NUCLEAR REGULATORY COMMISSION

ORIGINAL

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	:	
	:	
PHILADELPHIA ELECTRIC COMPANY	:	
	:	DOCKET NO. 50-352 OL
(Limerick Generating Station	:	50-353 OL
Units 1 and 2)	:	

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UNITED STATES OF AMERICA

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Fifth Floor Conference Room

4350 East-West Highway

Bethesda, Maryland

Tuesday, October 19, 1982

The hearing in the above-entitled matter convened, pursuant to notice, at 8:30 a.m.

BEFORE:

LAWRENCE BRENNER, Chairman
Administrative Judge

RICHARD F. COLE, Member
Administrative Judge

PETER A. MORRIS, Member
Administrative Judge

APPEARANCES:

On behalf of Applicant,

Philadelphia Electric Company:

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C O N T E N T S

E X H I B I T S

PROCEEDINGS

JUDGE BRENNER: Good morning.

We wanted to get the time estimates, Mr. Sugarman. Can you give us some estimate of how much longer you will be on cross with Applicant's panel?

MR. SUGARMAN: I think until some time midday.

JUDGE BRENNER: Does that mean noon?

MR. SUGARMAN: That's the best I can say. I will say hopefully by lunchtime.

JUDGE BRENNER: Okay. We will break for lunch probably around 12:15. Let's shoot for that as a goal.

Mr. Conner, can you give us an estimate of your cross-examination time with Mr. Phillippe? And then I guess I would also ask you if you know about McCoy and Miller and McNutt.

MR. CONNER: I haven't got to McNutt. Depending of course on how the witnesses answer questions, I would say about an hour and a half to two hours for Phillippe, and about the same on McCoy and Miller.

JUDGE BRENNER: Staff, can you give us an estimate of your time with the Applicant's panel, and then in turn as far as you can go with Del-Aware's witnesses?

MS. HODGDON: Not more than half an hour for Mr. Phillippe, possibly less; probably not more than an hour for the panel. And McCoy and Miller would be next.

MR. RUTBERG: I would estimate we have about an hour's worth of cross-examination for McCoy and Miller.

JUDGE BRENNER: Have you gotten up to McNutt and Brundage in your thinking?

MS. HODGDON: Brundage, we have an hour, too. McNutt, we have half an hour.

JUDGE BRENNER: All right. Bear in mind one thing, Mr. Sugarman. When you talked about the flexibility of switching around McNutt, McCoy and Miller, don't get yourself in a situation where McCoy and Miller are sitting around on Thursday because we're going to take Mr. Brundage. So I think you might want to get McCoy and Miller here sooner, rather than have them sequentially with Mr. Brundage. But it is up to you.

MR. SUGARMAN: Sooner meaning Thursday morning?

JUDGE BRENNER: The arrangement as I understand it is, we're going to take Mr. Brundage either as soon as we get to him or no later than

Thursday morning. I'm not taking a subpoenaed witness in the middle of the day any more, based upon past experience. We will start him first thing Thursday morning.

So if you have McCoy and Miller immediately before Brundage, as opposed to being separated by Mr. McNutt, you are liable to get into a situation where they are going to be sitting around, because I'm going to take Mr. Brundage. He has been bobbed around quite a bit and there's nobody here directly protecting his interest, and I'm going to do what I can for his convenience.

So Thursday morning, if we have not previously gotten to him, we're going to start with Mr. Brundage. So bear that in mind in your scheduling of McCoy and Miller. Based on these time estimates, I would suggest you get Messrs. McCoy and Miller here for tomorrow afternoon, but I may be wrong and we may not get to them. But I would do that if I was you.

MR. SUGARMAN: Well, I will try to do that. The problem is, there's no telephone here that I can get access to, other than the one down in the lobby, and the pay phones are tied up.

JUDGE BRENNER: Well, you can't go make a call now anyway. I'm sure there are plenty of telephones

through the Staff.

But anyhow, let's continue the examination if there are no further preliminary matters.

MR. SUGARMAN: May I ask if a copy of the final documents on the project can be made available?

JUDGE BRENNER: I don't know what you mean by that. Are you asking me, Mr. Sugarman?

MR. SUGARMAN: Well, I was, but apparently Mr. Conner is making them available now.

MR. CONNER: For the record, these are documents that I haven't even looked at, that went along with the bid package for NWRA. And why Mr. Sugarman didn't get them when he was up at Mr. Bourquard's office, I don't know. But these are the property of NWRA and they want them back. But I will lend these to Mr. Sugarman, as I have lent him my copy of the bid package.

JUDGE BRENNER: What are they, drawings of the intake; is that it?

MR. SUGARMAN: I imagine they are, in detail. I haven't seen them. I've been trying to get them from NWRA and they were first saying, well, we will give them to you next week, next week.

JUDGE BRENNER: Well, don't stop and read them now. I want to continue the examination.

MR. SUGARMAN: Well, I would like to take a look at them to see if they suggest any examination questions. That's why I've been trying to get them for the last three weeks.

JUDGE BRENNER: I'll be surprised if you can look at them in two or three minutes. That is why I wanted this worked out overnight, and I'm sorry it wasn't.

Let's continue the examination. Take a quick look, but then let's go to the examination. You will get the mid-morning break also before your examination is completed.

MR. CONNER: For the record, we did not have these until this morning.

MR. SUGARMAN: Mr. Bourquard had them.

(Pause.)

JUDGE BRENNER: Mr. Sugarman, can you orient us into your cross plan and how you expect to proceed through it?

MR. SUGARMAN: Well, yesterday I was finished up at question 10, and I was in the range of questions 10 and 11, and I think that I want to continue to explore that area and then continue on down.

JUDGE BRENNER: All right. With the exception of questions on noise, which you have already asked, and

with the exception of questions pertinent to the Bradshaw Reservoir; is that right?

MR. SUGARMAN: Right.

JUDGE BRENNER: All right. Well, that is page 3 of a cross plan that runs 19 pages, almost 19 pages.

MR. SUGARMAN: Well, I've hit some of the elements as I've gone through. But really, I'm cross-examining on testimony that came out in the first two questions to cross-examination, which completely changed the entire scope of the direct examination.

JUDGE BRENNER: Well, I understand you cross-examine on things that come up, and that is understandable and perfectly acceptable. Whether or not it changes the entire scope is a matter of opinion. I can understand why you shifted your focus, however, into those questions.

But I'm worried about getting so divergent in cross-examination of opportunity which strikes you at the moment that you will lose the efficiency of covering questions in here which we hope you will cover, because they are good questions and we want to hear the answers. And what happens is, you suddenly get diverted on a detail without thinking about the ultimate importance in terms of the time spent on it. And that is the very purpose, in part, for requiring a cross

plan.

So I hope you will stay with it a little more, or at least not forget about it in the course of picking up these other things.

Whereupon,

VINCENT S. BOYER

W. HAINES DICKENSON

E. H. BOURQUARD

and PAUL L. HARMON,

the witnesses on the stand at the time of recess, resumed the stand and, having previously been duly sworn by the Chairman, were examined and testified further as follows:

CONTINUED CROSS-EXAMINATION

BY MR. SUGARMAN:

Q Mr. Harmon, I was asking you with regard to your velocity measurements, regarding the measurements of July 1981. I would like to ask you with respect to the measurements that you made in November 1980, which are also referred to in Mr. Boyer's cross-examination.

How did you ascertain the locations at which you were making the measurements on November 7, 1980, that are reflected in your table there?

A (WITNESS HARMON) We positioned a man on shore, ascertained the meeting of the water with the

bank in order to determine the shore line, and then we measured distance out from the shore line with a split-image range finder, and used again two to three anchors and the same meter that I referred to earlier to determine the velocity readings.

Q And did you report approximate and maximum velocities at that time also?

A (WITNESS HARMON) In the same terminology, yes, basically prevailing currents.

Q And do you have your field notes?

A (WITNESS HARMON) No, I don't.

Q Do you recall how the meter was oriented when you took the maximum velocities?

A (WITNESS HARMON) Directly into the current.

Q And do you recall what direction the current was in from November 1980?

A (WITNESS HARMON) I measured the current in the downstream direction, which was where most of the current was prevailing. I made notes in the tabular report to Mr. Bourquard at I believe one location or two where there was some lack of downstream, predominant downstream movement.

Q Which locations were those?

A (WITNESS HARMON) Well, we did a transect 500 feet downstream from the intake site, and at about 82

feet offshore I noted that there was a slight downstream movement that we couldn't measure with a current meter. It might have been due to wind-driven currents, that sort of thing.

Q This is in November 1980?

A (WITNESS HARMON) Yes.

Q Other than that, are you able to say with certainty that the meter was oriented so that the flows were in the direct downstream direction, directly upstream-downstream, and not angled in either direction, towards Pennsylvania or New Jersey? Is that your testimony, that you remember that?

A (WITNESS HARMON) My testimony is that I recall that the predominant direction of the current flow is directly from upstream to downstream. I can't give you, as far as a degree determination, of five degree difference one way or the other from the maximum velocity vector.

Q Well, how about ten degrees? Can you give us ten degrees?

A (WITNESS HARMON) Not really, no. We oriented it -- in a field measurement of this sort, we orient it to read a maximum velocity, which was determined as a generally upstream to downstream direction, and then you read your velocities right there.

Q Well, you didn't, or did you, make any measurements to determine whether the direction was upstream or downstream? In other words, you didn't site each meter reading to see whether it was directly in the downstream current or to what extent it was out of the downstream current, did you?

A (WITNESS HARMON) We could tell from the orientation of the weighting rod that we used. In other words, you make a measure -- well, you have the meter up on board, you make a mark on your weighting rod as to where the meter is facing. And as this goes under water and you lose visual contact with it, you can still tell the direction of the orientation.

Q How precisely?

A (WITNESS HARMON) Precisely enough for our biological needs.

Q And what were your biological needs?

A (WITNESS HARMON) We needed to determine the general velocity patterns in order to make a biological evaluation.

JUDGE MORRIS: Mr. Sugarman, let me ask a question for clarification.

Did you relate the direction of the velocity meter with any geographical feature when you made these measurements?

WITNESS HARMON: With the shore line, and also the direction of the anchor lines that were out, landmarks upstream, the outcropping upstream, the bridge abutments -- things you could just see visually. We didn't lose contact, visual contact with the shore line or anything.

JUDGE MORRIS: Well, were the directions of the flow recorded anywhere?

WITNESS HARMON: Not in that sense, no. Flow was from upstream to downstream as the river flows right there, and that is what we were recording.

JUDGE MORRIS: Well, as I understand it the use of the instrument is such that you measure the maximum which you find by rotating the device so that you get the maximum flow, which is in the direction of the flow. But you didn't relate that direction of flow to anything else; is that correct?

WITNESS HARMON: Not in the sense other than we could tell basically which way the river was heading.

JUDGE MORRIS: I think I understand.

WITNESS HARMON: Not a compass reading or anything like that, that would give you more or less a bearing measurement or something like that, we did not.

JUDGE MORRIS: No such measurements were

recorded?

WITNESS HARMON: That's right.

JUDGE MORRIS: Thank you.

BY MR. SUGARMAN: (Resuming)

Q What was the nature of the meter that you used? What is it called?

A (WITNESS HARMON) It is a March McBurnie, is the name of the manufacturer.

Q It has a generic name, does it not?

A (WITNESS HARMON) Yes, it is called an electromagnetic sensing probe.

Q Now, Mr. Harmon, did you correctly and accurately measure the distances from the Pennsylvania shore in the course of your November 8 -- November 7th and 8th survey?

MR. CONNER: Objection. That's been asked and answered.

JUDGE BRENNER: Could I have that question read back, please.

(The reporter read the record as requested.)

JUDGE BRENNER: I will let him answer it as phrased, but we certainly had quite a few questions as to what he did. But you can ask him his conclusion in the words of your question.

Mr. Harmon, it's to you.

(Panel of witnesses conferring.)

WITNESS HARMON: We made some distance measurements with a split-image range finder, and subsequent to that we callibrated against known distances on shore. So on that particular day, although we did have an index of the distance, we corrected those in a subsequent correspondence to Mr. Bourquard.

BY MR. SUGARMAN: (Resuming)

Q And your corrections were based on what?

A (WITNESS HARMON) Based upon a set of known distances measured on land.

Q Well, I don't understand. Your numbers were off when you came back on November 7th, isn't that right?

A (WITNESS HARMON) The distance measurements were off due to the imprecision of the instrument. And we then measured known distances on shore and were able to correct our erroneous readings to the known readings on shore.

Q Who measured the known distances on shore?

A (WITNESS HARMON) Our staff did.

Q Well, isn't it true that Mr. Bourquard made a curve to correct your distance measurements?

A (WITNESS HARMON) We gave him the tabulated results of our corrections.

Q Well, I want to show you -- or I want to ask you -- there's a letter here from Mr. Bourquard to you that says, using the attached curve I came up with the following revised distances in Table 1 of the intake study.

A (WITNESS BOURQUARD) That is correct, I sent him that letter. But the curve was based on information that Mr. Harmon had furnished me.

Q Well, I'm trying to figure out how you correlated the known to the unknown, in other words how you took the numbers that were in error and tried to reconstruct them, and had any confidence that the instrumentation that was wrong in the first place could be corrected in the curve.

A (WITNESS HARMON) We measured the distances in 25-meter intervals on the 7th of November, 1980. Subsequent to that we went back on shore near our offices in a parking lot, measured out 25-meter intervals, and again accurately with a tape, and then got a corresponding reading with the viewfinder, rangefinder, and we corresponded those to Mr. Bourquard. I believe we did that verbally to him.

Q Well, what was wrong the first time, and why didn't the rangefinder give you accurate readings in the first place when you were out there on November 7th?

A (WITNESS HARMON) The instrument gave us inaccurate readings. I don't know exactly why it did. It just did.

Q Well, what I'm asking you therefore is, how do you know that the degree of inaccuracy was the same the following March when you went out in the parking lot and tried to correlate it?

A (WITNESS HARMON) I don't see why it would change that much. It wasn't used that much.

Q But it was wrong in the first place. You don't know what was wrong about it. You have no way of knowing whether it was wrong to the same degree or twice as much or half as much in the following March; isn't that correct? If you don't know what was wrong with it, how can you know that it remained stable?

A (WITNESS HARMON) It is just my belief that it remained fairly stable.

Q And the measurements were off by as much as 80 feet; is that correct, according to your calculations?

(Panel of witnesses conferring.)

A (WITNESS HARMON) That is at several hundred feet out. That is way out. You're talking at 500 -- 480 feet was a revised measurement versus 574 in the old measurement. For example, at 246 feet, which we measured in November, the revised reading was 236. So

the area of interest again was, we felt, fairly close.

JUDGE BRENNER: Excuse me. I missed the number for your 236 revised. What was the original reading?

WITNESS HARMON: 246.

JUDGE BRENNER: Revised to 236?

WITNESS HARMON: Yes.

BY MR. SUGARMAN: (Resuming)

Q Which numbers were used in this E-240.27, the corrected numbers or the original numbers?

A (WITNESS BOURQUARD) I used the corrected numbers on those plots, exhibit whatever you have there, No. 1.

(Panel of witnesses conferring.)

A (WITNESS BOURQUARD) I'm sorry. Exhibit E-240.27-1.

Q Now, what was the source of the information that the flow was 4500 cfs at the July 23rd-24th measurements?

A (WITNESS BOURQUARD) That was taken off of the rating curve that we had prepared.

Q Did you verify that flow with the USGS?

A (WITNESS BOURQUARD) We got the reading down at Trenton, which was around 5,000 cfs, if I recall.

Q So your rating curve was off by 500 cfs?

A (WITNESS BOURQUARD) No. There is 200 square miles of drainage area between Trenton and Point Pleasant.

Q And therefore?

A (WITNESS BOURQUARD) Therefore we have no reason to believe that our measurement is not correct.

Q Well, didn't you calculate or adjust, or didn't you determine that the Trenton values should be adjusted to 97 percent in order to represent Point Pleasant?

A (WITNESS BOURQUARD) Well, that takes into account when you have a straight run, where there is no change in flow over a number of days and you don't have any -- you only have a small amount of inflow between Point Pleasant and Trenton.

Q And what was the situation on these days that made that different?

A (WITNESS BOURQUARD) For one thing, it was the falling stages at Trenton. In other words, the river was falling.

Q And therefore?

A (WITNESS BOURQUARD) Well, it doesn't necessarily correlate between the two when you have a variation in stage. In other words, you don't have a direct drainage area relationship when you have a

falling or rising stage.

Q Well, didn't your -- didn't Mister what's-his-name in your office, who calculated Applicant's Exhibit 2, make an adjustment for 97 percent to prepare your rating curve?

A (WITNESS BOURQUARD) Yes. And that was -- he picked times when there was fairly even flows in there, and where there was not even flows during the month of October '81, he went back and took into account channel storage between.

