in the intake structure with the tide that was considered. How well onewould actually be able to hold that is subject to some question.

Q Well, let me question what kind of range of velocities do you think the tows of the boat ranged over?

A I don't know. I could possibly compute it and give you an estimate, but I don't recall at this point.

Q I'd appreciate it if you will.

A I will try. I can't guarantee that we will be successful.

Q Do you know what the range of velocities through the net were?

A We know several things. We know the approximate boat-- Well, we know the boat rpm which is not really the boat speed, but we know the different distances we traveled, we know the phase of the tide, we know the time in which we traveled, and from that we should be able to get some estimate of the relative velocity of the net to the water.

Q How about the net to the water in the intake? Perhaps I would have to ask Dr. Lauer that.

A You would have to ask Dr. Lauer that.

Q Could you tell me the relative velocity of the water to the net in the intake at Indian Point on July 25th when the sampling tabulated in Table 19 was made?

MR. TROSTEN: Relative to what, Mr. Macbeth?

ebl4

MR. MACBETH: Water relative to net. I mean, you know, a mesh net, not a net of some 28 different --

WITNESS LAUER: I really don't know for sure what that was. We made some calculations by back-calculating, which would indicate that their velocities were probably on the order of one foot per second.

BY MR. MACBETH:

Q Is it true that different velocities of nets relative to water produce different efficiencies of gear use?

A (Dr. Lawler) Which of us are you asking?

Q Either one.

A (Dr. Lauer) It is true in a general sense the efficiency of gear relative to velocity is-- Well, let me back up.

I'm thinking in terms of the manner in which we would be able to calculate volumes of water going through a net. We do this based upon the calibration curve of meters and the efficiency of that meter as it changes relative to velocity. And each meter has its own calibration curve. However, they generate all, with some exceptions, reasonably close together.

Those curves indicate that at velocities lower than a foot per second, the rate of change of efficiency of the meter at least changes much more rapidly with a decrease in velocity than it does above a foot per second.

eb15

Above a foot per second, the ratio of water going through the meter per revolution of the meter levels off to a quite flat curve, so that at velocities of a foot per second and above, the meter is operating essentially reasonably near the same efficiency.

That is something we have to deal with in trying to calculate how much water goes through the net relative to a given number of revolutions.

I have not directly answered your question but I cannot answer it in quantitative terms other than relating it back to how the meter reacts to velocity. It is a general premise, I think, that the efficiency of filtration through the net would react in somewhat a similar way, but not necessarily the same way because you have different frictional considerations involved with the meter having mechanisms, the wheels turning and this and that.

But there is a general relationship of change in efficiencies with velocity, but it would not continue indefinitely on a straight line as it would tend to do with a meter. The meter is overcoming frictional resistance. When it has done that, then increased velocity tends to turn the wheel without changing the relationship of revolutions to velocity.

With a net, you would expect the efficiency to go up somewhat as velocity increases, up to a point and then it

b16

would probably go back down again, because you're trying to jam more and more water through the same sized mesh hole and you get to the point where you are losing efficiency again.

Q When you say the efficiency would increase up to a point, what would that point be?

A Well, I'm not sure what it would be. I'd have to look back into the literature to see if anything exists on that relative to the specific kind of gear we have. That relationship also varies with the specific design of the gear involved in terms of the geometric design of its opening relative to the remainder of the net behind it.

It's a very complicated thing and I don't know at this point in fact whether any literature does exist that specifically spells out that relationship.

End 22

Q Dr. Lawler, we have here on Table 19 the intake concentration, the total number of serranids per 1000 cubic feet.

Now, unfortunately this has white perch as well as striped bass, but isn't this really the number we want? I mean, couldn't we get rid of all the "f_1", "f_2", "f_3" if we really had this number? Because then we would know what was going through the plant.

A (Dr. Lawler) I don't think it is that simple, Mr. MacBeth, because in addition to knowing what's going through the plant, I think we need to know what is out of the river, and what's out of the river as a whole.

That's what this model is designed to do. It's designed to compare what is being taken by the plant, and in fact, damaged or killed by the plant, and comparing that to what in fact is the population in the river.

So I don't think it is simply a matter of just wanting this one number.

Q Well, I was over-simplifying it. I was thinking of it in terms of the factors "f_1", "f_2," "f_3". Obviously, one would still have to have the total population of the river and be able to make some comparison between what goes through the plant and perhaps more importantly, what comes out of the plant, and what happens in the transport through the plant and the total population of the river.

But as far as these "f" factors go, isn't it really that intake concentration we care about?

A I think it's the discharge concentration that you are really ultimately interested in, because not only are you interested in what the intake sees, but you're interested in what the discharge sees by comparison to the intake.

Q Yes. But I was restricting myself to "f_1", "f_2" and "f_3." I agree you need "f_c" because you have to figure out what happens on cross condenser tubes.

But as far as the "f_1", "f_2", "f_3" goes, isn't this it, right here? Isn't that the heart of the whole thing?

A This number that is reported here? I don't think it's that simple.

As I indicated in the discussion, for instance, the notion of "f_3" I think is very important to this whole thing, because we and others who have modeled this problem to date, or this question to date, have all presumed that once the plant begins to act on the concentration of organisms out in front of the plant, that there will be a continual replenishment of those organisms in front of the plant for the plant to continue to act on.

Well, we don't know that that's going to be the case at all, and in fact, these distributions that you see of fish are just totally different than distribution -- any

1 distributions of things like salt, dissolved oxygen, and what
2 have you.
3 But yet the modeling work that has been done to
4 date, both in this testimony -- with the exception of the
5 introduction of the "f_3" factor -- as well as the other
6 modeling efforts that have been made, presume that what is
7 in front of the plant at this time will continue to be in
8 front of the plant, available for the plant, to impinge --
9 I don't want to use that word -- to act on. And we don't
10 know that, particularly for the distributions of the fish.
11 The stuff that Dr. Lauer described yesterday, the
12 sampling, where you have any number of samples with zero fish
13 in it, and then you get a sample with a lot of fish in it,
14 that's very characteristic of these fishes.
15 So to suggest, for example, that the "f_3" number
16 is unnecessary -- I mean I don't have any way of evaluating
17 at this point in time. Perhaps when we get a better feel for
18 the way in which these organisms are distributed-- I mean, now,
19 from a statistical sense it is not normal to describe the
20 fish's behavior at any given point over a time period. --maybe
21 that will give us some clues as to what we can expect the
22 plant to be acting on, as time goes forward and the plant
23 flow has been moving for a continuing period of time.
24 Q But doesn't "f_3" simply look at the intake concen-
25 tration over a period of time? Perhaps I have used a little

too much shorthand, saying intake concentration. It's true you want intake concentration over the period of vulnerability, but with that qualification of my previous statement, isn't that really what we are after? Intake concentration over a period of vulnerability?

A I agree that that is what we are after, is the intake concentration over the period of vulnerability. I'm simply saying what I have tried to do here is distinguish the factors that are probably making up that concentration by comparison to the factor that the model -- by comparison of the concentration that the model predicts will be in the general vicinity of the plant.

I'm saying, from what I can see now I can think of three distinct things:

One, the quadrant kind of a story, the "f_1" factor that I described this morning, the distribution effect.

Then, the "f_2" factor. I have used the words "intake avoidance." That may not be the best description, but I'm simply saying there may still be a difference between the concentration that the intake actually sees and the concentration in that entire east quadrant, upper east quadrant.

And then, finally, I say that once the plant begins to operate what had been seen previously in that area may no longer be seen. It may not be correct to simply

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(Pause.)

MR. BRIGGS: Could you indicate again where east and east channels are relative to stations B and C?

WITNESS LAWLER: Yes. I indicated that I would give that information.

The east sampling station was, as I indicated yesterday, approximately 100 feet off the Indian Point plant, and the east channel was approximately 300 feet off the Indian Point plant.

I might add, Mr. Briggs, in response to your question yesterday as to what the 299 meant, I don't know the confidence intervals on those numbers yet, but that data that I just provided is the data from which we would compute those.

BY MR. MACBETH:

Q At the point where Mr. Trosten asked for a moment you were working your way across the chart, explaining it.

Was there anything more you wanted to say? Because I might ask one or two questions if you have finished.

A (Dr. Lawler) Well, in the chart are given the various raw data, including the number of fish collected in each run, and also the final calculation of concentration of fish, and that concentration appears in both the units of organisms per thousand cubic meters and the selection per thousand cubic feet.

1 I should also indicate that those are all white
2 perch. We did not find any striped bass in the vicinity of
3 Indian Point during that entire run.
4 So, therefore, the data in Table 19 first of all --
5 at least the river data -- must be considered to be white
6 perch data, rather than striped bass.
7 Now, the data in Table 19, which I will subsequent-
8 ly correct, the river data -- that is the data headed by
9 the expression "day sampling and night sampling" -- is
10 obtained directly from those sheets, simply by averaging
11 for any given depth for the period 6:00 a.m. to 9:00 p.m.
12 for the daylight hours, and for 9:00 p.m., to 6:00 a.m. for
13 the evening hours. And it will be seen that there were
14 seven of the twelve periods that were daylight samples, and
15 five of the twelve periods were nighttime samples. There
16 was a sample taken immediately after 9:00 p.m. which was
17 classified a nighttime sample.
18 Normally there are -- I'm going to change every
19 number on the tables indicated "day sampling and night
20 sampling." Normally we would expect some change just simply
21 based on the laboratory process that we go through in getting
22 this information.
23 The first step is to separate the larvae, and
24 when this is done an attempt is made to separate the white
25 perch and striped bass from the other groups. Then these are

1 MR. TROSTEN: May we confer for a moment, Mr.
2 Chairman?
3 (Pause.)
4 MR. TROSTEN: I want to observe that this is our
5 only copy of that computer run. You are welcome to use it
6 and peruse it now. I'm sure we could make a copy of it.
7 MR. MACBETH: Yes, all right. Fine. In fact,
8 just taking a quick look at it, with my limited technical
9 abilities, I think it would probably make a good deal more
10 sense to get a xerox and give me a little time to see if I
11 can make enough sense out of it.
12 But perhaps we could proceed and just change the
13 numbers on Table 19 so that when I come back to talk about it
14 at a later date we are talking about the right table.
15 WITNESS LAWLER: First of all, I should describe
16 what I have given you.
17 I have given the data taken on the 24-hour, July
18 25 sampling run that I described yesterday for the transects
19 at the east and east channel, which are given in here.
20 You will see that there is a set of 12 samples,
21 the top, middle and bottom in most cases, for each of the
22 12 runs.
23 The 12 runs are the 12 two-hour intervals.
24 MR. TROSTEN: May we have another moment, Mr.
25 Chairman?

end 23

1 presume that once certain organisms are taken out there is an
2 infinite supply of these which will constantly refill the
3 area. I just don't think that's a good assumption.
4 Q I certainly would want to qualify, or make clear,
5 that when I say intake concentration obviously it has to
6 include concentration over a period of time, not just on the
7 night of July 25 or any other particular night, in the course
8 of the summer.
9 I think I asked you yesterday to provide me the
10 data on which the tabulations in Figure 19 were made, and
11 I just want to make sure that I have made that request of
12 you, and I will repeat it now if I stated it yesterday. I'm
13 stating it for the first time if I did not ask it yesterday.
14 But I do want to see the data on which the tabulations on
15 Table 19 --
16 A I'm prepared to give you that data right now.
17 Q I'm afraid I probably won't be able to cross-examine
18 on it. It will take me a little time to look at it.
19 A And at the same time I'm prepared to introduce some
20 changes in the numbers based on this data that I think should
21 be done.
22 Q In other words, I take it that you want to change
23 the figures regardless of whether I asked you to change them?
24 A Correct. If you had never brought that up.
25 Q Perhaps I could turn it over to your counsel.

gone through a second time, and you always find mis-classifications on the first pass, because the first pass is not meant to be a final run.

There are, however, more significant changes than I would have expected just based on that reason, and I think perhaps that some of these values possibly were interchanged, not in the typing because these numbers that appear here in the typed text are the numbers that I did use in making the computations.

So let me correct these numbers.

I will start on the column that is headed "day sampling, east," and mention the present number first and then the correct number.

The 2.26 value becomes 1.24.

The 3.76 value becomes 1.97.

The 2.96 value becomes 5.88.

And I should interject here that no attempt is made at rounding until the final calculation is made. These were simply obtained from the fish caught, divided by the volume strain, and two decimal places does not mean a lot, but I do the rounding at the end.

The average value in that column, instead of being 2.99 should be 3.03.

Going on to the "day sampling, east channel," the surface value of 10.94 is 2.57. The 10-foot value of ~~1.14~~ 4.14 is

2.36.

The 20-foot value of 7.95 is 9.54.

And the average value, rather than being 7.68, is 4.82.

Going on to the night sampling, the east data, instead of being 1.34 is 2.56.

The 5.27 becomes 7.59.

4.03 becomes 5.82.

And the average, rather than being 3.55, becomes 5.32.

Finally, in the east channel, the first value of 3.01 becomes 4.60.

The second value of 8.17 becomes 8.71.

The third value of 9.93 becomes 7.99.

The average, instead of being 7.04 is 7.10.

Now, the quadrant averages under the day sampling, instead of being 5.33 is 3.93.

And under the night sampling, instead of being 5.35 is 6.21.

Now, there are also some corrections in the intake concentration, and again, these corrections reflect additional information that appears in the Hudson River Fishermen's Exhibit 2. That was the 11-sheet document Dr. ~~Lyle~~ Hauer gave you. More data appeared in there than I had available to me at the time I made these calculations, and the intake concentration

based on that data is, for the day sampling, 1.65 instead of 1.41, and, I might add, represented 14 fish and substantially more volume strained than did the earlier measurement.

In the night sampling my original data showed 2 fish, rather than the 1 that was mentioned yesterday. I must say that the 1 fish was 1 fish caught in 6 samples, and these averages all reflect the zero catches as well as the catches of real fish, because that is a real measurement.

However, rather than using the 1 fish, I used the 2, and left the intake concentration as 2.30 under the night sampling.

If I were to be consistent with the procedures I have used throughout in using precisely the numbers reported, that concentration would have been half the 2.30, or 1.15.

In calculating the "f_2" factors, these also changed.

The east shore value, instead of being unweighted, instead of being .74 is .46.

The east quadrant value, instead of being .48 is .40.

The day/night weighting for the east shore, instead of being .67 is .48.

And the day/night weighting for the east quadrant, instead of being .42 is .40.

And, again, those "f_2" values are calculated using

the somewhat high intake concentration values in the night sampling for the intake, in which I have assumed for the six samples that were run during those evening hours, in the intake that 2 fish were caught rather than 1.

Those are all the corrections.

end 24

#2 [illegible]ml BB

Q. Obviously the chart is a little different than what I started out with, so I would like to delay questioning until I get my bearings.

A. I certainly understand. I must apologize. As I indicated, I would have expected some change because of the normal procedure, and the changes in the information from the NYU group were really not that great and they just simply reflect what has been presented to you.

But I was rather surprised to see -- to have to make so many changes. You know, in more than simply the first and second decimal point.

CHAIRMAN JENSCH: I wonder if another sheet could be drawn up and formally incorporating all the changes, and may be filed with the reporter, and such insertion can be made for the benefit of people who have received them as an insert.

MR. TROSTEN: Yes, sir, we will.

BY MR. MACBETH:

Q. As a general question, Dr. Lawler, are there any other figures in the charts or testimony of October 30, that should be changed?

A. (Dr. Lawler) None that I know of Mr. Macbeth. I went through all the "f_1" factors briefly and they all looked to be pretty much what they should be. There are not any others that I know of at this moment.

This would have been the one way you could have

mm2

expected changes, because of the fact it was being used almost as quickly as it was being generated.

Q. Let me move on to ~~"c."~~ "f_c"

Now yesterday, we went over the basis of "f_c" and the number of days in which the plant was working at 15 degrees delta T across the condenser tubes, which was one, and the number of samples that were collected at times when there was no increase of delta T across the condenser tubes. And that was a very large proportion of the total samples collected.

I don't want to take the time to fish out the exact number.

I assume that you have had a chance to review that data in the Hudson River Fisherman's Exhibit 2. Did that lead you to make any change in your opinion that 54 percent survived. And the appropriate cropping factor is 0.46.

A. The cropping factor of .46 was rounded to a value of .5 which I used as a current maximum value based on the information available at this time.

And I also used an apparent minimum value of .1, again based on the information available at this time.

I would not have any reason at this time to change that range.

Q. Those cropping factors are set out, I believe, on page 63 in a chart.

A. That is correct.

mm3

Q. Now, Dr. Lauer, is my recollection correct that yesterday you told us that you counted only eggs and ~~yolks~~ yolk sac larvae in larvae and not juveniles in your study?

A. (Dr. Lauer) That is correct. We never did see any juveniles, not my definition of juvenile. I don't know what you really mean by the term juveniles, but in relative size of fish --

Q. I think we ought to get that elucidated, because it struck me as odd in that situation that Dr. Lauer was assigning cropping factors to juveniles.

But perhaps we can start by your telling me what you meant by -- well, let's take them a stage at a time. Yolk sac larvae.

A. The yolk sac larvae are larvae that have yolk sacs by definition.

Q. And what is the approximate period during which an individual striped bass would be in the yolk sac larvae stage?

A. That depends upon the temperature at which they occur. It was a bit less than 10 days in the hatchery experiments. Because of the differences in temperature that we were talking about yesterday, I would not try to relate those directly to the Hudson. I think the estimates of the Hudson, as I recall, from Cornwall's study and Dr. Lawler tells me he used a week to ten days -- ten days to two weeks?

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mm4

I think it is currently longer for the first yolk sac larvae produced in the river than it is the last yolk sac larvae produced in the river, because they are being produced at different temperatures. But I don't really think there is a magic number. There might be a mean number or something.

Q. I realize that. I am just trying to get a fix on what these terms mean in the testimony.

I take it the implication of what you just said is that, as the temperature rises, the period that the organisms in the yolk sac larvae state shortens?

A. That would tend to be the case.

Q. Now, could you describe the length of time that an organism would be in what you have described as the larvae stage, and what its characteristics in that stage are?

MR. TROSTEN: Would you define what you mean by larvae?

MR. MACBETH: I would like to have Dr. Lauer define what he meant by larvae, because I am trying to unravel his testimony, because I don't know what he meant by larvae. That is one of the problems here.

MR. TROSTEN: Are you distinguishing -- in other words, you are saying larval -- post yolk sac larval?

MR. MACBETH: No, I said larvae, and I meant larvae. If Dr. Lauer feels that larvae is too broad a term and has to be broken down, that is fine with me. But let's

mm5

see where we get on that word.

WITNESS LAUER: I think there is a bit of difference probably between what we have categorized as larvae coming through the plant as compared to what various individuals have used for the modeling efforts.

What I mean when I say that we have not seen any juveniles coming through the plant is that we rarely, if ever, see any larvae much over one-half to three-quarters of an inch. That is about the upper limit, three-quarters of an inch, that we have collected coming through the power plant.

That is also about the upper limit of the size of fish that are collected in the nets out in the field, and we have categorized those as larvae up to that point.