Q Are you saying that the flows were fairly even at the other times that he made his rating curve, that he used to make his rating curve?

A (WITNESS BOURQUARD) I'm pretty they are, or at least if they weren't he took some account of that.

JUDGE BRENNER: Excuse me. Mr. Bourquard, you've confused me. How did we get involved with October 1981? I thought the 4500 cfs was measured on July 23, 1981?

WITNESS BOURQUARD: He was asking me about my curve that I had prepared, the rating curve that we had set up for the station, that I used to determine what the flow was past Point Pleasant on July 23rd, 1981. Now, this curve had -- in other words, the curve that we have in here we had prepared at the start. We had

measurements back in June.

But I see what you are driving at, that this was done in October. But we had started putting data together even prior to this July and had established a relationship between water surface elevation at the site --

JUDGE BRENNER: Well, his starting question is how do you know it was 4500 cfs on July 23rd? Was that your question, Mr. Sugarman?

MR. SUGARMAN: Yes, sir.

JUDGE BRENNER: And your answer, Mr. Bourquard, was that it was 5,000 cfs at Trenton.

WITNESS BOURQUARD: And we estimated it was 4500 at Point Pleasant.

BY MR. SUGARMAN: (Resuming)

Q That is only 90 percent of the flow at Trenton, right?

A (WITNESS BOURQUARD) Well, it is not a direct relation. The drainage area relationship --

Q I understand what you're saying, but 4500 is 90 percent of 5,000, is it not?

A (WITNESS BOURQUARD) That sounds about right.

Q And yet, Mr. Steacy in his tabulation, which is Del-Aware Exhibit 2 and which was used to make the rating curve, concluded that 97 percent of the Trenton

data was the basis, the appropriate basis for estimating the flow at Point Pleasant, did he not?

A (WITNESS BOURQUARD) Yes, I'm sure he did. But this was under, you might say, stable flow conditions, that you would anticipate that that would exist.

Q You're saying --

JUDGE BRENNER: Mr. Sugarman, can I ask one other, because Mr. Bourquard's reasoning loses me a little.

What was the flow at Trenton on July 24th, 1981?

(Panel of witnesses conferring.)

JUDGE BRENNER: And then I'm going to ask you for July 25th also, if you have it.

WITNESS BOURQUARD: July 24th was 5,080. July 25th was 4,330. July 26th was 3,860.

JUDGE BRENNER: Give me the 25th again?

WITNESS BOURQUARD: 4,330.

BY MR. SUGARMAN: (Resuming)

Q These measurements were made on July 23rd, were they not? That is to say, 240.27-2.

(Panel of witnesses conferring.)

A (WITNESS BOURQUARD) Yes.

Q What factor did you use -- well, what was the

flow on July 23rd at Trenton?

A (WITNESS BOURQUARD) 5,880.

Q 5,880?

A (WITNESS BOURQUARD) Yes.

Q What did we say was the travel time between Point Pleasant and Trenton?

A (WITNESS BOURQUARD) I think about 11 or 12 hours.

Q And yet -- and so the value on the 23rd was 5,880. The value on the 24th was 5,080. And yet you selected a Delaware River flow of 4,500 for this for Point Pleasant as of July 23rd, 1981?

A (WITNESS BOURQUARD) Yes.

Q Can you please state the basis for the calculation that you made that justified reducing that value by 25 percent, almost 25 percent from the recorded flow at Trenton on that day, and more than 10 percent from the recorded flow at Trenton the next day?

A (WITNESS BOURQUARD) Well, to a certain extent it was a matter of judgment.

Q A matter of judgment. Did you report that these were judgment factors that were taken into account in this figure?

A (WITNESS BOURQUARD) The whole concept here is to a certain extent a matter of engineering judgment.

The only actual measurement we had at Point Pleasant was the one made by the USGS at Lumberville, and that was made on September the 12th. I might point this out as a relationship between the flows at one or the other under certain conditions.

On September the 12th, the flow at Trenton was 4,070.

JUDGE BRENNER: Excuse me, Mr. Bourquard. This is 1981?

WITNESS BOURQUARD: 1981.

BY MR. SUGARMAN: (Resuming)

Q And how about on September the 13th?

A (WITNESS BOURQUARD) 3,660, a falling stage. The 14th was 3,320.

Now, an actual measurement made by the USGS, the U.S. Geological Survey, of the flow in the Delaware River at Lumberville just downstream of Point Pleasant on September the 12th was 3,340. Now, I might point out that the 3,000 -- that the U.S. Geological Survey is the agency that maintains the gauge at Trenton.

Q Are you saying on Del-Aware 2, the figure for September 12 is 3,640?

A (WITNESS BOURQUARD) That includes the flow down the Delaware and Raritan Canal.

Q And you're saying there is 300 cfs into the

Delaware and Raritan Canal?

A (WITNESS BOURQUARD) Yes. That was measured, also.

Q Isn't it true that the withdrawal of the Delaware and Raritan Canal is about 74 mgd?

A (WITNESS BOURQUARD) No. I think there is an allocation of 100 million gallons a day in the higher flows, unless there is some way to stop it. More could go down there.

Q Well, aren't there stop locks in there?

A (WITNESS BOURQUARD) As a control gate.

Q Yes, with stop locks, right?

A (WITNESS BOURQUARD) This is an actual flow measurement. So regardless of how the gate was set up, this was actually measured by the U.S. Geological Survey.

Q As an instantaneous value?

A (WITNESS BOURQUARD) That's right.

Q So you don't know whether it represents a daily value or what?

A (WITNESS BOURQUARD) Well, it should be reasonably close.

Q Isn't it true that the daily values vary as much as 5,000 cfs at Trenton from morning to night?

A (WITNESS BOURQUARD) I'm sure on some days

they vary a lot more than that.

Q So wouldn't it be -- how do you know? How can you take the instantaneous value of one moment at the D&R Canal and use that as the entire basis for a rating curve?

A (WITNESS BOURQUARD) Because we knew what the flow was at that instantaneous time just upstream from there. In other words, at the time they were making that measurement we were measuring the water level at the Point Pleasant intake site.

Q Right. But the rest of the values on your rating curve are derived from flows at Trenton, and you only have that one data point to relate the Lumberville Wing Dam to the Trenton gauge. And the data for the Trenton gauge are substantially different, are they not, for the purposes of constructing an entire rating curve?

A (WITNESS BOURQUARD) As I mentioned before in connection with the October, Mr. Steacy went back and examined -- in other words, let me start over again.

The flow is coming down the river during a rising or falling stage. Some of it is going into storage. That is, the water level is rising and some of the water is going into storage. And in a falling stage, some of it is coming out.

So taking that into account between Trenton and the Point Pleasant, he arrived at the figures that were developed in October 1981, and that pretty well gibed with the figures we had before.

Q Well, you say pretty well jibed, but you look on Del-Aware 2, line 1, USGS measurement, that is not the USGS measurement you're now telling us.

A (WITNESS BOURQUARD) What am I telling you?

Q You're saying that the USGS measured 3340.

A (WITNESS BOURQUARD) No. I told you that the USGS measured 3340 of the Delaware River at the Lumberville bridge which is just downstream. That 3340 does not include the flow that went in the Delaware and Raritan Canal, which flow, plus that flow that went by the Lumberville bridge, also passed in the Delaware River at Point Pleasant.

Q Well, then the asterisk on Del-Aware 2 is -- no, I'm sorry. May I see your copy of Del-Aware 2?

A (WITNESS BOURQUARD) I don't have it. I don't know what Del-Aware 2 is.

Q That is it.

(Witness handing document to counsel.)

JUDGE BRENNER: I don't remember what Del-Aware 2 is either, Mr. Sugarman.

MR. SUGARMAN: It's Table 1, a tabulation of available data attached to the letter of January 22nd, 1982 which was our prehearing exhibit, I believe 20-1.

JUDGE BRENNER: Which table of the January 22nd letter? And don't worry about your prehearing

exhibit. Which table of the January 22nd letter?

MR. SUGARMAN: Table 1. But there may be more than one Table 1.

JUDGE BRENNER: That's Applicant's Exhibit 2 you mean?

MR. SUGARMAN: Applicant's exhibit. I'm sorry. I was calling it Del-Aware exhibit.

JUDGE BRENNER: All right. I have got it.

Mr. Sugarman, I'm sure you know where you're going, but you've strayed in some details from where I thought we were headed when I last interrupted you, and that was to establish, if there is one, what the relationship is between flows in the vicinity of Point Pleasant and flows accounting for travel time at the Trenton gauge.

MR. SUGARMAN: Well, it's more than travel time, sir.

JUDGE BRENNER: Wait. I'm just prefacing my questions.

Mr. Bourquard, on September 12th, 1981 should I assume that the flow in the vicinity of Point Pleasant is about 3600 CFS?

WITNESS BOURQUARD: That would be correct.

JUDGE BRENNER: Yet on September 13th the flows at Trenton were also about 3600 CFS.

WITNESS BOURQUARD: On the 13th they were 3600 CFS, yes.

JUDGE BRENNER: Or somewhat over.

Now, why then, given that, is it correct, going back to the date I'm interested in of July 23rd, 1981, to use -- to state that this confirms your view that the flow was approximately 4500 CFS in the vicinity of Point Pleasant to get a guage reading on July 24th of something over 5,000 CFS at Trenton? It appears to me that there is a discrepancy in the correlations that you're relying on between the July 23rd date and at least the September 12th or 13th dates.

WITNESS BOURQUARD: We picked the flow off of our curve which we felt like had been confirmed by other measurements rather than using the Trenton gauge. We did not know whether -- what flow had come in between Point Pleasant and Trenton. And as you will notice, we used about 4500.

JUDGE BRENNER: Do I understand now that you don't rely on the Trenton gauge for a correlation or a check?

WITNESS BOURQUARD: Yes, we do rely on that. That is the only gauge that is downstream from here that has daily readings.

JUDGE BRENNER: Well, isn't there a

discrepancy of over 500 CFS in whatever correlation exists between that July time period and the September time period that you referenced as a check? That is the only reason I got involved in September. You told me this was a confirmatory check, and I don't see at all why it is a check.

WITNESS BOURQUARD: I don't know that I can explain it except that on the fact that there was a rapidly rising or falling stage in there. Starting with the 23rd, 24th and 25th it was dropping about 800 CFS a day on an average there, and this was our estimate as to what for the water elevation level we had at Point Pleasant was what the flow would be, around 4500.

JUDGE BRENNER: But, sir, on July 24th the flow at Trenton was still somewhat over 5,000.

WITNESS BOURQUARD: Yes, but we did not know what flow was coming in between that time, between Trenton and the Point Pleasant station.

JUDGE BRENNER: Do you think it went down rapidly and then back up again between the two readings on July 23rd and 24th?

WITNESS BOURQUARD: No. What I'm saying is there could very well have been considerable flow come into that 200 square mile drainage area between there, between the Point Pleasant intake and Trenton. We

picked the 4500 directly off of a curve we had prepared on the basis of other measurements, and you might say all of these are based on that. And the confirmation was by means of a USGS measurement.

JUDGE BRENNER: Which USGS measurement confirms your curve?

WITNESS BOURQUARD: The one on September the 12th.

MR. SUGARMAN: That's the one I was asking him about.

JUDGE BRENNER: Mr. Sugarman.

MR. SUGARMAN: I'm sorry, sir.

JUDGE BRENNER: My memory is usually good enough for the last three or four minutes of a hearing. I wanted him to tell me.

How did they measure that flow at Lumberville? With a gauge?

WITNESS BOURQUARD: Current meters.

JUDGE BRENNER: Why don't you measure it at Point Pleasant?

WITNESS BOURQUARD: Because it's difficult to get out in the river and measure it, and they have a bridge that they can work off of at Lumberville.

JUDGE BRENNER: Why didn't you have it measured at Lumberville on July 23rd, 1981 and November

7th, 1980?

WITNESS BOURQUARD: Well, this was -- I have no answer to why we didn't.

WITNESS BOYER: Again, I can --

JUDGE BRENNER: Mr. Boyer, I will let you add later.

WITNESS BOURQUARD: In other words, this was done as a favor by the USGS. In other words, they were requested by the authority to make a measurement on the river so that we could check our curve here.

JUDGE BRENNER: Well, sir, you have testimony here in support of your proposition as to what the minimum bypass velocities will be in the area of the intake structure at Point Pleasant given certain flow conditions, and we have to test the correlation of the right flow conditions to what you are saying about the velocity.

Given that, you tell me how do I know, how does this Board know what the flow is in the area of interest, Point Pleasant intake, or even that pool downstream to Lumberville at the time that these velocities were measured?

WITNESS BOURQUARD: Well, first off, if you go back to the first one where we had used 3,000 CFS, that is on November 7th. We had not finalized and not set up

in this any detail, our rating curve. The velocity reading at Trenton was just around 3,000, slightly less than that, for about three or four days.

On November 6th it was 3020. November 9th -- I'm sorry -- 7th was 2970. November the 8th was 2860. November the 9th was 2810.

Now, those are all fairly level flows, and you have a relatively constant flow condition in the river. And so we assumed we had -- I said 3000 CFS at Point Pleasant.

JUDGE BRENNER: Excuse me for a minute. I thought you told me not to pay very close attention -- those are my words -- to the Trenton flow because you don't know what flows were being added into the river between Point Pleasant and Trenton.

WITNESS BOURQUARD: At this stage of low flow such as this you would not have too much added in. In other words, this is a low flow condition.

JUDGE BRENNER: Have you analyzed what would have been added in on that day? How did you know that?

WITNESS BOURQUARD: Well, we don't know that. In other words, we only have the fact that there was a dry period in that particular time, and this was a drought condition or close to a drought condition.

JUDGE BRENNER: Okay. I interrupted your

explanation as to how we know what the flows were at Point Pleasant in correlation to these river velocities that were measured on those days, and you started with the November dates and gave me the Trenton flows. And let me allow you to continue the explanation.

WITNESS BOURQUARD: And by the time we came to the July measurement, the only thing we had then was the actual water level elevation, and we had prepared a curve which seemed to be very reasonable and checked out later with the USGS measurements. So we used that as a means of estimating what the flow was on July 22nd or 23rd, 1981.

JUDGE MORRIS: Mr. Bourquard, in your table you give those numbers, 3000 and 4500, and both have plus or minuses after them.

WITNESS BOURQUARD: Yes. That was one of the reasons.

JUDGE MORRIS: Could you supply a number for what the plus or minus might be for one sigma?

WITNESS BOURQUARD: I would say usually with something like that it's plus or minus whatever the last significant digit is which would be 500.

JUDGE MORRIS: Just to be sure the record is straight, you're saying 3000 plus or minus 500?

WITNESS BOURQUARD: No. Not the 3000, the

4500.

JUDGE MORRIS: Well, 3000 plus or minus what?

(Panel of witnesses conferring.)

WITNESS BOURQUARD: I would say that even though we do have a plus or minus, that should be pretty close, within a hundred or so.

JUDGE MORRIS: Thank you.

(Panel of witnesses conferring.)

JUDGE BRENNER: Mr. Bourquard, could you reference what is the rating curve?

WITNESS BOURQUARD: The rating curve is a graph, and I am not sure how it applies as far as your terminology or your exhibit numbers are concerned.

MR. SUGARMAN: It's in Del-Aware 31, sir, the prehearing package, and it is three or four sheets past the table.

JUDGE BRENNER: Is it part of any other responses to the staff or otherwise part of Applicant's Exhibit 1?

MR. SUGARMAN: I think it's part of E-240, but I'm not sure.

JUDGE BRENNER: Mr. Conner, do you know?

MR. CONNER: We're trying to find it here.

JUDGE BRENNER: Let's take a moment and see if we can find it here.

(Pause.)

JUDGE BRENNER: If this is in Del-Aware prehearing 31 I take it it was one of the attachments to Mr. Bourguard's letter to the Corps.

MR. CONNER: That is correct.

JUDGE BRENNER: Which in turn is Applicant's Exhibit 2. Well, I will leave it here at this point, but if somebody wants to use this for something, then they had better get it into evidence somehow.

WITNESS BOYER: I don't have that in my 31. I have it in 20-1, D 20-1 is the rating curve data and information.

JUDGE BRENNER: Well, I'm going to leave it at this point and let Mr. Sugarman continue his examination. Counsel can figure out what they want to do.

MR. CONNER: If it will simplify it for everybody, we will just simply put in all of the attachments to the June 22nd letter or the January 22nd letter, 1982, which should eliminate any confusion looking for documents.

JUDGE BRENNER: Well, I'm not prepared to do that right off the top of my head, and I don't know if Mr. Sugarman or the staff has a position. There is a large bulk of materials there, and I don't recall

offhand what all of those attachments are. Right now we are focusing on this.