And thereby, by our definition with reference to juveniles, we would be referring to fish that have one more characteristic, a striped bass shape and configuration where you can recognize them as striped bass without putting them under a microscope. They are obviously striped bass.

I think that is a different definition than has been used in the model.

I think Dr. Lawler could define what he has defined this size fish as being in the model.

Q. Yes, I will dothat in a minute. Just let me make sure I have got this correct.

You said a half to three-quarters of an inch?

mm6

A. That is correct.

Most we have seen have been under one-half inch in length coming into the intake that we have seen in the intake or discharge samples. A few have been between one-half inch and three-quarters of an inch. This is also true of what we have seen in the river net samples. Most have been under one-half inch. There are some that are caught that are up to as much as three-quarters of an inch long.

There appears to be quite good agreement between what we see in the field samples, and what we have seen in the intake and discharge canal samples relative to the length of the larvae that we get.

Q. Could you tell me roughly, how old strip bass half an inch to three-quarters of an inch long would be?

A. We went through that somewhat yesterday. Based upon -- I would only base this on looking at the time lapse between when we see the peak abundances of eggs in the river and when we see the peak abundances of the larvae in our samples, and that is approximately two months -- I am sorry, approximately a month. The peaks are approximately a month apart.

The time period from the beginning of the egg-laying season and the end of when we see larvae is about two months.

The time interval between the peak abundances of

mm7 1 eggs to the peak abundances of the larvae that we have seen
2 is approximately one month.
3 We tend to see the peak abundance of eggs in the
4 samples of the last week of May. It may vary from the third
5 week of May to the fourth week of May, but it is right in that
6 time period and we see the peak abundances of the larvae in
7 our net samples, in the last week of June or thereabouts, so
8 it is approximately a month.
9 Q. Now you said that the samples that you collect at
10 the plant and those that you collect in the river show pretty
11 good agreement on sizes.
12 Are you using the same kind of nets in the river
13 and in the plant?
14 A. We are.
15 Q. Do you account for the fact that you don't see any
16 large organisms by the fact that they simply are not being
17 caught by the nets?
18 A. This is one possibility that they are not coming
19 through, or we are not catching them in the nets.
20 Q. Do you think it is probable that you simply are not
21 catching them in the nets?
22 A. I think that is a possibility.
23 If that is the case, though, that means that they
24 are in good enough shape to avoid the nets. And in that case,
25 it would look pretty good for them.

mm8

If they were being stunned or damaged, they presumably would not have the capability of avoiding the nets and we ought to be picking them up in the discharge canal in some numbers. Even though we don't see them in the intake, where presumably they have experienced passage through the plant, they still would be able to avoid the net.

So there are those two possibilities. Either they are not coming through, or they are coming through without their condition being affected such that they can still avoid the nets in the discharge canal.

That seems to be the two possibilities that exist.

Q. All right.

Now perhaps we can turn to Dr. Lawler, and if you could just refresh my memory on where you put the dividing line between larvae and juveniles, to juvenile-one stage, maybe we can make some of these figures match up.

A. (Dr. Lawler) We have used an egg stage of a day and a half or two days, rounded; a larval stage of 28 days; and then a so-called J-1 stage of 30 days.

Now what that does after you take the length of the larvae at the end of the 28-day period, you have an organism that is approximately a half an inch long. And then if you take the length of the organism at the end of 60 days, which is the two-day egg stage, and the 28-day larva stage, and the 30-day J-1 stage, which is eight and a half weeks later, you

mm9

have an organism that from the various evidence that is around, is on the order of an inch and a half.

Now what I am simply saying -- and I have used the expression later larvae-early juveniles, to describe this J-1 stage.

Dr. Lauer has indicated that he feels that the maximum that he sees is on the order of up to a half an inch to three-quarters of an inch, so on that basis, I presume that some of what I have arbitrarily classified as J-1, would be organisms that someone else might call larvae or later larvae.

So, in this stage from day 30 of life to day 60 of life, you would be seeing some of the organisms that Dr. Lauer has seen.

Q. Yes.

I just wanted to get these terms clear, because I have a feeling that the words are being used differently by different witnesses, and it is important to get it straight.

Now, you say that at the end of the eight and a half weeks, the end of the J-1 stage, the organisms would be about an inch and a half in length?

A. Yes. I think that is a reasonable estimate.

They may be even slightly larger, but I generally use an inch and a half. I think somewhere in here I estimated an inch and a half to two inches.

mm10

I think you will find this is consistent with the data that has been presented in both the Environmental Statement and also Mr. Clark's testimony.

Q. Well, looking at it, I think I found it almost consistent, but not quite, and there are a few details I would like to go over.

In your October 30 testimony at page 40, you say "that juvenile-one stage length is chosen to be that span of time when self-determination (migratory swimming ability) begins to be the representative behavior of the time in which their size will permit entrainment through the plant intake."

MR. TROSTEN: What are you reading from, Mr. Macbeth?

MR. MACBETH: Page 40 of Mr. Lawler's testimony of October 30.

BY MR. MACBETH:

Q. What size does a striped bass have to reach before its size will prevent entrainment through the plant intake screen?

A. (Dr. Lawler) Mr. Macbeth, I think there is an error here. This should say juvenile-two.

Q. Well, this explains some of the difficulty.

A. I don't know if it is defined elsewhere, but the language the model operates, and the way in which we have always used these terms -- and I am sorry for the error -- is

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that juvenile-one -- the eggs, the larvae, the so-called later larvae-early juveniles which I have designated as juvenile-one, has always been potentially subject to entrainment. That is to say, it is not caught in the screens, and it is only at the so-called juvenile-two stage -- that is why I broke it between one and two, because I said once they get to the length of an inch and a half to two inches, that is the time when we would begin to see them caught on the screens rather than passing through the plant.

MR. TROSTEN: Dr. Lawler, this notion is presented on page 14, is it not? The description of the stages and their characteristics, just so this point could be laid out.

WITNESS LAWLER: Yes, that is correct.

Page 14.

BY MR. MACBETH:

Q Let me see if I have this clear.

The juvenile-one stage ends when the fish are an inch and a half long, is that correct?

And the juvenile-two stage ends when they are no longer of a non-screenable size?

A (Dr. Lawler) No.

This cycle that I show is a picture on figure 4, which is opposite page 13.

MR. KARMAN: What correction was made on page 40, Doctor?

WITNESS LAWLER: On page 40, on the 4th paragraph which begins "Juvenile-1 stage length..." it should read, "Juvenile-2 stage length..."

Actually, I think that what has occurred here is the typist has left out a sentence which probably started, "Juvenile-1 stage length is chosen to be..." something, and then immediately below it was written, "Juvenile-2," and she may very well have skipped from 1 to 2. Because when I wrote this up I included each stage, and if you will note there is no short description or short explanatory note of what juvenile-1 is supposed to be.

BY MR. MACBETH:

Q There was until you changed it.

A (Dr. Lawler) It is clearly an error.

MR. TROSTEN: Mr. MacBeth, the description is on page 14.

MR. MACBETH: I don't want to quarrel with Dr. Lawler changing his testimony if there is an error, but the paragraph did have three sentences, one covering juvenile-1, one covering juvenile-2, and one covering juvenile-3. So at least the explanation that there's a sentence missing doesn't seem to catch all of the problems.

WITNESS LAWLER: I'm sorry. Let me explain this

whole thing. I did not read the sentence carefully.

My associate has just pointed out to me that the English here reads: "Juvenile-1 stage length is chosen to be that span of time from when self determination ~~migratories~~ migratory ~~with the ability~~ swimming ability, namely the ability to move in some fashion, begins to be representative behavior, to the time at which their size will prevent entrainment through the plant ~~screen~~ intake."

So that is the end of the juvenile-1 stage, is when they become no longer -- when they no longer are entrainable, but become subject to being screened.

MR. MACBETH: That's what I thought. Now I'm back on the track.

BY MR. MACBETH:

Q And what is that length at which young striped bass become non-screenable -- excuse me -- become screenable?

A (Dr. Lawler) We have estimated that length to be on the order of an inch and a half to two inches.

Q In your testimony of April 5 at page 36 you said, "The 2-inch length is the criterion which separates the non-screenable from screenable juveniles," giving a reference to an article by Kerr.

Now, in the testimony of October 30, on page 14, where you said the length is 1.5 to 2 inches, there is no new citation.

MR. TROSTEN: What page of the April 5 testimony,

1 Mr. MacBeth?

2 MR. MACBETH: 36.

3 MR. TROSTEN: Let me exhibit this to the witness.

4 (Document handed to the witness.)

5 CHAIRMAN JENSCH: What page are you on now?

6 MR. TROSTEN: Page 36 of the April 5 testimony.

7 MR. MACBETH: Would you like me to repeat the

8 single sentence?

9 "The 2-inch length is the criterion which

10 separates the non-screenable from the screenable

11 juveniles."

12 And then there is a paren 4 paren, and that is

13 a reference to an article by J. E. Kerr, entitled "Studies on

14 Fish Preservation of the Contra Costa Steam Plant of the

15 Pacific Gas & Electric Company." That was 1953. They seem

16 to have been worried about whether or not fish could be

17 screened at that plant at that time, but maybe no one was

18 taking it too seriously.

19 WITNESS LAWLER: Several things, I think, have

20 come into play here.

21 There seems to be -- well, first of all, it has

22 been my general impression in talking to people at the plant

23 that the time at which the young fish begin to be screened is

24 when they reach lengths of an inch and a half to two inches.

25 I think to select two inches as an absolute criterion is

1 probably not a good idea.