MR. SUGARMAN: I would like to have our copies of that rating curve marked for identification, not for admission, as Del-Aware Exhibit 11. My copies are in two pages. In the xeroxing they were split, and they are attached. They are part of D 21 or D 20-1 and also a part of D 31. But I'm only asking that this two-page rating curve be marked.

The table Mr. Boyer keeps referring to has already been marked as Applicant's Exhibit 2.

JUDGE BRENNER: Let's go off the record for a moment, because all of these numbers are going to confuse the record.

(Discussion off the record.)

JUDGE BRENNER: Let's go back on the record and get the exhibit identified.

So Del-Aware Exhibit 11 for identification will be a one-page graph, although for now some of us have it on two separate sheets. In the lower righthand corner there is the initial RGS and the date December 10th, 1981. It is captioned at the bottom "Rating Curve, Point Pleasant Intake Site." And that will be Del-Aware Exhibit 11 for identification.

(The document referred to

was marked Del-Aware Exhibit No. 11 for identification.)

BY MR. SUGARMAN: (Resuming)

Q Now, as I understand it, Mr. Bourquard, the only piece of data that you have at the vicinity of Point Pleasant is this figure that you have at Lumberville which is adjusted to reflect the 300 -- you've added 300 CFS to the flow to reflect the recorded discharge into the D&R Canal.

A (WITNESS BOURQUARD) Yes. I added the measured discharge that went down the Delaware and Raritan Canal.

Q Do you know, first of all, what is the effect of the discharge into the Delaware and Raritan Canal out of the Delaware River on the flows at Trenton when the -- in light of the existence of the wing dam and the contraint on the flow through the wing dam, through and over?

A (WITNESS BOURQUARD) What is?

Q What is the relationship between withdrawal of, let's say, 300 CFS at the D&R Canal on an instantaneous basis and the flow at Trenton?

A (WITNESS BOURQUARD) Well, it depends upon how the control gates are operated.

Q Well, how can you add that entire withdrawal back in and use it as the sole basis for computing a rating curve?

A (WITNESS BOURQUARD) Well, it was measured at the same time the elevation was taken at Point Pleasant.

Q Yes, but doesn't the variation -- in fact, doesn't the effect on Trenton 20 miles downstream vary according to the timing of the withdrawal, the length of the withdrawal and the height of the water over the wing dam at the time?

A (WITNESS BOURQUARD) What I added it to was not the flow at Trenton but the flow at Lumberville at the same time.

Q All right. But you used it to construct a curve every other point on which was based on a relationship, a constant relationship between Trenton and Point Pleasant.

A (WITNESS BOURQUARD) Not necessarily a constant relationship. As you will see and as I mentioned before, we went back and analyzed the month of October and made adjustments for channel storage between Trenton and the Point Pleasant intake.

Q And where are those adjustments recorded, if anywhere?

A (WITNESS BOURQUARD) They are computation

sheets that are part of this July and January 22nd letter.

Q But those computation sheets say that the factor that was used was 97.7 of the flows at Trenton.

A (WITNESS BOURQUARD) The computation sheets that I'm referring to which are part of that do not state that. It is part of a package which was put together to show how the rating curve was prepared.

Q And where is the package? Is the package all in that January 22nd letter?

A (WITNESS BOURQUARD) It is.

Q All right. What sheet in the package shows how the October 1981 values at Trenton were adjusted for Point Pleasant?

A (WITNESS BOURQUARD) There is a sheet entitled PPS, Preliminary Design Sheet 1 of 4, and 2 of 4 and 3 of 4, and the rating curve is 4 of 4.

Q Right. I see those sheets. But I don't see in there where it says how you adjusted the October '81 data at Trenton to reach Point Pleasant values.

A (WITNESS BOURQUARD) I'm sorry. It isn't October. It is May data. I am off there. It is May that this was done.

Q You're talking about the May data?

A (WITNESS BOURQUARD) Yes. I apologize to the

judges. I was months off. This was May when this was done, '81, and not October '81. I don't know that you have the sheets that I'm referring to here.

JUDGE BRENNER: Don't worry about them for now. We have them, but they are not in the record in any form yet.

BY MR. SUGARMAN: (Resuming)

Q So you're saying each value of the May values, each value is a different relationship between Point Pleasant and Trenton, and they are not all 97?

A (WITNESS BOURQUARD) That is correct.

Q Well, on sheet 3 of 4 Mr. Steacy says use flows dated July 6, 1981. Mr. Steacy says use flows at Trenton reduced by 97.7.

A (WITNESS BOURQUARD) That's right. He did that on some of them.

Q It doesn't say some of them. It says all of them.

A (WITNESS BOURQUARD) Well, if it states that, it is not correct. It doesn't say all of them. It says use flows at Trenton reduced by 97 percent.

Q Well, it doesn't say -- I'm sorry. I misstated it. But it doesn't say for some of them, does it? It says use flows at Trenton.

A (WITNESS BOURQUARD) Well, I think you have to

realize this was made up for people that you might say were going to use this data and were going to understand what was being done. In other words, he did not try to cover every possibility in here. The drainage area was worked out, and where he felt like that there was not a drastic change in flows on the day, then he used the 97 percent. We only did one month, and that was May of 1981 where we went back and broke it down.

(Panel of witnesses conferring.)

Q Well, let's take sheet 3. I don't want to prolong this indefinitely, but I think we have to get a picture of how much judgment was used and how much precision was used in creating this rating curve which then became the basis for your velocity measurements. So I would like you to take sheet 2 of 4 which seems to indicate the adjustments that were made in May of 1981, and for the Board, these are attachments to Del-Aware 31, the prehearing numbers or the pretrial numbers, and it is the three sheets above the rating curve. And I would like to ask you to explain to the Board what the basis of those changes was.

A (WITNESS BOURQUARD) Well, he worked out the change in storage in here and took it into account. He took the Trenton discharge --

JUDGE BRENNER: I'm sorry.

Mr. Sugarman, this is not three sheets before the rating curve. It is the immediate sheet before the rating curve.

MR. SUGARMAN: I'm sorry. It is two sheets before the rating curve, sir. It is labeled "2 of 4."

JUDGE BRENNER: All right. I thought you meant 3 of 4. Thank you..

MR. SUGARMAN: 2 of 4 is the one that says 97 percent.

JUDGE BRENNER: That is the reason I asked you if you wanted to identify this material.

MR. SUGARMAN: I think I'd better now. I didn't realize I had to, but it looks like I do.

BY MR. SUGARMAN: (Resuming)

Q And this is getting -- well, dealing with sheet 2 of 4, you took the Trenton gauge height in the morning and did what?

A (WITNESS BOURQUARD) The Trenton gauge height. Then you have the Trenton gauge there. Then this is the rate of change in feet per hour is the next column.

Q Now, the rate of change of what?

A (WITNESS BOURQUARD) Stage.

Q Where.

A (WITNESS BOURQUARD) Trenton.

Q And where did you get that value?

A (WITNESS BOURQUARD) It is from a plot of the USGS data.

Q Which is what, twice daily, right?

A (WITNESS BOURQUARD) I think it is more than that. But actually they have a rating curve which gives a continuous reading.

Q Isn't it true that they record measurements only twice a day?

A (WITNESS BOURQUARD) No. I think it is recorded continuously.

Q But that they report measurements only twice a day?

A (WITNESS BOURQUARD) I don't remember. I would have to look at their records to see. As far as reporting, they generally only report the mean for the day in their publications, but the other data is available.

Q All right. Go ahead.

A (WITNESS BOURQUARD) Okay, then. The difference in storage in there in between, now there was a storage curve worked up for the channel between Point Pleasant and Trenton, and that's column 5. So the time in feet per hour is multiplied by that difference in storage in there, and it gives you a certain correction

factor which he applies to that storage. And in this case he added the flow at Trenton -- it was 11,500 CFS -- and he added that on to get 11,800.

Q Well, what is the correction factor that he used?

A (WITNESS BOURQUARD) The correction factor?

Q Yes. You say there was a certain correction factor. What was the correction factor?

A (WITNESS BOURQUARD) Okay. He added a correction factor, and as you will see in the note down at the bottom, he took into consideration the 97 percent which is the flow at Trenton, which is column 6, and then he added on the change in storage in CFS which was 680.

Q But he didn't add 680; he added 300.

A (WITNESS BOURQUARD) Yes, but he has multiplied it by 97 percent to get the change in storage area between the two.

Q He added the entire change in storage at Trenton?

A (WITNESS BOURQUARD) Yes. The 680.

Q That comes to -- well, strike that.

If I may take a minute.

(Pause.)

That comes to 12,126.

A (WITNESS BOURQUARD) No. 11,835, which he rounded off to 11,800.

Q Let's try again. Ninety-seven percent of 11,500 equals 11,155.

A (WITNESS BOURQUARD) And add 680 to that.

Q Equals 11,835, you're right. Now, what is the basis for adding the entire change in storage at Trenton over a 12-hour or a 24-hour period or a 16-hour period to the calculated discharge at Point Pleasant?

A (WITNESS BOURQUARD) I don't have the curve here. There is a curve plotted of flows during that month in which he tried to take into account the rise or fall in storage in between there. In other words, when a river rises a certain amount, part of the flow that came in upstream goes into channel storage. In other words, the -- if you have a point A upstream and there's a flow coming down there, and the river is rising, part of that flow has to go into increasing the depth of the river.

Q But at Point Pleasant? If there is an additional 680 CFS at Trenton at 18 hours later than the morning data, how can you say that that is translated back into -- on a one-to-one basis into additional storage at Point Pleasant retroactively?

A (WITNESS BOURQUARD) I'm not too sure I

understand what you're saying. In other words, when the flow is coming down the river and the river rises, part of the flow that came in from upstream had to be utilized to raise the level of the river, and that is all he has done.

Q Yes, but he has added the entire increase.

A (WITNESS BOURQUARD) Well, that is the incremental increase that is involved there, yes.

Q But he is saying that of the 680 CFS that showed up at Trenton 18 hours later, at Trenton, that this is without regard to what time the elevations were taken at Point Pleasant; that that entire amount must have been at Point Pleasant 18 hours earlier is what you are saying.

Isn't that right? Isn't that what that means? He said it went up 680 at the Trenton gauge. It went up 680 CFS at Trenton 18 hours later.

A (WITNESS BOURQUARD) No, I did not say that. No, I did not say that.

Q Well, what did he do?

A (WITNESS BOURQUARD) Well, just what I said; that as the water was coming down from Point Pleasant, a certain amount of it went into storage, and that was the 680 CFS. In order to provide that difference in storage and Point Pleasant and the intake, 680 CFS had to flow

in. So that must have gone by Point Pleasant in order to do that.

Q So that is the assumption, that 680 CFS must have gone by Point Pleasant, but at what time were the elevation readings made at Point Pleasant? Do you have the times of those readings on sheet 2 of 4?

A (WITNESS BOURQUARD) There are no readings at Point Pleasant. In other words, these are measurements of the related flow at Trenton related to the flow at Point Pleasant.

JUDGE BRENNER: I think he means the elevations in the left column, Mr. Bourquard -- in the second to the left column on 2.

WITNESS BOURQUARD: You mean number 2? Yes. These were water surface elevation readings at Point Pleasant, yes.

BY MR. SUGARMAN: (Resuming)

Q Yes, but at what time of day were they made?

A (WITNESS BOURQUARD) Usually -- this was usually made -- I don't really know exactly what time of the day they were made. They may have been made at different times.

Q So they may not relate to those midnight values at Trenton at all.

JUDGE BRENNER: Wait a minute, Mr. Sugarman.

I think he was still answering. He said -- Mr. Bourquard, you said --

MR. SUGARMAN: Mr. Boyer is trying to give him information at this point.

JUDGE BRENNER: Do you object to that?

MR. SUGARMAN: I would like to hear what Mr. Boyer has to say on the record.

WITNESS BOYER: On the sheet I have it has 8:00 a.m. written above column, the identification number 3.

BY MR. SUGARMAN: (Resuming)

Q Right. But it has no number written above column 2.

A (WITNESS BOURQUARD) I would have to go back to the letter to see exactly when they were made.

Q Now, you're saying that the assumption was made that all of the water that showed up at Trenton by midnight had to have been at Point Pleasant at the time of the same day in which the gauge reading was made or in which the surface water elevation was made at Point Pleasant.

A (WITNESS BOURQUARD) No. No, I did not say that. Going back again, I said that the flow going past Point Pleasant, that part of it went into raising the level of the river between Point Pleasant and Trenton.

And taking that into account and adding that two 97 percent of the flow at Trenton gave you what would be the flow at Point Pleasant.

Q But the question is: How much of it went into the value at Trenton, and how do you know that any of it went into the value at Trenton in the timeframe between the time the elevation was taken at Point Pleasant and midnight of that particular day at Trenton?

A (WITNESS BOURQUARD) I don't understand that.

Q How do you know what part of the change went in? You said that only part of the increase at Trenton had to flow by Point Pleasant or vice versa. How do you know which part?

(Panel of witnesses conferring.)

A (WITNESS BOURQUARD) You kind of lost me there. This water will eventually flow past Point Pleasant.

Q Past Trenton, you mean?

A (WITNESS BOURQUARD) Past Trenton, yes.

JUDGE BRENNER: Let me interrupt. Two questions ago, Mr. Sugarman, you said Trenton twice in one question when I believe you meant Point Pleasant. And although your question after that was clearer, I think the confusion was still lingering, if you will. So why don't you back up and break it up and ask the questions again that you want to ask, and try not to confuse Point Pleasant with Trenton as you go through the question.

WITNESS BOYER: Could I possible -- ?

JUDGE BRENNER: No, let him ask another question.

BY MR. SUGARMAN (Resuming):

Q What I want to know is how do you know if, even assuming that you're right that part of the flow past Point Pleasant will show up at Trenton and not be taken out at the D&R Canal or somewhere else, how do you know what part and when?

A (WITNESS BOURQUARD) I don't see where that makes any difference. We were trying to work out the flow at Point Pleasant based upon Trenton measurements.

Q Isn't it true -- but the question is you wanted to correlate that flow with a certain elevation reading, and you had the elevation reading?

A (WITNESS BOURQUARD) At Point Pleasant.

Q At Point Pleasant, but at a given moment you had it.

A (WITNESS BOURQUARD) Yes.

Q And how do you know that the water that you saw at Trenton later in the same day was at Point Pleasant at the time you took the elevation reading?

A (WITNESS BOURQUARD) The water at Point Pleasant -- well, what was taken into account was the fact that there was a travel distance down there. In

other words, the curve was -- that was prepared; I don't it in front of me, but he was able to judge what the flow was at Point Pleasant. I mean, what the flow was at Trenton.

Q Mr. Bourquard, I don't understand. Some of these elevation readings may have been taken at 4:00 o'clock in the afternoon. The time of travel to Trenton you estimate at 12 hours. It wouldn't show up in the Trenton gauge until sometime the following day -- the rise in the gauge or the fall in the gauge at Trenton. We don't know how that was determined.

JUDGE BRENNER: Mr. Sugarman, let me interrupt you because I know this question is going to be too long to grapple with and answer. Feel free to ask it, but in subparts.

BY MR. SUGARMAN (Resuming):

Q Couldn't these figures be off -- well, let me strike that and ask it another way.

If the elevation readings were taken at Point Pleasant in the afternoon in some cases, wouldn't that diminish your ability to calculate the difference at Trenton as a factor of travel time, or based upon the difference, based upon the travel time?

A (WITNESS BOURQUARD) I would say he would know when he did this; he had a graph of the entire month.

This was done in the following month, and we got information from the U.S. Geological Survey on what the flows were during the month of May 1981, and these were plotted. And he used that, so he was able to tell. He was looking back in retrospect and was able to tell what the flow would be at Trenton and the related flow at Point Pleasant.

And in any case, what he did here was attempt to relate the effect of storage. This is not -- I will have to admit it is not an exact determination, but it is something that is within the accuracy of rating curves.

Q Well, didn't it turn out to be to not fit the data that you got for October 1981?

A (WITNESS BOURQUARD) The data?

Q Didn't the October data have to be adjusted in order to locate it on this, the rating curve?

(Panel of witnesses conferring.)

Isn't that what you testified before?

A (WITNESS BOURQUARD) I don't think so.

Q You said because of rapid fluctuations in October 1981, that data had to be adjusted to go on this rating curve.

A (WITNESS BOURQUARD) No. No, I did not say that. I said September 12th, that there was a falling

stage on September 12th. And so, while the flow at Trenton on the following day was about 5000 cfs, we adjusted it down to about 4500.

JUDGE BRENNER: Okay, let's back up because we've got a lot of confusion. That is the July data, Mr. Bourquard?

WITNESS BOURQUARD: I'm sorry, July.

JUDGE BRENNER: October got into this, Mr. Sugarman, when Mr. Bourquard meant to say May, and he explained that. The September data was the data that Mr. Bourquard cited as being fairly constant in his view, at approximately 3000 cfs or a little over. And it also gave us some November data which he felt was similar.

All right, that is my recollection of the record. It is not testimony, obviously. I just want to orient you to all the states.

MR. SUGARMAN: I understand.

JUDGE BRENNER: Can I ask a question? Mr. Bourquard, you said before that this 97 percent adjustment really shouldn't be used for all cases, but your associate only meant to use it for this constant stage in the vicinity of 3000 cfs.

WITNESS BOURQUARD: When he had to use it in connection with this thing I was in error there. It was

used to take into consideration the adjustment but it was not the total adjustment in these particular cases.

JUDGE BRENNER: But he used it, for example, when the river went on May 11th from 5900 cfs at Trenton to 52,000 cfs on May 13th and to 35,000 on May 15th. And then, too, I can't tell if that's 39 or 37 thousand at Trenton. It looks like 39 on May 18th, and I'm reading from sheet two of four, column six.

Then on May 20th, 21,000, and then down to 15,000 on May 22nd, then down to 10,000 on the 25th and then to 8600 on the 27th. And a little over 8000 on the 29th. Hardly a stable river during that period.

WITNESS BOURQUARD: No. That is why he used channel storage in there. In other words, that is the purpose of the channel storage. In a rising and falling stage you don't get the direct relationship so we attempted to go back and take this one month and try to take into account the rising and falling stages by accounting for the flow that went in and out of storage at that time.

If you will notice the last two, on the 27th and 29th, if you are looking at sheet number two of four, you will see that the change in storage was zero, and 97 percent was applied.

BY MR. SUGARMAN (Resuming):

Q Now, would that indicate to you -- may I, sir?

JUDGE BRENNER: I want to add one other question. We are still back at the point on July 23rd of having 5800 at Trenton, and if I carry it over to the 24th, 5080 cfs at Trenton, and your estimate was that it was 4500 at Point Pleasant.

WITNESS BOURQUARD: Yes.

JUDGE BRENNER: And you don't think that is inconsistent with what was done on sheet two of four?

WITNESS BOURQUARD: No, no, I don't.

MR. SUGARMAN: May I note, sir, that the discharges at Trenton on those dates were --

BY MR. SUGARMAN (Resuming):

Q Mr. Bourquard, can you correct me if this is wrong? According to the USGS on July 23rd, 1981, the discharge at Trenton was 5,960?

A (WITNESS BOURQUARD) No.

Q And on July 24th it was 5,110?

A (WITNESS BOURQUARD) No.

A (WITNESS BOYER) Could I interject a short explanation here which hopefully will be clarying?

JUDGE BRENNER: Well, you know, we like to make Mr. Sugarman earn his keep here by asking questions, so we will keep playing the game.

BY MR. SUGARMAN (Resuming):

Q Do you have the USGS data sheets with you, Mr. Bourquard?

A (WITNESS BOURQUARD) No, I do not.

Q Do you know what they look like?

A (WITNESS BOURQUARD) Yes.

Q This is a USGS data sheet for July 1981.

JUDGE BRENNER: Mr. Sugarman, while he's looking at that, it's up to you if you want to let Mr. Boyer make a short explanation.

MR. SUGARMAN: No, I don't.

JUDGE BRENNER: Okay.

BY MR. SUGARMAN (Resuming):

Q What is the value on there for the mean discharge at Trenton on July 23, 1981?

A (WITNESS BOURQUARD) 5960.

Q And what is the mean discharge for July 24th, 1981?

A (WITNESS BOURQUARD) 5110, according to this.

Q And you adjusted that to 4500 for July 23rd?

A (WITNESS BOURQUARD) Yes.

Q At Point Pleasant?

A (WITNESS BOURQUARD) Yes. And the 25th is 4370.

Q Well, let's come back to the two figures that you cited as representing the zero adjustment from the 97 percent.

(Panel of witnesses conferring.)

A (WITNESS BOYER) I would like to converse with him for a moment, if you could hold your question.

(Panel of witnesses conferring.)

JUDGE BRENNER: Mr. Sugarman, I missed what you gave Mr. Bourquard to read from for the last three data points.

MR. SUGARMAN: That was the USGS data sheet for July 1981. And I'm going to ask that that be marked as an exhibit.

JUDGE BRENNER: You have a few things you will probably want to catch up and mark.

WITNESS BOURQUARD: Did you have a question?

BY MR. SUGARMAN (Resuming):

Q The question is turning to the two points that you referred to on page two of four, sheet two of four, as having reflected zero adjustments, that is May 27th and May 29th, 1981, in making up your rating curve, what is your point with respect to those numbers? Why is it that no adjustments were made?

A (WITNESS BOURQUARD) Well, there was a minimal amount of change in the channel storage.

Q What do you regard as a minimal amount of change in the channel storage?

A (WITNESS BOURQUARD) Well, here it was about a

tenth of a foot.

Q And that would convert -- a tenth of a foot?

A (WITNESS BOURQUARD) Yes.

Q A tenth of a foot in column four?

A (WITNESS BOURQUARD) Column three.

Q A tenth of a foot from what to what? Show me one that is significant in column three.

A (WITNESS BOURQUARD) Okay. In column three you will see that from the 22nd to the 25th you can see up around the 13th and 15th you had change of almost 10 feet. I don't have the curve here so I can't judge exactly how much it was, but when you got down to the 27th and 29th there was very little difference. So the curve probably did not show too much change in elevation in the intervening reach.

Q How are you showing -- how are you determining whether there is a change?

A (WITNESS BOURQUARD) On the basis of a plot of the gauge height at Trenton.

Q Do you mean from one line on column three to the next line?

A (WITNESS BOURQUARD) No. Well, it would be one line; only the curve that he was working from would have every day on it.

Q I understand that. But are you saying that

there is no change from the 27th to the 29th?

A (WITNESS BOURQUARD) I'm saying there was a minor change in the time involved there. In other words, it is a two-day period in which there was only about a tenth change in water elevation there. Now, I don't know what it was on the 28th or the intervening time, but evidently it was fairly constant then. It must have been pretty close to zero.

Q And what would that tell you about the flows? That the flows would be fairly constant?

A (WITNESS BOURQUARD) Yes. Yes. Basically, yes.

Q Well, from the 6th to the 8th the calculated -- I'm sorry, from the 4th to the 6th -- the calculated change in the Point Pleasant discharge in column seven is 1400 cfs; whereas, the change in the gauge over that two-day period is only a quarter of a foot. Is that right?

A (WITNESS BOURQUARD) Let's go through that again.

Q I beg your pardon?

A (WITNESS BOURQUARD) Let's go through that one more time.

Q From May 4th to May 6th.

A (WITNESS BOURQUARD) Yes.

Q The calculated discharge at Point Pleasant

changes by 1400 cfs.

A (WITNESS BOURQUARD) That's right.

Q And yet, the change in the gauge height at Trenton in that period is only less than a quarter of a foot.

A (WITNESS BOURQUARD) That came off the Trenton gauge, which -- it is their measurement. Now, you will notice if you read column six there is about a 1300-foot or 1300 cfs change in Trenton flow. That is taken off of the Trenton gauge.

Q I understand that, but now look at the period from the 25th to the 29th where there are two zero adjustments made to the 97 percent.

A (WITNESS BOURQUARD) Yes.

Q And in that period, the flow changes at Trenton by 2000 cfs.

A (WITNESS BOURQUARD) The 25th?

Q To the 29th.

A (WITNESS BOURQUARD) Yes.

Q The flow at Trenton changes in that four-day period by 2000 cfs.

A (WITNESS BOURQUARD) Yes. About 1000.

Q I'm sorry. And no adjustment was made to the 97 percent?

A (WITNESS BOURQUARD) This is the 27th. Each of

these is an individual computation in itself.

Q Well, let's do them individually, then. The change from the 25th to the 27th.

A (WITNESS BOURQUARD) That is what I'm saying. The 25th is a computation and the 27th is a computation.

Q I understand that. But the change in column three from one to the other is a third of a foot, and the change in flow at Trenton is 1700 feet, and yet, no adjustment was made to the 97 percent factor.

A (WITNESS BOURQUARD) That is because I said each computation is individual in itself and is not necessarily related to the prior computation.

In other words, the rate of change in the flow on the 25th was .012. This was applied to a storage factor to obtain an adjustment in here of 270, and I'm reading the 25th now. The 97 percent was applied to the Trenton discharge and 270 cfs was subtracted from the results to get 9,720.

Q All right. Now let's go on to the 27th.

A (WITNESS BOURQUARD) All right.

Q The gauge height changed by 32 tenths of a foot.

A (WITNESS BOURQUARD) No. This was a gauge height. The rate of change, the DHODT, was on that particular day, the 27th. It didn't necessarily have

anything to do with what was going on on the 25th or on the 29th.

JUDGE BRENNER: I think you are not communicating once again. He is talking about column three, Mr. Bourquard, and you're talking about column four.

(Panel of witnesses conferring.)

JUDGE BRENNER: Start again, Mr. Sugarman. Give him the two numbers from column two or from column three as to which gauge heights, the change of 32 tenths that you were talking about.

BY MR. SUGARMAN (Resuming):

Q The gauge height changes from 9.78 on the 25th to 9.46 on the 27th. Do you see that change?

A (WITNESS BOURQUARD) I see that.

Q And why wasn't an adjustment made to the 97 percent factor to provide for the change in storage?

A (WITNESS BOURQUARD) What was taken into account was how much the 9.78 changed on that particular day. In other words, there was -- there may have even been a rise. No. There was a falling stage, evidently, on that particular day, and it fell at a rate of .012 feet per hour. Now, that is just that particular day. It may have been only a matter of hours.

In other words, say ten hours, this was a

general slope of a plot of the flow.

Q From 8:00 a.m. to midnight?

A (WITNESS BOURQUARD) I don't know. I don't remember exactly what time it was selected, but it would probably be during, on, a six to eight or ten-hour period.

A (WITNESS BOYER) As further clarification on that item, if you look at the dates of the 11th when between the 8th and the 11th the river elevation went down but the correction was a positive correction since apparently on the 11th the tendency was to go upwards, because on the 13th it was considerably higher. So the change in DHDT, the change in slope, is taken over the period of time of interest, which would be related to the travel time. So it would be over five, six, eight-hour period.

Q Well, I understand what was done. You're saying, Mr. Bourquard, that these data are not exact. What degree of variance would you attribute to them?

A (WITNESS BOURQUARD) Most hydrologic data such as this is good to about three significant numbers.

Q Three significant numbers?

A (WITNESS BOURQUARD) Yes.

Q Which would mean what, for example, with respect to 10,000 cfs?

A (WITNESS BOURQUARD) Well, three significant numbers would be around 100, but that is as far as flows are generally listed down. And I would say it's not really accurate within that amount.

Q It is not accurate what?

A (WITNESS BOURQUARD) Within 100. In a 10,000 cfs flow it would not be accurate within 100 cfs.

Q Would it be accurate within 1000?

A (WITNESS BOURQUARD) I would say so, yes. Closer than 1000, I would guess.

Q Closer than 1000?

A (WITNESS BOURQUARD) Yes. And as you get smaller it gets a little more accurate as you go down.

Q Now, other than these calculations related to Trenton which went into construct this rating curve, -- and by the way, can you show us where on the rating curve the 70.4 value correlates to the 4500 cfs? The 71.4 value on July 20.

A (WITNESS BOURQUARD) Well, you just go up to 71.4 and read across and you will get 4500.

Q Couldn't you just as easily get 4200 or 4800?

A (WITNESS BOURQUARD) Not as easily, no. You might get 4400.

Q I note that the datapoint for the USGS at Kingwood at the bridge, even after being adjusted is not

on the curve; it is slightly off the curve. Isn't that right?

A (WITNESS BOURQUARD) It's slightly above it, yes.

A (WITNESS BOYER) But how much above.

A (WITNESS BOURQUARD) It's about a tenth. That's about as accurate as the curve is.

Q It doesn't plot on the curve. Would you agree with that?

A (WITNESS BOURQUARD) It is slightly off the curve.

Q You say you adjusted the May 1981 data because there were a lot of variations up and down in storage. Is that correct?

A (WITNESS BOURQUARD) Yes. Well -- yes, we adjusted the May data by making adjustments in general storage.

Q And how about the October 1981 data?

A (WITNESS BOURQUARD) No.

JUDGE BRENNER: What October data?

MR. SUGARMAN: I beg your pardon?

JUDGE BRENNER: What October data?

MR. SUGARMAN: The October data that is shown in Applicant's 2.

JUDGE BRENNER: Where is that? I don't know

where I am yet. Where is there October data in Applicant's 2?

MR. SUGARMAN: Items 15 through 18 on Applicant's 2 are October 1981 values. Applicant's Exhibit 2 is the tabulation of available data.

JUDGE BRENNER: Do you mean velocity measurements of Delaware River flow?

WITNESS BOURQUARD: It is tabulation of available data at the top of it.

JUDGE BRENNER: That is not Applicant's 2.

MR. SUGARMAN: I'm sorry, it must be Del-Aware 2. That is what I have on my sheet; it is Del-Aware 2.

JUDGE BRENNER: Del-Aware 2 in this case or in pretrial?

MR. SUGARMAN: In this case.

JUDGE BRENNER: Let's keep it straight because we've got a lot and you want us to follow along. All right. Give me a chance to get Del-Aware 2.

(Pause.)

Okay. I want you to slow down from now on, and this is for all counsel, to be more rigorous with these exhibit numbers because we are going to read this record later and it's going to be a mess. I don't care what page you want to ask your questions at. Slow down when you're going to use it, give the exhibit number and

use the one in this case or else identify it in this case before you ask about it.

Now, we are already 20 minutes past having used some documents that are not yet identified, which Ithought you would do. So you had better catch up during the midmorning break and get back as to those sheets from the attachments to Mr. Bourguard's letter to Mr. Denmar.

In any event, what you want to use now is in the case not once, but twice. It is -- the table itself is Del-Aware 2, and it was bound into the transcript following page 1376. In addition, the entire January 4, 1982 document which includes that table, Tabulation of Available Data, was marked for identification as Del-Aware Exhibit 7. So we've got it in both forms.

All right. Now I know what you're asking about.

BY MR. SUGARMAN (Resuming):

Q Was the October 1981 data adjusted?

A (WITNESS BOURQUARD) Yes, by the 97 percent. And I think you will see on here a good example of why we selected that October 1981. In other words, the flow variation at Point Pleasant, and I'm sure similarly at Trenton, amounted to less than about two-tenths of a foot. So, during the month of October 1981, which was a

low flow period and you had relatively constant flows all during that month, -- and so we used that because it was a good example of flows when channel storage would not have to be taken into account.

Q Then taking channel storage into account is a source of inaccuracy in the data?

A (WITNESS BOURQUARD) No, it is an improvement of the data.

Q But the necessity to do that creates problems in obtaining reliable data. Is that correct?

A (WITNESS BOURQUARD) I don't think so. It is a pretty standard procedure that is done by the USGS and most everybody that deals with flows.

Q But it does result in approximations.

A (WITNESS BOURQUARD) To a certain extent, yes.

Q Now your item number two, October 1980, that datapoint, did you make any adjustments to that?

A (WITNESS BOURQUARD) I'm sure we did, yes.

Q Do you know whether the adjustment was a straight 97 percent?

A (WITNESS BOURQUARD) I would think so but I'm not certain.

Q Do you recall whether there was any -- what the USGS value was at Trenton the following day after October 1?

A (WITNESS BOURQUARD) No, I do not.
Q Wouldn't it be necessary to consider that in determining, in taking into account the time of travel?
A (WITNESS BOURQUARD) It might be.
Q I show you the USGS data sheet for October 1981 and ask you if you would read the value for October 2nd, 1981. I'm sorry, 1980. The value at Trenton for October 2nd, 1980. This is datapoint two on Del-Aware 2.
A (WITNESS BOURQUARD) October 1st was 2770, October 2nd was 3130.
Q 3130?
A (WITNESS BOURQUARD) Yes.
Q And does the USGS have a special notation on 2770?
A (WITNESS BOURQUARD) Yes. It says here that the indicated data is less than desirable.
Q Do you see that notation on any other value for the month of October 1980?
A (WITNESS BOURQUARD) Yes.
Q How many other dates does that notation occur?
A (WITNESS BOURQUARD) Eight.
Q So the data that was selected for that point was a less than desirable data, correct?
A (WITNESS BOURQUARD) It came from that. But I would have to know what was indicated by less than

desirable.

Q Did you find out?

A (WITNESS BOURQUARD) No.

JUDGE BRENNER: Mr. Bourquard, why didn't you try to find out before using this datapoint?

WITNESS BOURQUARD: I did not have that sheet that Mr. Sugarman has there. In fact, I didn't know it was less than desirable.