2 Secondly, the length -- or the age of the fish at
3 the time it reaches an inch and a half or two inches, is
4 also subject to some variation. The data that Mr. Clark
5 presents in his testimony shows the Hudson River length data
6 as proposed by Raney and as proposed by Carlson-McCann.

7 There are some differences there which would show
8 after eight weeks, if you take one curve you will get a
9 2-inch length, but if you take the other curve you will get
10 about an inch and a half.

11 Thirdly, the environmental statement uses an
12 8-week period age over which the early stages of the striped
13 bass are subject to entrainment.

14 So, taking all those things into consideration,
15 that's probably the best explanation that I can give you as
16 to why we selected a 60-day period as a period during which
17 the organisms were subject to entrainment, and also why we
18 generally used the inch and a half as the approximate length
19 of the organism at the end of that period.

20 BY MR. MACBETH:

21 Q Well, I will take up with the cross-examination
22 their material in the final statement, but let me look at
23 your other two points for a moment:

24 Is there actual data from the plant? Has a study
25 been made of the length of screenable organisms? There is no

citation here to any such study, and I would like to know whether there is such a study.

A (Dr. Lawler) I don't know of a definitive study, Mr. MacBeth. There may be one, and then again there may not.

Q Do you know of any actual collection of data?

A Well, as I said, I don't know of any written report. I've had the general impression that the size of the screenables is on the order of what I have just suggested.

The general impression I've had is that the screenables vary from roughly an inch and a half to two or three inches.

Q Well, a variation of one and a half to three inches might certainly suggest that the average length was two inches rather than one and a half to two.

MR. TROSTEN: Mr. MacBeth, perhaps you might wish to address this question to another witness. We have another witness here who could respond to a question as to the size of fish that have been impinged on the screens at Indian Point.

MR. MACBETH: Well, yes.

MR. TROSTEN: Do you so desire?

MR. MACBETH: Yes, I'd be happy.

CHAIRMAN JENSCH: Would this be a convenient place

1 to interrupt your examination?

2 Just before recessing, however, and as part of

3 our overall consideration of the time for reconvening, while

4 of course we are anxious to accommodate all projections of

5 the length of cross-examination, we must bear in mind that

6 sometimes the estimates are exceeded. We would have only

7 two days available next week, and therefore, we are suggest-

8 ing that the parties consider -- and for the Fishermen's

9 Association their availability of witnesses -- convening on

10 January 10 and going through the 19th, a week and a half.

11 If that does not do it --

12 MR. TROSTEN: By going through it, do you mean

13 completing cross-examination only? Is that what you had in

14 mind?

15 The reason why I ask you that, sir, is that I

16 really believe that it will be necessary and desirable to

17 have a period of time following completion of cross-examina-

18 tion --

19 CHAIRMAN JENSCH: We are not putting a deadline

20 on it, but we are making the time available for such use as

21 the parties think it can be efficiently utilized.

22 In that connection, however, the Board -- perhaps

23 not today, but perhaps tomorrow you can give us a short

24 statement of the condition of the plant, because we want to

25 bear in mind the condition of the plant and what the situation

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is.

MR. KARMAN: Are you anticipating meeting in the District of Columbia?

CHAIRMAN JENSCH: Oh, yes, we would. We have not heard anything from the public so far. As we indicated, we are flexible in that regard. The Applicant has filed an objection to this. We have indicated if they hear of anything from the public about meeting again we will be glad to consider it. Otherwise, we would plan to continue our sessions in Washington.

At this time let us recess, to reconvene in this room at 3:50.

end 27 (Recess.)

CHAIRMAN JENSCH: Please come to order.

Dr. Lawler has resumed the stand.

MR. TROSTEN: Yes. And at this time, Mr. Chairman, in order that Mr. MacBeth may pursue his cross-examination with regard to the size of the fish impinged on the screens, I would like to ask that Mr. Ron Alevras come forward and be sworn as a witness to respond to his questions.

We are distributing Mr. Alevras' qualifications.

Whereupon,

RONALD A. ALEVRAS

was called as a witness on behalf of the Applicant, and, having been first duly sworn, was examined and testified

as follows:

MR. TROSTEN: Mr. Alevras, I might add, Mr. Chairman, is employed by Con-Edison. He's a biologist. He has been intimately involved with the program associated with the collection and counting and sampling of fish that have been impinged on the screens, among other duties.

CHAIRMAN JENSCH: Very well.

You have distributed a copy of the statement of qualifications to all parties and seek to have it incorporated into the transcript as if read?

Is there any objection?

(No reply.)

CHAIRMAN JENSCH: Is the statement correct?

WITNESS ALEVRAS: Yes.

CHAIRMAN JENSCH: Very well. The statement of qualifications may be physically incorporated into the transcript as if read.

(The statement of professional qualifications of Ronald A. Alevras follows:)

INSERT

PROFESSIONAL QUALIFICATIONS
RONALD A. ALEVRAS
BIOLOGIST
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

My name is Ronald A. Alevras. My business address is 4 Irving Place, New York, New York 10003.

I graduated from Montclair State College in 1965 with a Bachelor of Arts degree. I majored in science for secondary school teaching with a biological specialization. From 1965 to 1967 I taught biology and earth science at Mountain Lakes High School, Mountain Lakes, New Jersey. In 1967 I enrolled in the graduate school of Oregon State University and received a Master of Science degree in Fishery Biology in 1970. While at Oregon State University I was a teaching assistant in laboratories in Fish Culture and Limnology. During the summer of 1968, I was a student technical trainee with the Oregon State Game Commission in Bend, Oregon.

Upon completion of my graduate study I was employed by Con Edison as a biologist in January 1970. My primary work with Con Edison has been concerned with the fish problem at the Indian Point intakes. I have supervised the fish collections made at Indian Point beginning in April 1970.

I am a member of the American Fisheries Society.

1 CHAIRMAN JENSCH: Do you desire to interrogate?

2 MR. TROSTEN: Mr. MacBeth, I believe, wishes to

3 interrogate.

4 MR. MACBETH: I will continue with the interroga-

5 tion.

6 BY MR. MACBETH:

7 Q I think you were in the room and heard the last

8 exchanges with Dr. Lawler. We were discussing the question

9 of what size of fish are stopped by the screens at Indian

10 Point, and I was asking whether any studies or collections

11 of data had been made to determine the size of fish stopped

12 by the screens.

13 Have such collections of data or studies been

14 made, to your knowledge?

15 A (Mr. Alevras) Yes. Sampling has been taking

16 place at the intakes of the Unit 1 plant and also Unit number

17 2 when the pumps have been in operation.

18 We have collected fishes on a daily basis at the

19 intake, and in the course of processing these samples of

20 fish we have identified the species and measured their

21 lengths, and taken measurements of their weights also.

22 Q Now, have you taken samples in the discharge

23 channel to see what size of fish go through the net --

24 through the screen -- and into the plant?

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25 A No, I have not been involved in sampling of fishes

in the discharge canal; only the sampling of fishes at the intake.

Q Do you know of anyone else beside Dr. Lauer and the people under Dr. Lauer's control who have been sampling the discharge?

A I'm aware that samples of fishes have been made in the discharge canal. The sampling in the discharge canal that I'm aware of was sampling geared to collect fishes larger than the sizes of fish you were discussing with Dr. Lauer.

Q There was sampling to get larger fish?

A The sampling that took place in the discharge canal was not to sample fish which had, or which were believed to have passed through the condensers of the plant. They were fishes that were believed to have entered the discharge canal through the discharge structure and had entered the canal from the discharge side.

Q Okay.

You don't know of any sampling looking for fish in, say the range of one inch to three inches in the discharge canal?

A I am not aware of any.

MR. MACBETH: The Applicant does not want to offer some other witness on that point?

MR. TROSTEN: No.

1 MR. MACBETH: Would the record indicate that Mr.
2 Trosten indicated a "no" answer?
3 MR. TROSTEN: I'm sorry, I must have missed the
4 question. Would you please read the question?
5 (Whereupon, the Reporter read from the record, as
6 requested.)
7 MR. MACBETH: Does the Applicant want to offer
8 a witness that would discuss any sampling of fishes of the
9 size of one inch to three inches in the discharge canal?
10 I take it from Mr. Alevras that no such sampling
11 to his knowledge has been done, and I just wanted to make
12 sure that there wasn't some other witness I should be asking
13 about that.
14 MR. TROSTEN: Do you wish to interrogate with
15 regard to the sampling of --
16 MR. MACBETH: If any of it has gone on. My
17 general impression of where we've gotten so far is that no
18 such sampling has taken place. I don't want to just go down
19 a garden path.
20 MR. TROSTEN: Would you let me confer for just a
21 moment?
22 MR. MACBETH: Certainly.
23 I can ask Mr. Alevras some questions in the
24 meantime. Oh, you want to confer with Mr. Alevras? I see.
25 MR. TROSTEN: Yes.

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(Pause)

CHAIRMAN JENSCH: While there is a conference going on, there's a matter we would like to mention to the Hudson River Fishermen's Association counsel.

Will you contact counsel for the Environmental Defense Fund and the Citizens Committee for the Protection of the Environment and determine is there any contemplation on his part to inquire re radiological and safety matters? I understood he was going to read the fuel densification report and give us some response. At some time we would like to know.

MR. MACBETH: Yes, sir.

1 MR. TROSTEN: I wanted to confer in order to
2 clarify my understanding of the facts here, and also your
3 question. And I think the record should indicate that Dr.
4 Lauer has already testified that he has not seen any fish
5 larger than three-quarters of an inch in his sampling of
6 the discharge, and hence, that sampling has gone on. In
7 other words, Dr. Lauer's work involved sampling for all types
8 of fish and he has not seen any fish larger than three-
9 quarters of an inch.
10 Does that respond to your question?
11 MR. MACBETH: When I started this exchange I
12 asked Mr. Alevras if he knew of any sampling other than
13 Dr. Lauer's. I just want to avoid having to burden the
14 record with a discussion about Dr. Lauer's point, that it
15 may be that the fish avoid the net at that size, or that the
16 net is not of a size or type to catch the fish, so as not
17 to get into a long discussion of what Dr. Lauer's testimony
18 stands for.
19 I just wanted to know whether there was any other
20 sampling, since we know certainly that Dr. Lauer has not
21 caught any fish of one inch to three inches.
22 And I take it that no other sampling beside Dr.
23 Lauer's has gone on?
24 MR. TROSTEN: No other sampling than the sampling
25 that has taken place in the discharge that Mr. Alevras has

1 indicated, which involves sampling for fish that are swimming
2 in through the discharge.
3 MR. MACBETH: I just wanted to be clear on that.
4 BY MR. MACBETH:
5 Q Would you explain the sampling that you have
6 undertaken at the intakes to the Indian Point 1 and Indian
7 Point 2 plant?
8 A (Mr. Alevras) Yes. The fishes which are impinged
9 on the intake screens of the Indian Point plants are
10 sampled daily. This sampling is achieved by raising the
11 outer fixed screens of the plant. The fish that are
12 impinged on that screen roll off when the fixed screen is
13 raised and are carried by the intake flow into the individual
14 intake bays. These fish are carried by the flow onto the
15 traveling screens in the plant, and when the traveling
16 screens are washed the fish impinged on there are raised out
17 of the water on small lips on the screen and raised up to
18 the deck level. A spray washes the debris and the fish from
19 that screen into a sluice directly underneath the screen.
20 This sluice is inclined. It carries a flow of water out of
21 the building. We place a screen in the sluice to collect the
22 fish as they are flowing in the sluice. This screen is
23 used to gather the fish from each traveling screen individually.
24 At the end of the screen washing we take the
25 collecting screen out of the sluice, collect the individual

fishes, take it back to the lab area, select them by species, make counts and take measurements of their length and weight.

Q Now, what's the size mesh of the screen on which those fish that have been collected have been impinged?

A Both the fixed screen and the traveling screen on the Indian Point plants have a 3/8 inch square mesh.

Q And turning your attention to striped bass, what size of fish do you find in your collections?

A We find fish in the collections in the size -- generally in the size range of two to four inches. This is for striped bass.

MR. MACBETH: I have no further questions of this witness.

BY MR. MACBETH:

Q Dr. Lawler, in light of the witness' answer, do you wish to change or amend your testimony on page -- I believe it is 14 -- yes, page 14 of the October 30 testimony, in which you say young juveniles that reach 1.5 to 2 inches in length and at that point are no longer considered entrainable?

A (Dr. Lawler) No, Mr. MacBeth. I was referring in the previous discussion to the minimum size that I would expect to see on the screens. And the witness responded to generally what is seen on the screens. But I maintain that

1 -- or at least it has been my understanding -- that the
2 minimum size seen on the screens is on the order of an inch
3 and a half. That's what bears on my testimony.
4 All I'm simply saying is: Once they get to an
5 inch and a half, I don't expect them to be entrained.
6 Frankly, based on Dr. Lauer's data, I don't expect them to
7 be entrained for, say on the order of three-quarters of an
8 inch, because Dr. Lauer's testimony is quite clear. He has
9 indicated previously that he does not find them in the
10 discharge nets.
11 There is one of two explanations: Either they
12 don't come into the plant, or they are not damaged. Because
13 if they came into the plant and were damaged, he would
14 expect them to be found in the nets.
15 That's what he indicated previously in his
16 testimony, and I am simply--in constructing this model,
17 I took what I considered to be a pretty conservative position;
18 that is, that I was willing to admit them to be entrained
19 up to an inch and a half. But beyond that stage, since it
20 is the minimum point at which they begin to be entrained,
21 I don't see any reason for changing the testimony.
22 Q There are a number of different things in there.
23 Are you suggesting that fish up to three-quarters
24 of an inch are entrained, and then fish from one and a half
25 inches up impinged, and the fish in between are neither

1 entrained nor impinged?

2 And by "entrained" I obviously do not mean

3 cropped. I mean entrained, taken in with the water through

4 the plant.

5 A I did not say they were not entrained. I said

6 it's one of two alternate explanations, as advanced by Dr.

7 Lauer-- the fact that he does not see fish larger than

8 three-quarters of an inch in the discharge. And it's either

9 they don't get in there in the first place, or if they do

10 get in there, they're not cropped.

11 Really it is not too great a concern as to

12 whether they get in there and are not cropped, or whether

13 they don't get in there at all.

end 28 14

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I think it would be desirable to know that but based on the information we have, going back to-- Well, the whole line of questioning, of course, originated in terms of the range of values that I wished to associate with cropping factors. I indicated that I did not see a reason to change the range which appears here from .1 to .5, and some of that is based on the fact that we are simply not seeing these larger larvae in the discharge canal.

CHAIRMAN JENSCH: May I interrupt?

Do I understand that you are also covering the possibility that they would not be broken up or chopped up in going through the plant? I mean you would not see them, of course, if they were chopped up even if they may have gone in through the plant. Isn't that a possibility?

WITNESS LAWLER: I suppose, Mr. Chairman, it's a possibility but it would seem to me, though, if that occurred you would also see them chopped up in the three-quarter-inch sizes.

CHAIRMAN JENSCH: Well, I don't know if they chop them in different sizes or not.

(Laughter.)

The fact that you don't see them, it's a negative type of approach on which you are relying for a positive assertion, which kind of boggles me. You say you don't see them, therefore you assume. It could be present in a different

eb2

form than you are looking for, is what my question really is, and you don't know about that, I take it?

WITNESS LAWLER: I suppose it could be.

CHAIRMAN JENSCH: Thank you.

Please continue.

BY MR. MACBETH:

Q I'm really talking about this in terms of the cropping factor, because your whole notion of what the juvenile-one stage is is tied to whether or not the fish are entrainable in such-and-such a length, so I'm really addressing myself to that, and I would just as soon not go off into what may or may not be happening in the discharge channel any more than necessary.

I really would like a direct answer to the last question I put to you. You started to explain why you thought something else was the case.

But could we have the Reporter read back the last question, and see if we can just get a simple answer to it?

CHAIRMAN JENSCH: Do you remember it? It might be easier. If you can't, we will have it read.

BY MR. MACBETH:

Q In your answer to the previous question, it would seem to be that you were suggesting that fish are entrained up to the size of three-quarters of an inch, they are impinged upward from the size of 1.5 inches, and that they

eb3

1 are neither entrained nor impinged between three-quarters of
2 an inch and 1.5 inches.
3 And I'm asking you whether you do not think that
4 they are in fact entrained between the sizes of three-
5 quarters of an inch and 1.5 inches; not necessarily that they
6 are cropped, but do you think they are entrained?
7 A (Dr. Lawler) Yes, I indicated that would be one
8 possibility that they could be entrained between those sizes.
9 Q Let me ask you whether you think it is probable
10 that between the sizes of three-quarters of an inch and 1.5
11 inches, they are entrained?
12 A Whether it is probable?
13 Q Yes.
14 A I don't know.
15 Q Now when the minimum size fish start to-- Maybe
16 I should return to Mr. Alevras.
17 Are you basing your statement that fish of 1.5
18 inches are impinged on the screen on information from
19 Mr. Alevras or from someone else?
20 A Yes, I am.
21 Q Which one, Mr. Alevras?
22 A Mr. Alevras.
23 Q All right.
24 Well, let's go back to Mr. Alevras.
25 Maybe I misunderstood your last answer. I thought

eb4

I asked what size fish you found impinged and you said two inches to four inches. Do you want to amplify that in some way?

A (Mr. Alevras) I think I can clarify that. I think your question was what was the general size of fish that was on the screen. The vast bulk of striped bass impinged on the screen are two to four inches long. However, we have made many, many collections in which we measured the fish and the general minimum size of striped bass is 40 to 45 millimeters, which is slightly more than an inch and a half.

We collect relatively few striped bass in the 40- to 45-millimeter size range.

Q Forty-five millimeters is about two inches?

A Fifty millimeters would be just a hair under two inches.

Q So we're up to about 1.75 at 45 millimeters?

A That's correct.

Q And I take it you made no tests behind the screens or in the discharge channel to test whether there are a number of fish between 1.5 inches and 2 inches, or 40 millimeters or 50 millimeters which pass through the screens. Is that correct?

A I think Dr. Lauer previously testified that --

Q But beyond Dr. Lauer?

A I have not collected nor directed anyone to collect

eb5

1 or to try to collect fish of that size range.

2 Q Fine.

3 Would you expect it to be normal in the situation

4 in which fish were being impinged against a screen that

5 there would be a range of fish sizes over which some of the

6 fish would pass through the screens and some would not?

7 A Yes.

8 Q And in the situation at Indian Point, is it

9 probable that there are a number of fish between one-and-a-

10 half and two inches that pass through the screens?

11 A I would expect that some fish in the size range

12 one-and-a-half to two inches -- and I'm referring to striped

13 bass -- would pass through the screens.

14 Q What about a declining number of fish in the size

15 range from two to two-and-a-half inches?

16 A Yes, I think even some fish in excess of two

17 inches could pass through the screens. However, I think at

18 two inches we're probably getting close to the absolute cut-

19 off point on screenable size.

20 Q Have you made any studies in which you could

21 determine the length of fish in which more fish of that size

22 are impinged than pass through the screens?

23 MR. TROSTEN: Would the Court Reporter re-read

24 the question?