JUDGE BRENNER: Well, who used the Trenton gauge d for October 1st, 1980? Who was it? Who selected that point to use?

WITNESS BOURQUARD: Well, I think it was Mr. Steacy and myself, and probably based upon telephone calls to the USGS at Trenton to get the gauge readings. And I don't recall their having made any mention of it having been less than desirable.

(Panel of witnesses conferring.)

JUDGE BRENNER: You did this on the basis of phone calls instead of USGS's data?

WITNESS BOURQUARD: What he has there, the USGS has not published their data for the Delaware for 1981 yet. In other words, I don't know where Mr. Sugarman got his sheet from, but they have not come out with their formal publication for 1981, and I would take it that this was something in advance of printing or

something like that that he obtained.

BY MR. SUGARMAN (Resuming):

Q The data I was asking about was 1980.

A (WITNESS BOURQUARD) That is what I say, 1980, yes.

Q And you're saying they haven't come out with the 1980 data yet?

A (WITNESS BOURQUARD) I'm sorry, I'm a year ahead of myself. I'm sorry, the 1981 data. But I still did not know and I don't recall that being indicated in the book that we have that shows the 80 data.

Q Given the uncertainties of this data and trying to relate it back to Point Pleasant with the datapoints that you had, did you consider taking your survey reflected on Policastro 1 and making a grid corresponding to the 100-foot intervals and utilizing the cross sections that were prepared by the Pickering, Courts firm for the Corp of Engineers at river mile 157.08, and river mile -- at section 122, river mile 156.52, and the Lumberville wing dam and making a hydronet of the area so as to determine what the relationship of flows and elevations and velocities would be on a direct basis?

A (WITNESS BOURQUARD) No. The cross sections you are talking about -- one of them is located 1000

feet above our station and the other is 2000 feet downstream. We did not use those, no.

Q Did you consider making your own cross section relationships and creating a hydronet and doing a hydrolic and hydrologic survey of the area?

A (WITNESS BOURQUARD) Well, using I think Paul's measurements here we found, in calculating from the velocity measurements that he made, that it pretty well jibed on the November 7, 1980 measurement. In other words, we used his velocity measurements and applied them to the cross section of the stream, and it worked out to be just about, as I recall, 2900 or 3000 cfs.

Q So you correlated those precise value at those velocities?

A (WITNESS BOURQUARD) Yes.

Q But that is just one data point?

A (WITNESS BOURQUARD) That is right.

Q Why didn't you do that for a range of flow values?

A (WITNESS BOURQUARD) Well, cross-sections don't help out at all unless you know what the velocity is at various points in the cross-section, and there is no velocity measurements made in any of the Pickering, Courts cross-sections that I am aware of.

Q Can't you use the velocities that you had together with the cross-sections and the elevations and the flows that Pickering, Courts had, and construct a hydronet of the area?

A (WITNESS BOURQUARD) No.

Q Can you at least determine where the major current will be? Even if you can't determine the velocities, can you not determine where the major current would be at various flows?

MR. CONNER: I would object to this line of questioning. The witness has explained what they did. Mr. Sugarman's speculation as to something else that might have been done which the witnesses said they

didn't do is in our judgment irrelevant to the record.

JUDGE BRENNER: No, objection overruled. He is allowed to probe what a reasonable investigation by experts might have considered, and as part of that he is entitled to probe whether they considered certain things, and we will hear the witnesses' answers.

WITNESS BOURQUARD: Well, basically, we didn't consider it because we did not have any velocity measurements, and if you look at a cross-section of the stream, you just normally assume that the major flow occurs in the deepest part. Aside from that, it doesn't tell you anything finite.

BY MR. SUGARMAN: (Resuming)

Q Didn't you have an unusal -- at least a basis for believing that there might be a different situation here in that the bar was affecting the direction and extent of the current?

A (WITNESS BOURQUARD) You mean the bar?

Q The bar at the Tohicken.

A (WITNESS BOURQUARD) Well, we knew the bar was there, and we know what the flows were at that particular section. That is what we needed to know to estimate the discharge measurements.

Q But your data, with all of the points that we made about adjusting the July 23rd reading and having to

adjust the data to approximate storage, and having to change the September 12th data because of the change in storage there, and those kinds of what you have described as engineering judgments, wouldn't it have been better in order to determine the hydraulics and hydrology of that area to have made a hydronet of the area?

A (WITNESS BOURQUARD) If you had all of the data and the data had all of those sections, it possibly would. I don't see how it would have helped out any. We had -- The point we were working for was right at the intake site, and we concentrated our measurements at that site, which is the only point we were really concerned with.

Q You only made two measurements at that site, November 7th, 1980, and July 23rd, 1981, at two flows, and one of those flows you adjusted a 25 percent from that day's flow at Trenton. Do you consider that you had the best data that would be reasonably available after making appropriate studies to determine what the velocities will be at the intake at different flows?

A (WITNESS BOURQUARD) Yes.

Q Two data points?

A (WITNESS BOURQUARD) Yes. And you might say we used the ones from -- The other data points that we

used fell in line, so it would indicate confirmation.

Q They fell in line with adjustments to try to approximate storage?

A (WITNESS BOURQUARD) Well, you have this approximate storage you keep coming up with, but it is a relatively -- it is the engineering way in which this was handled.

Q Wouldn't it have been better to handle it engineeringwise by having a hydronet at the site?

A (WITNESS BOURQUARD) I don't really know what you mean by a hydronet.

Q I mean a hydraulic -- a hydrologic and hydraulic model of the cross-sections and the flows and the velocities that were representative flows and velocities and cross-sections in order to determine how that area would work at various flows and elevations.

A (WITNESS BOURQUARD) I don't feel like a hydronet would have helped you out much, not the hydronet that you are talking about.

Q What kind of a hydronet would have helped us out much?

A (WITNESS BOURQUARD) What we did. In other words, we took measurements at the site. We took some upstream and some downstream.

Q How did you use the upstream velocity

measurements?

A (WITNESS BOURQUARD) Just by guidance as much as anything else. They were quite a distance away, about 100 feet away, 100 feet upstream and 100 feet downstream. In one case they were 500 feet. They were used as general guidance.

Q You have been out on the site. You observed that the current is in specific areas, and there are still areas and areas where there is current. Is that correct?

A (WITNESS BOURQUARD) Yes, there are still areas, and there are areas where there is current.

Q And it changes at different flows, right?

A (WITNESS BOURQUARD) Yes.

Q And do you have a curve of the river to show more than those two data points where the main flow of the channel would be at different flows in the river?

A (WITNESS BOURQUARD) Well, it is indicated by the curve. That is a plot of the velocities.

Q Those are two data points.

A (WITNESS BOURQUARD) Yes.

Q One of them was adjusted more than 25 percent in terms of the flow from that day's flow at Trenton?

A (WITNESS BOURQUARD) Now you speak of adjustment. My adjustment was not an adjustment. It

came off of a curve which I felt like was accurate. In other words, you are adjusting the Trenton flow. I am not doing that. I am taking my 4,500 off of a curve which I prepared. I didn't adjust the Trenton flow. I noted it. But I didn't adjust it.

Q Where did you note it?

A (WITNESS BOURQUARD) Well, I mean, I looked at it.

Q And you reported you flow off of your curve and did not report the Trenton data.

A (WITNESS BOURQUARD) That's right.

JUDGE BRENNER: Mr. Sugarman, whenever it is convenient, we will take a break.

MR. SUGARMAN: This is a good time.

JUDGE BRENNER: During the break, I want you to catch up on the ones you have used that you want to get in for identification. There are portions of what is already in or attachments to what is already identified as Del-Aware Exhibit 7. That is Mr. Steacy's memo. And I wish we had been farsighted enough to get everything in together instead of spread out. In the future, I want you to identify something that you know you are going to ask questions about at the time of your first question or just before so we can have it marked, and then the questions will proceed, but for now I guess

you want to at least get that May, 1981, table. The page before it that explains the adjustment for storage, and Column 5, and you consider whether you want Sheet 3 of 4 that you also asked questions about. Just consider all of this over the break, and we will be back at 10:45.

(Whereupon, a brief recess was taken.)

JUDGE BRENNER: Let's go back on the record.

You may continue your examination, Mr. Sugarman. We are still on the same question or two, I guess. Do you want to identify these documents that you have used?

MR. SUGARMAN: Yes, sir, I do, but I want to find something that I had here when I left, if I could have just a moment to get reorganized here.

(Pause.)

MR. SUGARMAN: I would like to have marked as Del-Aware Exhibits, as Del-Aware 12 would be the USGS sheets for October, 1980, May, 1981, and July, 1981, if those could be marked as Exhibit Del-Aware 12.

JUDGE BRENNER: Are you going to give us copies?

MR. SUGARMAN: Yes.

(The document referred to was marked for identification as Del-Aware Exhibit Number 12.)

MR. SUGARMAN: Del-Aware 13 would be Sheets 2 of 4 and 3 of 4, both shown as computed by RES, checked by APB, entitled PPPS Prelim Design, and the first sheet is dated Discharge-Stage Data at Intake Site. The

second sheet is dated Discharge Versus Elevation Data at Intake Site.

JUDGE BRENNER: Could I suggest that we also include Sheet 1 of 4?

MR. SUGARMAN: I have no problem with that.

JUDGE BRENNER: Do you have it?

MR. SUGARMAN: I don't have copies of it. I have copies in the previous submissions, though, so there are copies, but I don't have more copies.

JUDGE BRENNER: I thought I made that suggestion before the break.

MR. SUGARMAN: You may have. I apologize if I didn't pick up on it.

(The document referred to was marked for identification as Del-Aware Exhibit Number 13.)

JUDGE BRENNER: The reason I suggest it is that it explains, if you look at the note for Column 5, it has a cross-reference back to Sheet 1. If you could catch up and put the top sheet in it, we will mark those three sheets as Del-Aware Exhibit 13. For context, they are attachments to the Steacy memorandum which has already been identified as Del-Aware Exhibit 7 for

identification, and they are also the three sheets preceding the rating curve which is Del-Aware Exhibit 11 for identification, I believe, and I am not sure of that. Forget about the last part, but at least these are the three sheets that follow Del-Aware Exhibit 7.

Is there any objection to admitting 11, 12, and 13 into evidence? Given the use of it, it seems to me it has gone way beyond mere identification. For example, you want to use the USGS numbers.

MR. SUGARMAN: Twelve I would offer. Eleven and 13 are not mine.

JUDGE BRENNER: Well, unless there are objections, why don't we put them all into evidence?

MR. SUGARMAN: Well, I object to them for the purpose of proving the truth or supporting the conclusions of the applicant.

JUDGE BRENNER: They have been cross-examined about the truth of the matters asserted in them, and I suspect they are going to continue to be examined on redirect and maybe board questions on the truth of the matters.

MR. SUGARMAN: I fully appreciate that, but the applicant, if it wanted to put those in evidence, should have brought Mr. Steacy in. Then we could have found out more about them. I don't think a foundation

has been laid. Mr. Bourquard doesn't have much of the information underlying them.

JUDGE BRENNER: All right. I will leave it for the applicant, and let them do what they want to, but you are moving Del-Aware Exhibit 12?

MR. SUGARMAN: Yes.

JUDGE BRENNER: Any objections to that, Mr. Conner?

MR. CONNER: We are not objecting, but it is not identified anywhere on any of these sheets, what they are. We only have Mr. Sugarman's representation, and it might be a little more specific that he in fact obtained this from USGS or whatever, but the documents themselves do not reflect what they are.

JUDGE BRENNER: All right. Why don't you better identify the document as to what it is from?

MR. SUGARMAN: They are from the USGS publications of the data that they recorded at the points that are indicated.

JUDGE BRENNER: What are they from? We only have three loose sheets here.

MR. SUGARMAN: They were supplied to me. I don't have a direct chain from USGS. The people who do will be here.

JUDGE BRENNER: I am sorry. I didn't hear

you.

MR. SUGARMAN: I don't have a direct chain from USGS. I didn't get them from USGS. I got them from Mr. Phillippe, who got them from Mr. Miller, who got them from USGS.

JUDGE BRENNER: Well, I wasn't quibbling with whether or not you got it directly. Do you know what publication they are excerpted from?

MR. SUGARMAN: No, sir. They are the data that gets published by USGS, but I don't know. I don't believe they are in a publication as such. They may be. I think they are published as they are.

JUDGE BRENNER: Do you want to admit them subject to check, Mr. Conner, and we can ask Mr. Phillippe and Mr. Miller or whoever?

MR. CONNER: You can't tell from this whether this is an official publication or not, and that is my only point, but for the record we will ask that Del-Aware 11 and 13 be received in evidence, having already been identified.

JUDGE BRENNER: Well, you have got his objection already in advance of your moving it in that you don't have a sufficient foundation, given the knowledge of these witnesses, and what is your response?

MR. CONNER: Do you want me to respond?

JUDGE BRENNER: Yes.

MR. CONNER: I think Mr. Bourquard has clearly shown what these documents are and how they were prepared and how they were used, and on that basis I submit there is more than an adequate foundation for the documents.

JUDGE BRENNER: Mr. Bourquard, how were you involved in preparing these documents with Mr. Steacy? Mr. Steacy is your employee?

WITNESS BOURQUARD: Yes. Mr. Steacy is a former district engineer with the U.S. Geological Survey who is retired and works for us, and when he prepared this, we went over it at the same time while he was doing it. We reviewed the data. He did the computations.

JUDGE BRENNER: You were there when he prepared it?

WITNESS BOURQUARD: Yes. I wasn't sitting by him, but I was in the same office.

JUDGE BRENNER: Well, did you discuss what he was doing?

WITNESS BOURQUARD: Oh, yes.

JUDGE BRENNER: Did he do it under your direction?

WITNESS BOURQUARD: Under my direction, yes.

MR. SUGARMAN: Sir, really, if I may be heard in support of my objection, these are very complex computations, and especially the adjustments that were made to approximate the changes in storage that led to adjustments in the Trenton gauge data, and I am not saying Mr. Steacy is or is not who Mr. Bourquard says he is in terms of his former title and whatever expertise he may or may not have in this field, and whatever knowledge he may or may not have had as to the changes in storage between Point Pleasant and Trenton, but this is a very complicated set of adjustments that were made, and I think that before it would be admitted into evidence, we ought to have the opportunity to cross-examine the individual who made them.

The applicant did not include this in its offer of testimony or in its exhibits, and it came up in cross examination, and I don't think it is appropriate or within the rules for this to be included, to be admitted as an exhibit without Mr. Steacy having been noticed as a witness and having been made available and his testimony having been prefiled, and so on and so forth.

I mean, this is -- we have gone a long way from the applicant's prepared and filed testimony.

JUDGE BRENNER: That is a different point than whether or not -- let me cut you off, because I think I know where you are going. The matter comes down, Mr. Sugarman, to whether or not you have been deprived of the ability to cross examine the documents by the absence of necessary witnesses.

MR. SUGARMAN: Exactly.

JUDGE BRENNER: And technically it would come in as being performed by persons under Mr. Bourquard's supervision, with some involvement by Mr. Bourquard. It also may fit under Rule 703 as a type of approach reasonably relied upon by experts, although I am not sure of that from what we have so far. What would you want to know about this that you have not been able to learn from Mr. Bourquard?

MR. SUGARMAN: The basis for the adjustments that were made and the time frames that were used, if there were time frames used, to compute the time of travel, to take the time of travel into account to Trenton, and to evaluate the extent to which changes in storage at Trenton relate to changes in storage at Point Pleasant on an individual ad hoc one by one basis.

JUDGE BRENNER: Well, you didn't ask him very much about that in my opinion, that is, Sheet 1 of 4, as to how they did the storage adjustment.

MR. SUGARMAN: As I understand that sheet, 1 of 4, it does not, and I don't have it in front of me any more, it does not -- well, maybe I don't.

(Pause.)

JUDGE BRENNER: Mr. Conner?

MR. CONNER: To save time so we can get moving, suppose we offer it merely to show what the rating curve is and how it was prepared, and have it limited to that, because that has been the matter under discussion.

JUDGE BRENNER: Well, if you limit it to that, you are not going to be able to use this rating curve for demonstrating what flows, what velocities there are at different flows. So it is up to you.

MR. CONNER: I don't agree with your characterization. The witnesses have testified this would merely illustrate what they did.

JUDGE BRENNER: Well, if you want to leave it at that, that is your business.

MR. CONNER: Let me just withdraw the offer at this time so we can get moving. We can sit here and debate this all day and not get anywhere, and we have witnesses still on the stand.

JUDGE BRENNER: Is Mr. Steacy available?

WITNESS BOURQUARD: I would assume so, yes.

JUDGE BRENNER: Is he here?

WITNESS BOURQUARD: No, he is not here.

JUDGE BRENNER: Give us a moment.