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25 (Whereupon, the Reporter read from the record

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1 as requested.)

2 WITNESS ALEVRAS: No, we have not done any studies

3 to establish, for example, a size at which 50 percent are

4 collected and 50 percent pass through. It would require that

5 you would be able to sample fishes that are passing through

6 in that size, so we would know what percentage went through

7 and what percentage impinged at any particular size.

8 BY MR. MACBETH:

9 Q Dr. Lawler, am I right in thinking that the aver-

10 age striped bass two inches long is older than the average

11 striped bass one-and-a-half inches long?

12 A (Dr. Lawler) Are you correct-- Your question is,

13 are you correct in presuming that the average striped bass

14 of two inches in length is probably older than the average

15 striped bass of one-and-a-half inches in length?

16 That's probably true.

17 Q How much older, do you think?

18 A Well, that's hard to say.

19 Two points that might be of significance here:

20 First of all, I have indicated that it is very

21 difficult to tell whether the -- you know, how old the fish

22 is at an inch-and-a-half or two inches, or conversely, in the

23 eight-week period that we have used, some data suggest that

24 they're an inch-and-a-half; other data indicate they are

25 closer around two inches. This is why I have suggested it.

eb7

I might also add that with respect to some of the comments which Mr. Alevras has just made, that perhaps one of the reasons why we find larger animals impinged is that the impingement tends to be more significant in the colder months, in other words, during the latter months of the summer when the fish are still growing but not being impinged, at least not to the degree that impingement is possibly taking place later on.

So the fact that there is perhaps a gap here I don't think is terribly strange.

Q You said there's a gap here. What was the gap between?

A Well, you suggested to me a few minutes ago that it was rather strange that there was, say, a space somewhere in the area of an inch or an inch-and-a-half where fish were neither being entrained nor impinged.

Q Could you give me a rough estimate of how much older you think the two-inch fish would be than the one-and-a-half-inch fish?

A Gee, I really wouldn't want to estimate that.

Q Okay.

A I think what I'm simply saying is that the entrainable stage that I have used in the model is 60 days, and from everything I can see, including the work that has been done by the other modelers in this proceeding, I think this

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eb8

is a reasonable estimate of the period of time in which the striped bass in the river may be potentially drawn in by the intake and not the screen.

Q On the other hand, if you used the end point for susceptibility to entrainment as two inches rather than 1.5 to two inches, the fish would be susceptible to entrainment for a longer period than your model is presently constructed?

A If I presume that a two-inch fish is older than the one-and-a-half inch fish, and if I don't define what the age of any of these are, I would have to conclude that if one presumed that a two-inch fish is also entrainable, then it would be there along with the inch-and-a-half.

CHAIRMAN JENSCH: You will have to speak a little louder.

WITNESS LAWLER: What I'm saying is, Mr. Macbeth, certainly if you say to me, "Will a two-inch fish be subject to entrainment for a longer period of time than a one-and-a-half inch fish?" I would have to answer yes.

What I'm simply saying is-- Well, you know, even that is not terribly accurate because that presumes that that particular animal is in the vicinity of the plant the entire time, which is another factor which has not been brought into play here.

BY MR. MACBETH:

eb9

end 29

Q Well, we can build another premise for the question.

#30 BB mml

A. (Dr.Lawler) Let me help you.

If we are going to presume that the age of the two-inch fish is more than eight weeks, and if we are going to presume that we must entrain or permit fish to be entrained all the way up to two inches, then I would use more days than I have used in the entrainable form. That is all.

But I don't really think that that is applicable here.

Q. I realize you havenot done it, that you have done what you think is proper.

MR. TROSTEN: Mr. Macbeth, if you want to put all the assumptions to Dr. Lawler, he will be in a position to answer this. I think if you want to ask him the question, you will have to put the time and the year into the question, and the distribution of the fish, when it was two-inches in size versus one and a half inches in size.

Then he would be in a position to respond to this question more fully.

If you want to do that, he can respond to it.

MR. MACBETH: I think Dr. Lawler has been very helpful. I have covered what I thought was probably enough.

I think Dr. Lawler's last statement was very helpful. He seemed to realize what I was driving at.

I think there could probably be an infinite number of premises if we kept at it long enough.

m2

BY MR. MACBETH:

Q. Let me go on to another subject at this point.

For the later stages of striped bass mortality due to the operation of the plant, you use a series of impingement figures, do you not?

A. (Dr. Lawler) Yes.

Q. Would you just remind me on what page that occurs?

A. I think it is first discussed on page 64, and associated table opposite page 65.

Q. That is table 21 and following.

MR. TROSTEN: Excuse me.

(Mr. Trosten conferring with the panel.)

BY MR. MACBETH:

Q. That is table 21 following page 64, is that correct?

A. (Dr. Lawler) What was your question with respect to?

Q. The impingement figures appear on table 21, do they not?

A. That is correct.

Q. Where did you obtain the figures that you have listed under column 2, base unit 1, monthly totals?

A. These figures were obtained from the applicant.

Q. And do you know what sampling period they represent?

A. I think I should ask Mr. Alevras to answer that question.

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MR. TROSTEN: What page are you on, Mr. Macbeth? Table 21?

MR. MACBETH: Following page 64.

MR. TROSTEN: Thank you.

WITNESS ALEVRAS: The data in table 21 is from fish collections made at unit number one, from December 1970 to March of 1972.

BY MR. MACBETH:

Q Dr. Lawler, earlier in the day you were emphasizing the value of data from 1967, which is the year in which the Carlson-McCann data were collected.

Do you think a more accurate picture of the impingement totals would be obtained if data from 1967 on impingement were available?

MR. TROSTEN: This question, Mr. Macbeth, should be directed according to the witness' qualifications, to Mr. Alevras.

MR. MACBETH: But it was Dr. Lawler who was discussing the importance of 1967 to his testimony, and Mr. Alevras established that the totals actually used came from 1971-72.

I was asking Dr. Lawler, I thought he was the appropriate party, whether he thought 1967 figures would be more appropriate, if they were available.

MR. TROSTEN: Dr. Lawler's testimony this morning

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1 was referring to the appropriateness of using 1967 egg and
2 larval distribution data with regard to his entrainment
3 calculations.
4 This is an impingement calculation, and hence
5 was not related to the subject that Dr. Lawler was testifying
6 to this morning.
7 MR. MACBETH: That is why I put the question, as
8 a question rather than a statement. I asked him if it would
9 be more appropriate.
10 I mean, he is free to say no, if that is his
11 opinion. I would just as soon have his opinion, if that is
12 all right.
13 May the witness answer the question?
14 CHAIRMAN JENSCH: There really has been no objection
15 and these conversations get somewhat lengthy. It might move
16 along by an objection and a response.
17 But as I understood the previous testimony of this
18 witness, he felt that he was keeping things on a comparable
19 basis by using '67, and I think that is the purpose of this
20 inquiry.
21 The witness may answer.
22 WITNESS LAWLER: No, I don't think so at all,
23 Mr. Chairman. The only reason for using 1967 data is to test
24 the basic model before we ever even talked about the impact
25 of the plant on the model.

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To me, the most sensible thing to use when one is discussing the impact of the plant as computed through the model would be to use the best indication of what the plant can be expected to do. There is really no bearing at all on my comments this morning, with respect to use of Carlson-McCann's '67 data simply to see how the basic model without the plant's operation, functioned in the context of this inpingement.

CHAIRMAN JENSCH: I think what the question really seeks is, aren't you going to get some comparable bases for one type of analysis or the other. If you are using '67 data in order to utilize the Carlson-McCann data, that is one thing. If you have another analysis that will bring it up to later on, '70-71, do you have eggs and larvae distribution for entrainment for '70-71, should you carry through the analysis on that study? --on that basis?

I think that is what this question is really trying to seek, putting on one similar foundation for each type of analysis.

MR. MACBETH: I would put it in a slightly different way.

BY MR. MACBETH:

Q. I would ask whether you have any information as to whether the striped bass population of the Hudson in 19 -- in the period covered by the impingement data, was the same as

mm6

1 the striped bass population in the period covered by the
2 entrainment data?
3 MR. TROSTEN: I am sorry --
4 WITNESS LAWLER: I understood Mr. Jensch's question
5 more clearly.
6 CHAIRMAN JENSCH: Take a run at mine, then take
7 a run at his. I think we are trying to get at the same
8 basis for analysis.
9 WITNESS LAWLER: What you are asking, I think, is
10 that wouldn't it be nicer if we had the kind of data that
11 Carlson-McCann had provided in years '66 and '67 in the years
12 '70, '71 and '72?
13 I think that is what you are asking.
14 CHAIRMAN JENSCH: In order to see how your model
15 applies to each different period.
16 WITNESS LAWLER: I would be inclined to answer,
17 yes, we would begin to get a greater degree of consistency
18 in testing the applicability of the model to what is actually
19 happening.
20 CHAIRMAN JENSCH: Now take Mr. Macbeth's question,
21 do you have impingement data similar to the entrainment data
22 for the '70-71 period?
23 WITNESS LAWLER: I think Mr. Alevras has just
24 testified that there is impingement data for the '70-71 period.
25 CHAIRMAN JENSCH: Is there entrainment data?

mm7

WITNESS LAWLER: The entrainment data that we provided has been, for example, the experiments of Dr. Lauer, or the tests of Dr. Lauer. For instance, in trying to estimate the effect of the plant, the entrainment effect of the plant, I introduced a series of what I call "f" factors.

Now for "f_1," which is the distributional analysis, I use data from '67,'69, '70 and '71, or '70, '71 and '72.

For the "f_2" and "f_3" factors, we used data collected in '72.

In the case of impingement, I think the best data to use is the data that can be judged to be most representative of what the plant can be expected to do.