(Whereupon, the board conferred.)

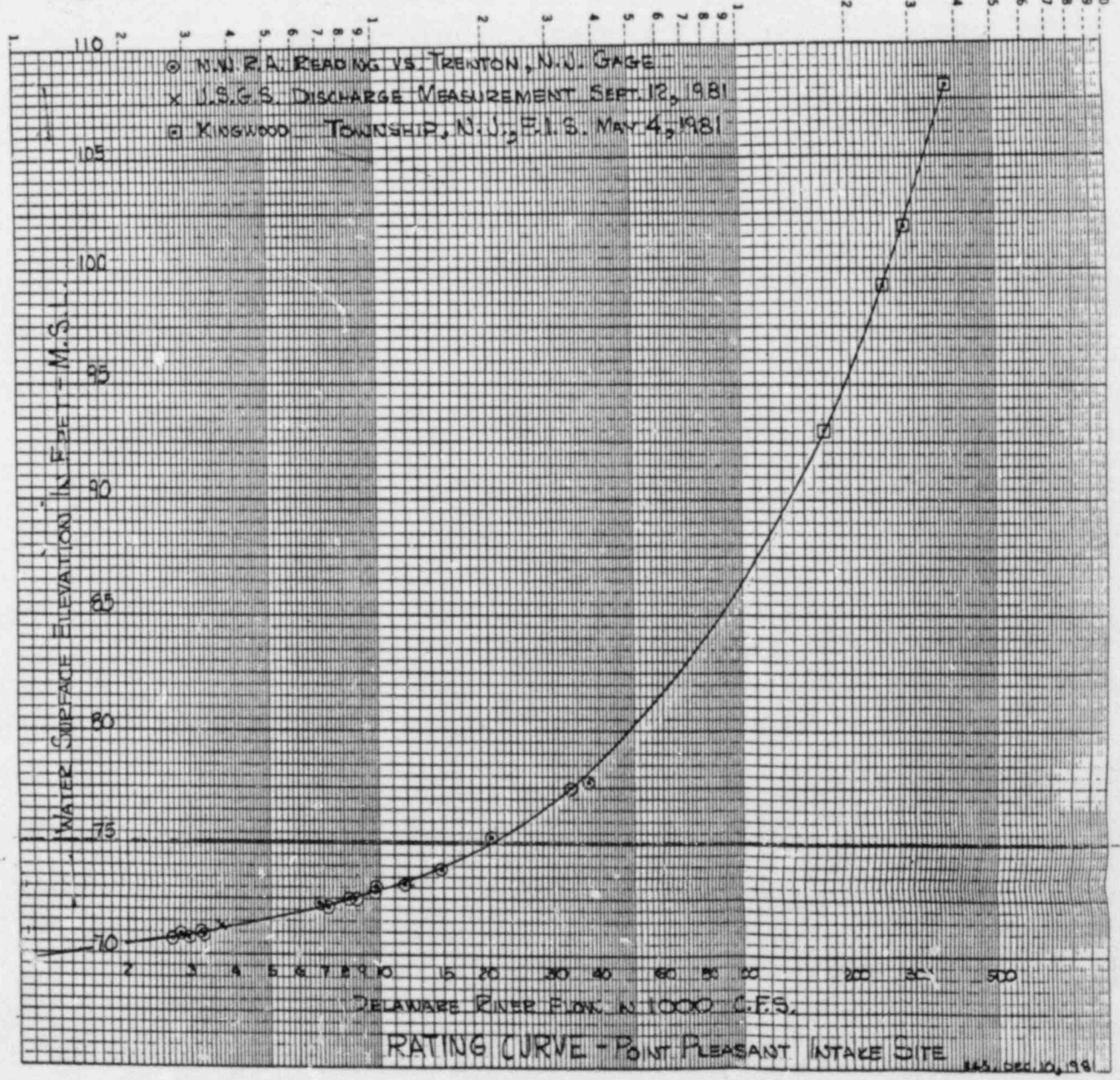
JUDGE BRENNER: All right, Mr. Conner. We will allow you to withdraw the offer. So it is in for identification for the use it was made of in the examination, and it will not be relied upon for the truth of the matter asserted, so all you have got is what the witnesses testified to in response to questions, and nothing beyond that. So only Del-Aware Exhibit 12 is admitted into evidence, subject to check and some better identification through whatever witness Mr. Sugarman wants to use for that, and make sure you do that, Mr. Sugarman.

(The document referred to, previously marked for identification as Del-Aware Exhibit Number 12, was received in evidence.)

JUDGE BRENNER: Del-Aware Exhibits 11 and 13 are in solely for identification. I would like to bind all of these exhibits in for convenience at this point in the transcript.

(Del-Aware Exhibits 11, 12, and 13 follow.)

INSERT #1
D-11


K•E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO.
46 5490
⊙ N.W.R.A. READING VS. TRENTON, N.J. GAGE
X U.S.G.S. DISCHARGE MEASUREMENT SEPT. 12, 1981
⊡ KINGWOOD TOWNSHIP, N.J.; F.I.S. MAY 4, 1981
WATER SURFACE ELEVATION IN FEET - M.S.L.
110
105
100
95
90
85
80
75
70
2 3 4 5 6 7 8 9 10 15 20 30 40 60 80 100 200 300 500
DELAWARE RIVER FLOW IN 1000 C.F.S.
RATING CURVE - POINT PLEASANT INTAKE SITE
DEC. 10, 198

D-12

SUMMARY SHEET

OCTOBER, 1961	New York City Reservoirs cfs				Delaware River at Montague Mean	Lehigh River at Bethlehem			Delaware River at Trenton Mean	Schuylkill River at Philadelphia 0800	Average Chlorides		Releases	
	Pepacton	Cannonsville	Neversink	Total	0800	0800	Dissolved Oxygen (at Easton)				At Benjamin Franklin Bridge	At Chester	From Beltzville	From Blue Marsh
					Q cfs	Q cfs	PPM	HRS.	cfs	cfs	PPM	PPM	cfs	cfs
1	309	442	45	796	1860 *	615	6.8	0730	2770*	364		555	200	50
2	309	1154	46	1509	1690*	545	6.4	0730	3130	254	50	620	300	100
3	309	1267	46	1622	1820*	885	6.2	0730	3210	598		583	300	100
4	309	1242	46	1597	2030	---	---	----	3480	---		563	300	100
5	309	1194	46	1549	1790*	840	---	----	3520	679		545	300	100
6	312	1213	46	1571	1820*	797	7.2	0730	3570	448		667	50	100
7	308	1049	46	1403	1940	744	7.1	0730	3280	427		704	50	100
8	308	1173	46	1527	2020	Out	7.4	0730	3090	343		641	200	100
9	309	1211	46	1566	2010	Out	7.3	0800	2930*	322		560	200	100
10	309	1221	46	1576	1960	480	6.7	0730	2950*	343		582	50	100
11	461	1074	46	1581	1960	428	---	---	3080	280		650	50	100
12	469	924	45	1438	1680*	Out	---	---	2990*	427		520	50	100
13	463	931	45	1439	1640*	Out	---	---	2940*	389		424	50	100
14	464	859	46	1369	1720*	300e	7.2	0730	2690*	322		500	50	50
15	461	835	45	1341	1700*	300e	7.6	0800	2630*	301	45	610	300	200
16	454	831	45	1340	1700*	346	7.4	0700	2760*	280		555	300	200
17	466	826	45	1337	1700	685	7.0	0730	2790	267		555	200	200
18	464	840	45	1349	1760	587	---	---	3030	343		600	200	200
19	684	574	45	1303	1620*	657	---	---	3180	706		560	200	200
20	679	514	45	1238	1520*	545	5.9	0730	3140	679		640	300	100
21	674	586	45	1305	1580*	601	5.6	0730	2850	598		645	300	100
22	682	631	45	1358	1630*	699	5.6	0730	2670*	427		635	300	100
23	679	657	45	1381	1630*	699	---	---	2780	280	<72	655	200	100
24	681	631	46	1358	1610*	601	---	---	2870	322		650	50	50
25	679	644	42	1365	1780	415	---	---	4740	267		900	50	50
26	294	407	17	718	2370	1360	---	---	8660	3687		340	50	50
27	19	26	17	62	2510	990	7.8	0730	6220	1385		330	50	50
28	20	26	17	63	2250	480	7.6	0730	4970	853		380	50	50
29	20	26	15	61	1570*	657	8.2	0730	4530	544		330	300	50
30	19	26	15	60	1260*	657	7.8	0730	3910	469		338	100	50
31	71	376	46	493	1240*	990	8.1	0730	3460	448		303	100	50
Normal October Flow cfs					2125	895			4020	605				
October Average					1788				3510					

e = estimated

Low Flow Transit Time Montague to Trenton = 48 hours.

*Indicated data is less than desirable.

Low Flow Transit Time Beltzville to Trenton about 42 hours, to Easton about 36 hours.

Low Flow Transit Time Marsh to Belmont Filters est. = 3 days.

SUMMARY SHEET - JULY 1981

	New York City Releases cfs				Delaware River at Montague Mean Q cfs	Lehigh River at Bethlehem 0800 Q cfs	Delaware River at Trenton Mean cfs	Schuylkill River at Philadelphia 0800 cfs	Chloride		Releases		
	Pepacton	Cannonsville	Neversink	Total					Fort Mifflin PPM	At Chester (7 day) Avg. PPM	From Beltzville cfs	From Blue Marsh cfs	From Nockamixon cfs
1	19	43	15	77	1910	1540	4810	880	--	42	69	105	11
2	19	26	15	60	1960	1560	4960	1615	--	45	89	105	11
3	19	33	15	67	1980	1630	5430	1980	--	47	89	296	11
4	73	141	15	229	1640	1678	6510	1540	--	49	89	293	11
5	19	637	46	702	2120	4500	7350	3910	--	48	89	296	11
6	70	478	46	594	2360	2140	7840	3960	31	47	89	942	11
7	70	162	19	251	2340	2090	7890	2860	--	45	89	296	11
8	19	121	17	157	2140	1640	7070	2620	28	43	89	257	11
9	70	70	46	186	2160	1640	6170	1690	28	41	89	145	11
10	71	200	46	317	2300	1490	5590	1420	--	39	69	104	11
11	101	209	71	381	1910	1300	5190	1180	--	36	69	104	11
12	121	729	91	941	1580	----	4880	----	--	36	71	104	11
13	70	662	88	820	1640	1100	4220	920	20	35	61	104	11
14	71	271	46	388	1790	1040	3880	880	25	36	61	104	11
15	107	144	71	322	1550	930	4080	760	--	36	71	104	11
16	105	555	48	708	1520	840	3880	760	31	37	71	104	11
17	71	599	48	718	1810	780	3550	710	30	37	56	100	1
18	71	657	46	774	1790	760	3450	680	--	38	54	100	1
19	101	1055	68	1224	1600	685	3550	650	--	40	56	100	11
20	93	811	70	974	1630	640	3650	600	33	43	54	93	11
21	104	373	63	540	2200	1580	5070	3910	38	45	54	145	11
22	101	275	17	393	2330	1490	6430	1420	37	47	54	257	11
23	19	25	17	61	2040	1390	5960	1500	37	48	54	93	11
24	19	25	17	61	1500	1140	5110	----	35	50	54	93	11
25	71	391	45	507	1640	1050	4370	----	--	53	54	93	11
26	71	848	45	964	1570	840	3880	----	--	57	54	93	11
27	71	950	45	1066	1740	1190	4730	----	35	59	232	95	11
28	71	356	45	472	1950	1870	7350	570	na	67	232	95	11
29	70	345	45	460	1760	1490	5430	730	na	71	81	98	11
30	71	343	45	459	1740	1140	4810	625	na	81	62	98	11
31	71	450	45	566	1620	1040	4290	540	na	89	50	93	11
Normal		July	Flow cfs		2240	1550	5070	1320					
Average		July 1981		498	1865		5210						

Low Flow Transit Time Montague to Trenton = 48 hours.
Low Flow Transit Time Beltzville to Trenton about 42 hours, to Easton about 6 hours.
Low Flow Transit Time - Blue Marsh to Belmont Filters est. = 3 days.
Low Flow Transit Time - Nockamixon to Trenton about 12 hours.

SUMMARY SHEET

May, 1981

	New York City Releases cfs				Delaware River at Montague Mean	Lehigh River at Bethlehem 0800	Delaware River at Trenton Mean	Schuylkill River at Philadelphia 0800	Chlorides		Releases		
	Pepacton	Cannonsville	Neversink	Total	Q cfs	Q cfs	cfs	cfs	Fort Mifflin PPM	At Chester (7 day) Avg. PPM	From Beltzville cfs	From Blue Marsh cfs	From Nockamixon cfs
1	19	25	15	59	8850	2340	11,200	1540	28	34	142	127	Spill
2	19	25	15	59	7200	2340	13,500	1940	--	34	142	127	Spill
3	19	25	15	59	5440	2440	12,600	1810	--	34	142	130	Spill
4	19	25	15	59	5350	2730	10,700	1420	30	33	142	132	Spill
5	19	25	15	59	4290	2710	9,730	1280	31	33	142	139	Spill
6	19	25	17	61	3980	2090	8,810	1180	33	33	142	142	Spill
7	19	25	15	59	3730	2050	7,850	1420	--	33	142	144	Spill
8	19	25	15	59	3400	1610	7,380	1110	--	33	116	147	Spill
9	19	25	15	59	3000	1560	6,850	1040	--	33	116	152	Spill
10	19	25	15	59	2490	1508	6,410	1010	--	33	116	155	Spill
11	19	25	15	59	3040	1610	6,590	1040	28	33	116	174	Spill
12	19	25	15	59	21500	5190	29,300	13800	33	33	439	214	Spill
13	19	25	15	59	32800	6540	56,300	5500	18	33	439	214	Spill
14	19	25	15	59	19800	5670	51,000	3852	16	31	439	211	Spill
15	19	25	15	59	14900	5260	34,700	3010	15	30	444	211	Spill
16	19	25	15	59	23200	8910	40,600	10700	--	28	444	211	Spill
17	19	25	15	59	21200	----	48,700	----	--	26	444	235	Spill
18	19	25	15	59	15300	5940	37,300	4900	28	24	444	426	Spill
19	19	25	15	59	11600	3990	27,500	3740	23	23	230	426	Spill
20	19	25	15	59	9040	----	21,500	3370	20	22	230	162	Spill
21	19	25	15	59	7340	4130	18,700	2910	15	21	230	125	Spill
22	19	25	15	59	6280	3150	15,300	2240	23	21	228	103	Spill
23	19	25	15	59	5220	2700	12,900	1900	---	20	228	101	Spill
24	19	25	15	59	4120	2580	11,400	1700	---	20	228	99	Spill
25	19	25	15	59	3600	2440	9,840	1620	---	20	228	97	Spill
26	19	25	15	59	3600	2340	9,010	1210	18	20	194	129	Spill
27	19	25	15	59	3490	2340	8,660	1210	11	19	182	185	Spill
28	19	25	15	59	2910	2100	8,420	1460	15	19	116	182	Spill
29	19	25	15	59	3060	2320	8,080	1940	18	19	116	127	11
30	19	25	15	59	2910	2260	8,420	1560	--	20	116	127	11
31	19	25	15	59	2260	2000	7,850	1420	--	20	116	127	11
Normal May Flow cfs					8020	2960	14,300	3040					
1981 Average May					8545		18,294						

Low Flow Transit Time Montague to Trenton = 48 hours.
Low Flow Transit Time Beltzville to Trenton about 42 hours, to Easton about 36 hours.
Low Flow Transit Time - Blue Marsh to Belmont Filters est. - 3 days.
Low Flow Transit Time - Nockamixon to Trenton about 12 hours.

SUBJECT [illegible]

COMPUTED BY RES' DATE 6-10-81 CHECKED BY KPB

Area of Delaware River TPPS site to Trenton Gage

D-13

Dist. Downstr From TPPS (Feet)	Width (Feet)	Av. Width (Feet)	Area (1000 Ft²)
0	450		
		450	4,500
10,000	450		
		425	4,250
20,000	400		
		500	5,000
30,000	600		
		700	7,000
40,000	800		
		710	7,100
50,000	620		
		610	6,100
60,000	600		
		590	5,900
70,000	580		
		690	6,900
80,000	800		
		780	7,800
90,000	760		
		755	7,550
100,000	750		
		875	8,750
110,000	1000		
		1050	10,500
120,000	1100		

Total 81,350,000 Ft²

change in storage in Delaware River, TPPS to Trenton Gage in Ft³/sec =

$$\frac{\text{Area} \times \text{change in stage in Ft/Hour}}{60 \times 60}$$

$$= \frac{81{,}350{,}000 \times \text{Ft per Hour}}{3600} = 22{,}600 \times \text{Ft/Hour in CFS}$$

EXHIBIT NO. 8

PROJECT PPPS - Preliminary Design SHEET NO. 2 OF 4
SUBJECT Discharge - Stage Data at Intake Site
COMPUTED BY RES DATE 6-10-81 CHECKED BY KDB

May 1981

Day	PPPS W.S. Elev (Ft)	Trenton Gage Height (Ft) 8:00 a.m.	dh/dt (Ft./Hr.)	Change in Storage (cfs)	Trenton Discharge (cfs)	Calculated PPPS Discharge (cfs)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	73.10	10.00	+0.030	+680	11,500	11,800
4	72.83	9.82	-0.007	-160	10,500	10,000
6	72.42	9.58	-0.016	-360	9,210	8,600
8	72.13	9.26	-0.006	-140	7,660	7,300
11	71.76	8.86	+0.006	+140	5,910	5,900
13	81.77	14.18	+0.092	+2080	52,200	52,700
15	77.48	12.80	-0.042	- 950	35,800	33,800
18	77.79	13.12	-0.045	-1020	39,400	37,200
20	75.25	11.46	-0.016	- 360	21,200	20,200
22	73.88	10.70	-0.021	- 470	15,800	14,900
25	72.92	9.78	-0.012	- 270	10,300	9,720
27	72.47	9.46	0.000	0	8,610	8,350
29	72.30	9.34	0.000	0	8030	7,790

1. Day of month
2. From NWRA ltr. of 6-2-81 (Letter dated June 5, 1981)
3. From USGS, Trenton.
4. From plot of USGS Data
5. (4) x 27,600, See Sheet 1
6. From USGS Trenton (Letter dated June 5, 1981)
7. [Col.(6) x 0.97] + Col.(5), 0.97 corrects for difference in drainage area.

PROJECT TTTS - Prelim. Design SHEET NO. 3 OF 4

SUBJECT Discharge vs Elev. Data at Intake Site

COMPUTED BY RES DATE 7-6-81 CHECKED BY KPB

Drainage Area at Intake Site

D.A. of Riegelsville, N.J. (includes Musconetcong River D.A.)		6328 Sq. Mi.
Intervening Streams		
Pa. Tinicum Cr.		24
Tohickon Cr.		112
Direct Flow 18 mi. x 1.5 mi.		27
N.J. Direct Flow 18 mi. x 5.0 mi.		90
Rough Estimate for Pt. Pleasant		6581
	Say	6600
D.A. at Trenton, N.J.		6780
Diff. Intake Site to Trenton, N.J.		
6780 − 6600 =		180 Sq. Mi.
Intake Site as per cent of Trenton		
6600 ÷ 6780 =		97.3 %
Use flows at Trenton reduced by 97.7.		

USGS Current Meter Discharge Measurements of Sept. 12, 1981 Received from NWRA

		cfs
Delaware River at Lumberville Footbridge		3340
Raritan Canal at Raven Rock	+	304
Total at Lumberville		3644
Less inflow from Paunacussing Creek	−	1
		3643
	Use	3640
Water Surface Elev. at Intake Site at time of USGS Measurement from NWRA letter of Sept. 14, 1981	Average	71.27 Ft MSL

Kingwood, N.J. Flood Insurance Study of May 4, 1981

Elevations for floods of 10 year, 50 year, 100 year, and 500 year recurrence interval for a point 5,000 ft upstream from the corporate limits are shown on Panel 01P

Corresponding discharges are listed on page 11 of the above report under the heading: "Delaware River at Confluence of Tohickon Creek"

JUDGE BRENNER: All right. We are ready to continue the examination.

BY MR. SUGARMAN: (Resuming)

Q Mr. Bourquard, you have concluded that the intake will never be -- that the intake will always be covered by four feet of water, and I would ask you how you can reconcile that with the fact that at the bridge upstream of Point Pleasant, the water elevations have been measured as low as 69.28 feet, and that is above sea level, and Point Pleasant is downstream from that bridge pier where the measurements were taken, and the top of the intake is at 66 feet above seal level.

MR. CONNER: I object to the form of the question. If Mr. Sugarman is reading from a document, he should identify the document and show it to the witness and let him see what he is referring to.

JUDGE BRENNER: He doesn't have to for every question, and given the nature of that question, I will rule in this instance that he doesn't have to. He can if he wants to.

WITNESS BOURQUARD: I don't know what flow this relates to, Mr. Sugarman.

BY MR. SUGARMAN: (Resuming)

Q But it was a flow in the Delaware River?

A (WITNESS BOURQUARD) Yes, but this could have

been -- there were flows in the Delaware River that were considerably lower in the past than was likely to occur in the future.

Q So your point is that it is not likely that it will happen?

A (WITNESS BOURQUARD) That's correct.

Q Your testimony then that it will not happen is in error?

A (WITNESS BOURQUARD) No, not necessarily. In other words, if the flow doesn't go below what we anticipate it would be, then it will have at least four feet of cover over the screens.

A (WITNESS BOYER) Again, the recent measurements and the rating curve show that that would not have occurred.

Q Well, the rating curve appears to be -- Does the rating curve appear to anticipate a water surface elevation of less than 70 feet?

A (WITNESS BOYER) No, it does not.

Q And yet the river has been measured upstream of the intake at the bridge piers at 69.13 feet, according to USGS.

A (WITNESS BOYER) The rating curves were taken that were made from measurements, and the USGS measurement that was made just below the Point Pleasant

intake is considered to be an accurate value made in recent times, and gives a good benchmark for the foundation of the rating curve in the neighborhood of a flow of 3,600 cubic feet per second.

Additional calculated points as shown on the sheet which was discussed prior to the break during October gives several values in the region of 2,700 to 3,300 cubic feet per second. All of these thus contribute to the verification of the rating curve line in that area flow.

Q That is in the 2,700 to 3,300 range.

A (WITNESS BOYER) Yes, up to, say, 4,000, and from the data which we discussed at higher flows, namely in the seven to 20,000 cubic foot per second range, in which there are many points, and from an examination of the data in relation to the rating curve which was drawn through those points, it can be projected with confidence down at least to the point where water stops flowing over the Lumberville wing dam.

Q And which is at elevation 70.7?

A (WITNESS BOYER) That's right, and there was a verification of level at 69.9 in the Lumberville wing dam. That was in the weir section, just below the point at which it overflows the wings, and the flow as indicated by Mr. Hansler in the prior week's testimony

on that time was in the neighborhood of 2,200 to 2,000 cubic feet per second. That is, the river flow.

Q Can you reconcile --

JUDGE BRENNER: Excuse me, Mr. Sugarman. Was that at Trenton or at the dam?

WITNESS BOYER: I think he stated it at Trenton. Yes, he stated it at Trenton.

BY MR. SUGARMAN: (Resuming)

Q That was on September 30, 1964?

A (WITNESS BOYER) Correct.

Q Do you know what the flow was at Trenton on October 1, 1964?

(Whereupon, the witnesses conferred.)

A (WITNESS BOYER) 3,030.

Q So what do you think that value of 69.9 related to?

A (WITNESS BOYER) Well, if you look at the rating curve, which is made up of a compilation of data over a long period of time, I would get more confidence out of picking a number from the rating curve than I would in looking at an isolated value at some point in time, at some location.

Q The rating curve, Mr. Boyer, is based on three months' data taken during three one-month periods at Point Pleasant and converted, or at Trenton and

converted to Point Pleasant by factors that included adjustments for storage, et cetera, et cetera, and you would place more confidence in that than a measurement at the Lumberville wing dam. Is that what you are saying?

A (WITNESS BOYER) That measurement was not at the Lumberville wing dam. The measurement was at Trenton.

Q Well, didn't you cite it just a minute ago as confirming the rating curve?

A (WITNESS BOYER) I said that the indication that water was essentially up to the wing walls when the flow as indicated at Trenton was somewhere, I said 2,200, it would be somewhere between 2,200 and 3,000, and you would have to say it was between those values, because you don't know when the rainfall came that started that increase, and where it occurred, so there is a question about the application of those numbers, but it is another indication that the rating curve is a reasonable curve, and you can rely on it, and I would come back, rather than argue over one particular point, I would come back to the values that are used in the generation of the rating curve, particularly the one that was made directly below the Point Pleasant site by the USGS, which is really a calibration for Point

Pleasant at that period of time which was relatively recently, and it comes in very well with other points which are tied into the Trenton gauge during a period of relative flow stability in the river, and during periods which cover several months.

Q That is the September 12, 1981, value at 71.27, at 3,640 CFS?

A (WITNESS BOYER) That is one plus the others down in the 2,900 to 2,850 to 3,300 range through the month of October.

Q Well, if we assume that the curve is reasonably accurate for that --

A (WITNESS BOYER) Plus, I might add -- I am sorry for interrupting, but there is also one tied into the Trenton gauge of October, 1980, which ties in at the same area.

Q If you assume that the curve is reasonably accurate in the 2,700 to 3,500 range, which is where those values are, does that give you -- did you conclude from that that it is more reasonable to rely on that curve for values, for elevations in the 2,000 CFS range as opposed to the actual data that USGS took on September 26th, 1964 -- I am sorry, that the Corps of Engineers took on September 26th, 1964, at Station 156.52, where they found an elevation of 69.4 feet?

A (WITNESS BOYER) I think it is 69.9.

Q 69.4. 69.9 was at the wing dam on September 30th.

A (WITNESS BOYER) Yes.

Q At River Mile 156.52, 2,000 feet downstream of Point Pleasant, or 1,800 feet downstream, we have an elevation of 69.4 when the flow is 2,200, and that was a stable flow, as we have heard testimony before.

A (WITNESS BOYER) All I can say is that that is data that is in the records for 1964, which is 18 years ago, and let it go at that, and I would stand by my statement that it is inconsistent. It is inconsistent with the rating curve based upon recent data, and therefore has to be in error.

Q But the lowest value in the rating curve is 2,700 CFS.

A (WITNESS BOYER) And you can project down to the neighborhood of 2,000 cubic foot per second without introducing an error of more than half a foot, and at 2,000 projected, it is 70.5 feet, and if it even has an error of half a foot, it would still be 70.

Q So you are saying that the measurement by Pickering, Courts for the Corps of Engineers was off by half a foot?

A (WITNESS BOYER) I am saying there is an

inconsistency there, and I suspect that there is either some errors or some information relating to that which we do not have available to us at this time.

JUDGE BRENNER: Mr. Sugarman, just for reference, since it has been some time, you are using Del-Aware Exhibit 1D for the Pickering, Courts reference to River Mile 156.52?

MR. SUGARMAN: Yes, sir.

BY MR. SUGARMAN: (Resuming)

Q Now I wish to ask you about the USGS data at the Byrum Bridge and this was marked as D-28 in our prefiling. For example, July 21, 1954.

A (WITNESS BOYER) That goes back 25 years ago.

Q I understand that. We have an elevation of 69.28 feet.

(Witnesses conferring.)

Q Well, doesn't that indicate that the elevation will be less than 70 feet and, therefore, that there will be less than four feet of water over the intake at some flows?

A (WITNESS BOYER) No, it does not.

Q That is upstream, you will remember, upstream of the riffle.

A (WITNESS BOYER) I don't care where it is. The rating curve is the accurate figure and is the one which currently ties together the gauge readings at Trenton with the flow values. There may have been a recalibration of the river flows and gauge stations between '54 and '64 and 1981. Do you know that?

Q Do you know that, sir?

A (WITNESS BOYER) I know that it hasn't occurred in the last year and a half, since the data we are using.

Q Do you know that there has been any recalibration since 1954?

A (WITNESS BOYER) No, I do not.

(Witnesses conferring.)

Q Let's look at that 69.9 value at the Lumberville Wing Dam, at the flow, where the flow was 2,200 at Trenton on the day that the reading was taken, at 3,000 or more at Trenton on the next day.

A (WITNESS BOYER) That's right. When you are having changes of that magnitude, you know something is going on, and to make comparative elevation readings between different points in the river when the flow is changing by 25 percent in the river is very precarious and should not be done unless you have a complete pile of information relative to the data that you are taking.

Q Why didn't you get a complete pile of information?

A (WITNESS BOYER) We aren't using that data.

Q Why didn't you get a complete set of data so that we would know what was going on?

A (WITNESS BOYER) We have a complete set of data for the rating curve and it includes a measurement made by the USGS. How much better can you get than that?

Q You have one measurement made by USGS, right?

A (WITNESS BOYER) Right, in the range where we are interested in.

Q Right, at one point.

A (WITNESS BOYER) And it ties in with other points tied into the Trenton gauge.

Q And some it doesn't tie in with that are recorded here at Point Pleasant.

A (WITNESS BOYER) At some time in prior history.

Q The closest recorded data at other elevations and flows, then, that one USGS, are all inconsistent with the rating curve, isn't that right?

A (WITNESS BOYER) Say that again.

Q The closest recorded data at Point Pleasant.

A (WITNESS BOYER) Where is that?

Q The Pickering, Courts 1964 observation at river mile 156.

A (WITNESS BOYER) Do you know what they were using for a benchmark?

Q No, I don't know what they were using for a benchmark.

A (WITNESS BOYER) Well, how do you know the data is accurate?

Q I will ask the questions. My point to you, sir, is that there is an inconsistency between the

rating curve, which has no values at less than 2,700, and the data that is recorded at values less than 2,700, and yet you insist on using the rating curve as the better source of data.

A (WITNESS BOYER) We stand on that statement.

Q And my further question is wouldn't it have been more prudent to have obtained the data to have made a direct study, a number of different flows at the intake location in this vicinity?

A (WITNESS BOYER) We have sufficient data in the intake area at relatively low flows because the number of times that flows have been down, other than this 1981 period, are practically nil.

Q Well, the number of times that flows have been down since when, other than the 1981 period?

A (WITNESS BOYER) For the last six, eight years.

Q So you have one bad year in six or eight?

A (WITNESS BOYER) Well, since Beltsville came in, reservoirs have been coming in to provide augumentation.

Q Isn't it true that most of the storage that is available now was available in 1964?

A (WITNESS BOYER) Not Beltsville, and that is a large storage.

Q When did Beltsville come in?

A (WITNESS BOYER) Either '65 or '7. I think '67.

Q Isn't it true, then, that most of the storage that is available now -- in fact, almost all of the storage that is available now -- has been available since 1966 or '67?

A (WITNESS BOYER) Well, that would be true, but there are other planned storages and there has been conversation relative to agreements regarding diversion of water to New York. So there are a lot of things that go on and I would call your attention to the good faith and the level B studies, which state that in the drought of the '60s it is not expected in an equivalent drought to that of the '60s. It is not expected that the flow in the river at Trenton would go below 2,500 and some cubic feet per second.

Q Didn't it go to 1,900 feet last year?

A (WITNESS BOYER) I don't know.

Q What do you know it went to? What was the minimum value? Have you seen the McCoy testimony? Do you have any reason to disbelieve that the minimum daily flow in January 1981 was 1,900 cfs?

A (WITNESS BOURQUARD) January of 1981?

Q Right.

MR. CONNER: I would again object. I would want him to show the witnesses documents. I don't recall that in McCoy's testimony.

JUDGE BRENNER: He doesn't have to to ask them the question, although I would like to know what is in there before we go too far. Is that from Table 1?

MR. SUGARMAN: Yes, sir.

JUDGE BRENNER: That is what I thought -- of McCoy.

WITNESS BOYER: Table 1 lists, as you said, in January a flow of 1,900. I don't know whether it's accurate or not, but I do know what Mr. Hansler, the Executive Director of the Delaware River Basin Commission and the one who is responsible for management of water flows in the Delaware River, said at these hearings a week ago.

BY MR. SUGARMAN: (Resuming)

Q And he said that in drought periods that they plan to maintain a flow of 2,500, is that right?

A (WITNESS BOYER) He said he did not expect the flow to drop below those values.

Q Based upon providing additional future storage, right?

A (WITNESS BOYER) No, sir, not based upon future storage -- based upon that which is available

now.

Q If you look at his testimony, I think you will see --

JUDGE BRENNER: You are getting too far afield. If you have got something you want to focus them on in the transcript, do it. Otherwise, get on to another question.

(Witnesses conferring.)

WITNESS BOYER: It is brought to my attention that in January of '81, which I believe there could have been an ice block, which would give a temporary reduction in flow over what would be the normal flow in the river.

BY MR. SUGARMAN: (Resuming)

Q Now you testified that low flow velocities would occur, you said, taking into consideration the percentage of time or area that such low flow velocities would occur. What is the percentage of time in which the low flow velocities would occur?

A (WITNESS BOYER) Well, again you have to relate it to the period of time when we would be expected to be withdrawing the maximum quantity. Our tables of utilization show through the year 2000 that we would only be withdrawing two-thirds of the maximum authorized 95 million gallons per day, and at the time

when river flows would be expected to be low, the months of concurrence would be the last part of June, July and August.