For both entrainment and impingement, we are using data in the '70s primarily.

CHAIRMAN JENSCH: Does that answer your question?

MR. MACBETH: Yes.

I think that pretty well covers it.

end 30

ebl

BY MR. MACBETH:

Q Dr. Lawler, have you made a run of the model in which you substituted the migrational preferences of Table 5 for Table 5-A in which you omitted the compensation factor and in which you set the "f_1," "f_2," and "f_3," and "f_c" factors at unity?

A (Dr. Lawler) Yes, I have.

Q And what results did that run produce in terms of the chart presented in Table 24, I believe it is. Yes, Table 24 of your October 30th testimony.

A This was a run made, as you say, with "f" factors being unity in all cases, no compensation in any stage, and the severe downstream migration preferences described this morning as being given by Table 5.

This represents what we consider to be the severest case that we can expose the model to, though not representative of the conditions that we would expect to prevail on the river.

We obtained a percentage reduction of 15 percent. That 15 percent corresponds to one year of operation.

Q And the 15 percent is one-year-old's, or years one through thirteen?

A No, that's the total population.

Q The total population?

A No, I take that back. That's the one-year-old's.

eb2

The total population is substantially less than that. I don't have the number right off-hand, but it is probably less than ten percent.

Q And what were the results after five years?

A Well, the results after five years were on the order of 25 to 30 percent.

Q And after ten years?

A The results after ten years were 38 percent.

Q Did you do a run in which you used the migration preferences of Table 5 rather than 5-A, in which you included a compensation factor and in which you set "f_1," "f_2," "f_3," and "f_c" at unity?

A To the best of my recollection we did.

Q Would you tell me what the results of that run were in terms of the chart provided in Table 24?

A In terms of the chart provided in Table 24, the one-year operation was on the order of three to four percent, and the ten-year operation, I don't know what it was. That's in the process of being computed. I would estimate that it would be less than ten percent.

Q Was that the five-year figure or the ten-year figure?

A The ten-year.

Q Do you have the five-year figure?

A No. I can get five-year figures but I don't have

eb3

1 the five-year.

2 Q And again, these figures apply to the one-year-old

3 population or the total population?

4 A Well, the ten-year figure would apply to either;

5 the one-year figure would apply to recruitment for the first

6 year and the associated percentage reduction for the total

7 population would be somewhat less.

8 The percentage reduction of the total population

9 lags the percentage reduction in the first year recruit-

10 ment for several years. By the time you get out to some-

11 where between five and ten years, it is not terribly dif-

12 ferent.

13 Q As you alter the product of the four "f" factors,

14 is there a proportional change in the percentage figures

15 presented on Table 24? In other words, in a situation in

16 which an "f" factor of seven was used in the first run and

17 let us say the percentage reduction after one year for one-

18 year-old's would be ten percent, if the "f" factor was then

19 set at .35, would there be a change in the percentage reduc-

20 tion figure to five percent?

21 A May I have the question repeated?

22 MR. MACBETH: Will the Reporter read the question,

23 please?

24 (Whereupon, the Reporter read from the record

25 as requested.

MR. MACBETH: The first "f" factor should have been .7.

MR. TROSTEN: I object to the question because it states two questions, one, a question of what would happen if you altered an "f" factor, and the other a question as to what would happen if you altered the product of the "f" ~~factor~~ factors.

MR. MACBETH: I should have said the product of the "f" factors both times.

CHAIRMAN JENSCH: I wonder if you would restate the question so it will be clear.

The objection is sustained.

BY MR. MACBETH:

Q If you changed the product of the "f" factors between two runs of the model so that in the first case, the product of the "f" factors is twice what it was in the second case, would there be a proportional change in the figures represented in Table 24 for the reduction population of one-year-old's after one year?

A (Dr. Lawler) What you're driving at here, Mr. Macbeth, is the sensitivity analysis of the model, and I should probably describe to you as best I can what the model will do and what it won't do.

I have already given you some indication. We have found that-- We have looked at it in several different

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ways.

We have looked at by varying the "f" factors, varying the migration, varying -- and eliminating compensation, and also varying the degree of compensation. We find that if we eliminate the compensation completely, that, as I indicated this morning, eventually, as will occur with any other impact we put on the system, we will drive the population down until eventually we won't have a population.

In the case when we run the model without any compensation but incorporate the level of "f" factors that I have presented in the testimony we slow down that gradual -- quote -- spiralling" effect that I described earlier.

For example, if we use the "f" factors that are described in the testimony as our current best estimate of what the "f" factors ought to be,rather than getting the six percent -- the 15 percent that I described a moment ago, we get a factor of about six percent and again, if we use the level of .75 for all "f" factors, again numbers that I consider to be rather high by comparison to our current estimates of what these factors would be, we get -- with no compensation whatsoever, we get a reduction up on the order of 12 percent.

Now, once we incorporate the compensation, we suppress the tendency to reduce the population, not only in the first year but much more importantly, in the later years. When we use what we consider to be good estimates of "f,"

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we find -- with compensation operating, we find that the percentage reduction is on the order of three or four percent.

When we use high "f" factors, one, for example throughout but again with compensation operating, we get values on the order of four to six percent.

One of the most interesting things is the level, the degree of compensation that we actually apply.

If you will turn to Figure 9, which is opposite page 24, this is the figure that I was discussing this morning as representative of the manner in which compensation is applied.

A very important factor in the compensation analysis is what we call the minimum mortality rate. This is given the symbol K_{zero} and it represents the presumed minimum rate at which mortality will be occurring in a natural sense.

Now we began in the compensation analysis by using a factor of .5; that is, 50 percent of the presumed normal mortality rate, or that is the mortality rate that would be operating when you were up on this plateau. We find that we don't need nearly that degree of compensation to hold the operation in check. In other words, we find that there is little difference between using a factor of 50 percent, a minimum factor of 50 percent or a minimum factor of 80 percent. We find that it would be somewhere between 80 percent of the presumed natural -- quotes -- "plateau rate" and a

eb7

hundred percent of that rate;-- A hundred percent, by the way, is no compensation -- that the effect gradually begins to increase.

For example, in the case I just referred to with-- Well, another case where the "f" factors I have used, .4 for the egg stage which I consider to be a good value, and .4 for the larval stage which is indicative of only the distribution upon a -- assuming a hundred percent mortality across the condensers, which I don't believe occurs, based on the evidence Dr. Lauer has suggested or presented.

But in any event, using that and using the .2 factor for this juvenile-3 stage, which represents 50 percent higher values than I had used previously in best estimates, we show percentage reductions ranging from four up into the six and seven percent area as we move from a case of, say, 80 percent up to 100 percent, or no compensation.

The point that I'm driving at is that the system is not operating with a lot of compensation. Simply there are slight changes that are taking place in the natural mortality of the system when you set a minimum mortality rate to be 80 or 90 percent of the no-compensation case. And in that situation we see population reductions that I don't consider to be severe.

End 31

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I think this is very important, because you get various opinions from various biologists when you talk to them, and many of them, to use the expression, are of gut reaction.

I think what they are recognizing is the fact that in these natural systems, there is an ability to adjust and that ability to adjust, I am suggesting, does not have to be very great, to prevent this mathematical problem, if you will, that I have run into, if I take a situation where I avoid any kind of adjustments.

I would also like to say that I don't, by a long shot, mean to suggest that this is all there is to the problem. I am not suggesting that at all.

Right now we are in the throes of going through the sensitivity analysis, so I cannot propose to give you all the answers at this time. But it is clear that these "f" factors play a very important role, and it is also clear that the notion of compensation plays a role and finally, it is clear that the degree of compensation that we are presuming exists here, does not have to be very great to prevent this system from getting out of control.

And I have made a lot of suggestions in the latter part of the testimony as to kind of things that need to be done to tie some of these numbers down.

MR. MACBETH: Mr. Chairman, I think that concludes

mm2

1 my examination of Dr. Lawler, if I could just reserve the
2 right to ask one or two questions if something comes to
3 my mind during Mr. Karman's examination. It would simply be
4 picking up a stitch here and there.
5 MR. KARMAN: Mr. Chairman, without questioning
6 the imposition, we were wondering if Dr. Lawler was going
7 to be in town tomorrow morning. It is going to take us a
8 little time after all this testimony today to assemble our
9 force somewhat, and if we could commence cross-examination
10 first thing in the morning, I don't think it will be too
11 lengthy.
12 MR. TROSTEN: The only problem, Dr. Lawler, I
13 believe, is going to be here tomorrow. The problem is, we
14 have an exceedingly crowded day.
15 MR. KARMAN: It would not take long. Otherwise,
16 there is another step which came up during today's examination
17 which I may remove from my intended and others I may add. It
18 would require a readjusting of our thinking. And it is almost
19 5 o'clock now.
20 MR. TROSTEN: Let me suggest that -- let me confer
21 with Dr. Lawler.
22 (Pause.)
23 MR. MACBETH: I would say that my cross-examination
24 of Dr. Raney and Dr. McFadden is anticipated to be much shorter
25 than my cross-examination of Dr. Lawler.

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MR. TROSTEN: I would just request that, would you please reserve your cross-examination of Dr. Lawler until the end of the day?

MR. KARMAN: That would be fine.

CHAIRMAN JENSCH: That, perhaps, brings us to the close of the day.

When you were in conference, applicant's counsel, with Dr. Lawler a little earlier this afternoon, I had inquired of counsel of the Hudson River Fishermen's Association if he would contact counsel of the Environmental Defense Fund and the Citizen's Committee so as to get some response to any contemplations he may have, upon any examination he would desire to undertake.

And Mr. Macbeth indicated he would give us a report tomorrow.

MR. KARMAN: Am I to assume, then, that your first witness for cross-examination would be Dr. Raney or --

MR. TROSTEN: It will likely be Dr. McFadden on the subject of compensation, if this is satisfactory to Mr. Macbeth. Dr. McFadden has a very tight schedule tomorrow. I would suggest that thereafter, Mr. Newman be cross-examined and that thereafter, Mr. Macbeth may wish -- I understand Mr. Macbeth may wish to interrogate with regard to the proposed research program. I would like to come at that next, and then finally return to Dr. Raney. Then we can

mm4

1 pick up with Dr. Lawler at the end.

2 MR. KARMAN: THat would be fine.

3 MR. MACBETH: It is cramming the day a little bit.

4 I was anticipating McFadden and Raney.

5 MR. TROSTEN: Let me suggest this -- I will have

6 to confirm this with Dr. Raney, but I think Dr. Raney can be

7 available on Friday, Mr. Macbeth, if that becomes important.

8 The problem with our witnesses is twofold.

9 Dr. McFadden has to leave, he has to catch a plane to get

10 back somewhere tomorrow afternoon.

11 MR. MACBETH: I am sure we can get through

12 Dr. McFadden and I would be happy to take him first.

13 I take it you would then like me to take Mr. Newman?

14 MR. TROSTEN: Yes.

15 MR. MACBETH: Are you also saying Dr. Lawler will

16 be here Friday if it comes to that, because putting the

17 four in a row, it seems a little less likely to --

18 MR. TROSTEN: Dr. Lawler will be here on Friday.

19 CHAIRMAN JENSCH: Very well.

20 We are going to keep these various schedules in

21 mind, not only as to witnesses, but dates. We endeavored to

22 indicate our suggestion for consideration of the schedule after

23 this week, which would commence on January 10 and go through

24 10, 11 and 12, 15, 16, 17, 18, and 19.

25 Now, if all of that is not needed for that session,

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we will recess whenever the parties are ready to recess, so that the applicant can consider the rebuttal presentation at a later time.

Mr. Briggs had some items he would like to call to the attention of the parties, however --

MR. TROSTEN: May I just observe that perhaps we may defer a final decision of this until we can have an opportunity to discuss the schedule matters having to do with the plant facility which the Board said they wanted to discuss.

I will say frankly, Mr. Chairman, that I do have some significant concern about waiting until January 10 to proceed in this manner. It is related to the plant schedule, and perhaps if we could defer a final decision of this until the Board has had an opportunity to consider the matter, I would appreciate it.

CHAIRMAN JENSCH: All right.

The reason I suggested it, at the moment at least, it looks like we have a conflict. But we will consider it in the morning.

end 32

Mr. Briggs received

1 ~~We have reviewed~~ the Applicant's testimony and
2 other testimony concerning the integrity of the reactor
3 vessel, and there were several items that we thought it would
4 be useful for the Applicant to make available for inspection
5 by the parties, and that the parties might wish to examine
6 them, these not necessarily to be included in the record. It
7 depends upon what occurs as a result of the examination, I
8 would expect.
9 On page 3-2 of the additional testimony of the
10 Applicant concerning reactor vessel integrity, there was
11 mention of inspection report for the 173-inch ID reactor
12 vessel and components.
13 On page A-3, paragraph M-142, I believe, there
14 was the stress analysis report, on page A-3.
15 M-131 there was the equipment specification.
16 And on page A-26 in the last paragraph there was
17 mention of the vessel manufacturer's report on ultrasonic
18 inspection.
19 And we believe it would be worthwhile if these
20 four reports could be made available -- well, one of them
21 is the equipment specification -- if the four documents could
22 be made available for inspection.
23 In addition to that, the Board indicated some
24 concern about the fracture toughness requirements, and
25 during the cross-examination I suppose the question was asked

1 whether the Indian Point 2 vessel would meet the fracture
2 toughness requirements of 10 CFR Part 50, Appendix G. The
3 answer at that time was yes; there was the possibility that
4 there was some requirement that could not quite be met. As
5 I remember it had to do with the number of specimens that
6 would be available, or whether a particular specimen was
7 available.
8 But I believe other than that the answer was yes.
9 No more questions were asked at that time, but I believe
10 since one depends upon the fracture toughness during the
11 life of the vessel that it would be desirable for the
12 Applicant to show in detail how the materials in the vessel
13 satisfy the requirements of Section 4 of Appendix G, and
14 how they are expected to satisfy the requirements of Section
15 5 during service.
16 Now, I don't know whether some clarification is
17 needed there, but -- well, under Section 4 here, (b), it says:
18 "The initial upper shell fracture energy level as determined
19 by Charpy V-notch test shall be at least 15 foot pounds
20 higher than the value specified under Section 4(a)..." and
21 so forth.
22 What data do you have to show that the vessel
23 meets this requirement? And is the value exceeded by 15 pounds
24 or more than 15 pounds? Just what basis do you have for
25 concluding that the requirement is met?

wel 3

And that same sort of information is desired for the other paragraphs here.

I believe that's all concerning the vessel integrity, but there was mention today about going into the research program for the environmental business, and I think it would be helpful to us if the witnesses could give some information concerning the criteria that will be used to decide whether the plant has an effect, and the extent of the effect.

The criteria relative to the normal fluctuations that one can expect in abundance, the Board has some concern that after you have taken the measurements the argument will continue. One group will say yes, there's a big effect, and the other group will say, no, it's obvious that there is very little effect. And it's important for us to learn how one is going to decide what this effect is.

MR. TROSTEN: Our witnesses will be prepared to respond to that.

end 33

34 wbl1

May I seek clarification? Your inquiry, Mr. Briggs, as I heard it, was divided into two parts. One was a request that documents be made available to the Board.

MR. BRIGGS: To the Board and to the other parties to examine.

MR. TROSTEN: And the other was a series of questions relative to the fracture toughness requirements.

MR. BRIGGS: The other was to show in a fair amount of detail how the paragraphs of Sections -- I believe it was 4 and 5, of Appendix G are satisfied by the material in the vessel, and will be satisfied during the in-service operation of the vessel, if it ever goes into service.

MR. TROSTEN: Thank you.

CHAIRMAN JENSCH: There's a procedural caution that I would like to submit to the parties to bear in mind, that this Board is not desirous of reviewing any matters ordinarily that are not going into evidence.

Now this material on the inspection reports perhaps can be considered somewhat as reference material, background material. It may not all be relevant. But all parties should be free to express an objection to any review of those inspection reports either before the Board receives them, or to make an objection that if they are reviewed they should be included in the evidence so that we may consider that.

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We are anxious that the Board be guided solely by the evidence presented by the parties, or within the scope of stipulations respecting these matters. And while the request now is in a sense for review to determine relevancy, we will also entertain any objections to that review or the possibility of a stipulation regarding that review before we undertake it.

MR. TROSTEN: May I ask for a clarification of what the Chairman has said?

There have been a number of instances in this proceeding where the Board has expressed a desire to review documents. To cite just one, the Board expressed a desire early in the proceeding to see information that was transmitted to the intervenors by way of response to informal requests for information. At one point the Board desired to see that.

Is the Chairman suggesting now ~~that~~ concerning such requests by the Board that any party having an objection voice the objection at the time that the Board makes the request?

CHAIRMAN JENSCH: No. I'm referring particularly to these inspection reports at the moment identified by Mr. Briggs. The Board wants to be sure all parties see exactly what the Board has requested. And kind of collateral with that, or the corrolary of that, we are anxious to preserve the arrangement that ordinarily we do not review matters unless

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all parties see it, and that all parties agree that these matters may be reviewed, even though they may not become evidentiary. I have assumed that the previous submittals of information in response to requests were within the scope of the general reference review and not that they do become matters of evidence.

MR. TROSTEN: Would the Chairman also accept that if a party does not desire to see information submitted to the Board, or waives any right to see it, that ~~this~~ it would not be necessary to show it?

CHAIRMAN JENSCH: That's certainly true. It's the opportunity for review that is to be provided. If they do not utilize that it is of no concern to the Board.

MR. TROSTEN: What happens sometimes, and the reason why I raise the question, Mr. Chairman, some of these documents are rather bulky, and transmitting them to everybody becomes burdensome.

CHAIRMAN JENSCH: I don't think you necessarily need to make copies for everybody. If you bring in one set of them here we can look at them and everybody can look at them. We don't ask you to prepare a lot of copies of anything.

If we find matters are relevant we may discuss the possibilities of inclusion in the record so the parties may make comments on them. And we may ask that parts be copied.

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Is there any other matter we can take up before we recess? If not, what time did you say?

MR. KARMAN: I made it by nine-fifteen.

MR. TROSTEN: Again because of-- I'm sorry, Mr. Karman. I heard your problem yesterday. But because of the crowding of the day could we start at nine o'clock tomorrow morning? Would that be all right?

MR. KARMAN: I'll certainly make every effort to be here. Schedule it for nine.

CHAIRMAN JENSCH: We will schedule it for nine.

My recollection of that bus service is -- and I think it is shared by all the passengers: if they wouldn't lay over so long in Bethesda--

MR. KARMAN: We left promptly today, Mr. Chairman. And I could have been here by nine o'clock.

CHAIRMAN JENSCH: It leaves Germantown at seven-thirty and it's due in at Bethesda at eight-fifteen. And I have been on it when it wouldn't leave until eight-thirty-five. And I always thought my time could have been better employed, than in waiting, with a second cup of coffee.

At this time let's recess, to reconvene in this room tomorrow morning at nine o'clock.

(Whereupon at 5:10 p.m., the hearing in the above-entitled matter was recessed, to reconvene at 9:00 a.m., Thursday, 14 December 1972.)

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