Q And what would be the anticipated frequency of low flows at that time?

(Witnesses conferring.)

A (WITNESS BOYER) Based on past history, which would be conservative, very conservative based upon the plans for water management in the Delaware River, since 1963 it would be three days in June we would not have 3,000 cubic foot per second in the river; fifteen days in July; and twenty in August would be the worst condition. If you go on a median year, it would be zero days in June, ten days in July and one day in August.

Q Can you state what percentage or what return frequency would be for a one-day flow of less than 3,000 cfs in June or July?

(Witnesses conferring.)

A (WITNESS BOYER) Well, you would have to develop a recurrence curve for the exact specifications that you spoke or requested.

Q Have you done that?

A (WITNESS BOYER) We have a recurrence interval in years in our environmental report.

Q For 3,00 cfs?

A (WITNESS BOYER) Well, it covers various flows, and it is a historical record from 1940 to 1980, which covers all the prior two reservoir installation years and prior to river management years. So, therefore, it is not really appropriate for what you are talking about in projecting into the future. What you really want is what is projected into the future.

Q But projected into the future, Mr. Boyer, involves taking into account both additional withdrawals and additional storage, does it not?

A (WITNESS BOYER) It would, yes.

Q And we don't know what additional withdrawals would be, do we? Do you know whether additional storage --

A (WITNESS BOYER) Just a moment, if you would, please.

(Witnesses conferring.)

A (WITNESS BOYER) I would like to make a correction at the same time I make a statement. The correction is that Beltsville was 1973. Cannonsville was 1967.

And the statement is that in determining low flows at Trenton historic values back through 1914 is misleading in that flow augmentation reservoirs such as Cannonsville, which went into service in '67, and

Beltsville, in '73, tend to be averaged out by the earlier non-regulated flow records. Level B and the preliminary good faith recommendations both show sustained June to September average flow of the Delaware River at Trenton under 1980 depletive uses and the 1960 drought conditions is estimated to be 2,587 cfs.

Q And yet the flow in January 1931 went as low as 1,900 cfs.

A (WITNESS BOYER) That is what your data says. The addition of other flow augmentation reservoirs in the future, such as modification of Francis E. Walter, estimated for 1990, and Prompton in 1995, would both increase flow and, to answer your question, with Merriel Creek, Francis E. Walter and Prompton, by the year 2000, I presume it is the level B study shows that the Trenton flow capability would be up to 2,890 cfs.

Q If all those things happen as planned?

A (WITNESS BOYER) Yes.

Q Now taking the historic data during the month of June, what is the return frequency for flows of less than 2,400 cfs?

A (WITNESS BOYER) Historic over what period?

Q The period of record.

A (WITNESS BOYER) As I said, it is not relevant.

Q I understand that is your opinion, but I am asking what does the data show.

A (WITNESS BOYER) What was it that you were exactly asking?

Q For the month of June, what is the return frequency?

A (WITNESS BOYER) For the forty years of record, the worst in forty years, it would be two days in which it was, in the month of June, that it was less than 3,000 cubic feet per second.

Q I am asking you a different question. I am asking what is the return frequency of flows less than 2,400 cfs in June.

A (WITNESS BOYER) I don't have that in front of me.

Q Would you be in a position to disagree that it is about ten percent -- .98 percent? I'm sorry. Let me change that -- that it is one percent?

A (WITNESS BOYER) I'm not thinking along that line right at the moment. I just have to take it subject to check.

Q As to the month of July, what is the return frequency?

JUDGE BRENNER: Wait a minute. We didn't get an answer. He asked for a moment.

WITNESS BOYER: Well, I said I would accept it subject to check. These calculations which he is asking me, you can do it for any period of time and any value, and you need to have the proper curve in front of you to pick the value off. But not having that, I can't really make any statements regarding it.

JUDGE BRENNER: Mr. Boyer, what did you have in front of you for your information as to the number of days during a June period for the period of record for the flow under 3,000?

WITNESS BOYER: I am referring to a question at E-240.25, which is part of Applicant's Exhibit --

JUDGE BRENNER: It's either 1A or 1B. Don't worry about which it is.

WITNESS BOYER: In response to a question from the NRC.

JUDGE BRENNER: Thank you, sir.

(Pause.)

JUDGE BRENNER: Back to you, Mr. Sugarman.

BY MR. SUGARMAN: (Resuming)

Q Well, what you are saying is that looking at Table 240.25-1, in the median year the flow is less than 3,000 cfs ten days out of thirty at Point Pleasant.

A (WITNESS BOYER) Based upon historical records.

Q Yes.

A (WITNESS BOYER) Which again I say are not appropriate to projecting into the future.

Q Has the enhancement of the Walter and Prompton Dams been appropriated and funds been appropriated by Congress to do that work?

(Witnesses conferring.)

A (WITNESS BOYER) I don't know that it has been appropriated at this point in time.

Q And Merriel Creek will compensate for withdrawals by Philadelphia Electric and other utilities?

A (WITNESS BOYER) Correct.

Q Will it compensate for anything else, any other increased withdrawals?

A (WITNESS BOYER) There have been compensations with other parties, but there has been nothing consummated yet.

Q And Point Pleasant, the Point Pleasant withdrawal is regarded by DRBC in its studies as a future withdrawal, correct?

A (WITNESS BOYER) I wouldn't say that. In any reports they issue now, since the future has not been constructed, but they have authorized it under various docket decisions.

Q I know they have authorized it. My point is that it is not reflected in the present flows. They treat it as a future withdrawal, which will increase the rate of withdrawal and will be offset by Merriel Creek. Merriel Creek will not be an enhancement, correct?

A (WITNESS BOYER) Well, I don't know the gist of your question here. Certainly the Merriel Creek Reservoir is in progress as far as the application and approvals go, so it is not in existence. If you are saying it is not in existence and operating today, yes, that is true.

Q No, that's not my question. I am sorry to be confusing. My question is: Merriel Creek will offset what DRBC has calculated as future withdrawals. It will not increase the storage as a free matter. It will offset increases in withdrawals at Point Pleasant.

A (WITNESS BOYER) No, there is some present withdrawals that will be made up from Merriel Creek.

Q But in terms of the vast majority of withdrawals, they are future, is that not right?

A (WITNESS BOYER) The vast majority is future, right.

(Pause.)

Q Now, Mr. Boyer, you testified that the protrusion below the mouth of Tohicken Creek controls

the flow in the eddy and controls the dimensions and the extent of the eddy. Is that correct?

A (WITNESS BOYER) In response to your questioning as to what caused the eddy, I described that as being one of the fundamental reasons that the eddy exists.

Q And at what flow would you expect that the bar would be overtopped?

A (WITNESS BOYER) I have already answered that several times and I don't know what flow. I know it will be higher flows than those that are existing today because the bar is not topped.

Q Now as long as the bar is not overtopped, will not that eddy area remain out of the main channel?

MR. CONNER: Objection. This is asked and answered and has been gone into over and over again.

JUDGE BRENNER: I didn't hear you after "asked and answered," Mr. Conner.

MR. CONNER: I say that we have gone over this many times before and it's gone beyond being a preliminary question.

JUDGE BRENNER: I tell you, it's been so long for me that although the area has been explored, I can't ascertain that that particular line has been asked and answered, although it might have been, so it's easier

just to allow the answer again, if it is again, and we may have a return period of that answer of two weeks, if you are right.

WITNESS BOYER: Well, you would have to ask the question again.

BY MR. SUGARMAN: (Resuming)

Q Well, would you repeat the question?

(The reporter read the record as requested.)

WITNESS BOYER: The eddy area, yes, that is true.

BY MR. SUGARMAN: (Resuming)

Q Now you testified that there is a whirlpool effect.

A (WITNESS BOYER) I did not say a whirlpool.

JUDGE BRENNER: Mr. Sugarman, if you are going to start a question with "you testified," then you should point to the particular place.

MR. SUGARMAN: I will. It's at page 1427. I will read it to you, Mr. Boyer.

BY MR. SUGARMAN: (Resuming)

Q "The only reason you have the eddy is because you have a relatively high velocity out in the main channel and in the channel, not only in the main channel but the whole channel, creating a Venturi action in the low velocity area, making enough of a swirl to create a

small eddy or a small whirlpool or whatever you want to call it."

A (WITNESS BOYER) The only reason I used "whirlpool" was somebody else, I think, had used it and I would call it an eddy. A whirlpool, to me, can occur in a river, but it would be like I experience when I rafted down the Green and Colorado Rivers and went through rapids and there are whirlpools below there. They are strong and they have a high current.

I would call that a whirlpool more than an eddy. A whirlpool to me has a relatively high velocity. There are certainly no high velocities associated with the eddy that you are talking about.

Q Well, in the eddy, the eddy has a downstream dimension as well as an upstream dimension, doesn't it?

A (WITNESS BOYER) If you are saying it has a width and a length, yes, naturally it does.

Q No. What I meant was the flow does circle around in it, doesn't it?

A (WITNESS BOYER) By definition.

Q So there is a side of the eddy in which the flow is flowing downstream and back around, isn't that right?

A (WITNESS BOYER) Right.

Q And how would you know what the edge of that

flow area is in the cross section of the river?

A (WITNESS BOYER) I would modify that previous statement, that there is a side at which the water is going down. How much that water continues around and is the same water or how much is other water mixing in with it from the edge of the channel is not known. Some of it certainly may go around.

I would say that the eddy stops when the velocity goes above about .2 of a foot a second and then I say you are starting to be in that no man's land between the shallow water or low velocity water and the channel. It depends upon your definition of "channel." Channel is the deeper water and the higher velocity water, and there is a transition area in any section of the river where you may not be out of the main channel, where you may be out of the main channel and yet not into stagnant water.

And whether you call that the edge of the channel or what depends on individual preferences, I guess.

(Pause.)

Q Mr. Harmon, did you in your report to the Corps of Engineers or to the NWRA and from them to the Corps of Engineers, did you indicate the velocity that would be -- that would exist in order to maximize

efficiency for the screens of the intake?

A (WITNESS HARMON) Yes, we made reference to generally one foot per second or higher. I believe that was the terminology there.

Q And did you say even at low flow?

A (WITNESS HARMON) Yes, we did.

Q And did you state what the low flow was?

A (WITNESS HARMON) I gave a reference to 3,000 cfs.

Q Now did you make any study as to what the impact of the intake would be at flows less than 3,000 cfs?

A (WITNESS HARMON) Not really a study, no.

Q Did you make any study of what the impacts would be if the velocities were less than one foot per second?

A (WITNESS HARMON) I made an evaluation of it, not a published study.

Q And is that evaluation reflected in any record?

(Witnesses conferring.)

A (WITNESS HARMON) I believe in my deposition we were discussing this subject. We talked about the velocities required to provide protection to fishes and we got to discussing the one foot per second bypass

velocity which seems to have become some sort of magical figure, and what I attempted to explain there was that this was basically a round number guideline and between .5 feet per second and one foot per second bypass fish receive considerable protection, that the one foot per second bypass was not absolutely required to maximize protection of your aquatic life.

Q Was the one foot per second based on being double the intake velocity?

A (WITNESS HARMON) The one foot per second in one respect was taken from the velocity surveys, and what we showed that, that the velocities out in the river at the intake location that was proposed would approximate one foot per second at these low flows, and we felt that that velocity was certainly high enough to provide a high level protection for the aquatic life.

And there was also some consideration on our part as to clogging, debris loading on the intake, and the assistance with cleaning the screens at any bypass velocity would have.

Q So at a lower bypass velocity there would be increased problems for fish and increased debris clogging?

A (WITNESS HARMON) It depends upon how low you are talking about.

Q Well, would the decreased velocity cause an increase in problems as the velocity decreases?

A (WITNESS HARMON) Not necessarily at even a one-to-one velocity bypass to intake velocity ratio. For example, a .5 foot per second bypass and a .5 feet per second maximum through-slot velocity, studies have shown you will still get considerable protection when you compared this to a vertical traveling screen that has openings of a quarter or three-eights of an inch.

We are talking about considerable protection for efficiency for the screens. This is what we as fishery biologists have been forced to compare it to as existing technology prior to this institution of Johnson screens into cooling water intake design.

Q Well, how about comparing it to a Johnson screen and the fast current?

A (WITNESS HARMON) I think this again depends on the species under consideration and the particular life stages under consideration.

Q Now you stated in your report that of foremost important in the evaluation of potential entrainment to the Point Pleasant intake is the small volume of water to be withdrawn relative to the volume of the Delaware River water available (maximum of five percent at low flow and then at 1.25 percent at average flow at the

Trenton gauge).

Now isn't it true that at flows of 2,000 cfs the intake would be withdrawing as much as 7.5 or 8 percent of the river flow?

A (WITNESS HARMON) I believe Mr. Hansler tetified that one of the targets he gave was 2,500 cfs.

Q I understand those are the targets.

A (WITNESS HARMON) And that is six percent, as another stepdown figure. And you have to realize also the context in which the statement is made.

JUDGE BRENNER: Mr. Harmon, excuse me. You haven't answered his question, so answer the question.

WITNESS HARMON: Mathematically, I believe he is correct.

JUDGE BRENNER: Now, if you want to explain, go ahead, because I cut you off.

WITNESS HARMON: I was just trying to put this in context with the other things that we considered in this, and this is one of the primary factors, but there are other factors besides percent removed.

BY MR. SUGARMAN: (Resuming)

Q Now if the water in the pool contains larvae and the water circulates around in the eddy such that it is exposed more than once to the intake, isn't that likely as an effective matter to create a larger

percentage of water, the same eddy water, withdrawn, so to speak, passed through the intake, than would be the case if there is only a one-time exposure?

In other words, as a functional matter, doesn't that increase the relative volume of the water to be withdrawn if it is exposed multiple times to the intake?

A (WITNESS HARMON) Under the set of assumptions, this would be similar to, say, a circular pool test apparatus that has -- some of the literature contains.

Q Right, or a tidal reach.

A (WITNESS HARMON) Or a tidal situation, as in the estuary. You would tend to get the organisms exposed a greater number of times to the intake.

Q And that is why you pointed out drifting organisms will be exposed to the intake only once as they pass downstream because at Point Pleasant the river is not tidal?

A (WITNESS HARMON) That's right, and the intake is located out in the river currents that are heading downstream.

Q At 2,000 cfs?

A (WITNESS HARMON) That is a theoretical value.

Q You can't answer the question?

A (WITNESS HARMON) Based upon some of the low flow measurements that we have taken and the observations out there, I would say it seems to me it would still be out in the main river current.

Q We were out there together a week ago Saturday when the flow was 4,000 cfs almost. Would you say that the whole of the intake was in the main channel?

A (WITNESS HARMON) That is the way it looked to me.

Q Including the side facing Pennsylvania?

A (WITNESS HARMON) Yes.

Q At 4,000 cfs?

A (WITNESS HARMON) Yes.

Q Would you say it was on the edge of the main channel at 4,000 cfs?

A (WITNESS HARMON) I wouldn't say no.

Q You would say it was right in the height of the water, the main flow?

A (WITNESS HARMON) In the main body of flow, yes.

JUDGE BRENNER: Mr. Harmon, when you answered Mr. Sugarman's question about whether the intake would be out of the eddy at 2,000 cfs, you said yes, based upon measurements at low flow. What measurements at

what flows?

WITNESS HARMON: We went out there in November and did our velocity surveys, and based upon what I saw there, expecting the river would go down somewhat and still remain in the deeper part of the river bed. That is my basis of observation.

JUDGE BRENNER: I moved your tables aside perhaps too quickly. That was at 3,000 CFS?

WITNESS HARMON: This was in November, right, November, '80, 3,000 CFS.

JUDGE BRENNER: Well, his question was about 2,000.

WITNESS HARMON: Based upon my judgment, I think it would probably still be in the main river flow.

JUDGE BRENNER: Have you observed it at flows under 3,000?

WITNESS HARMON: No, we haven't taken any velocity readings at those lower levels.

JUDGE BRENNER: Have you even observed it? I guess I ought to be able to get a yes or no to that one.

WITNESS HARMON: I am sorry, but I can't recall the number of times I have been out there, unless I examined the dates that I have been out there and tried to put some flows. It was at least as low as that on one or two other occasions that I have been out there.

JUDGE BRENNER: At least as low as what?

WITNESS HARMON: 3,000, 2,900, not any lower than that probably.

JUDGE BRENNER: All right. Thank you.

BY MR. SUGARMAN: (Resuming)

Q Now, you have indicated previously that you took samples of eggs in the eddy this summer. Is that correct?

A (WITNESS HARMON) Yes, we made collections.

Q And have you had the opportunity since early summer or whenever it was to get reports back on what species the eggs were?

A (WITNESS HARMON) Not yet, no.

Q When do you anticipate? Do you recall at your deposition you anticipated having that data in another month or so, and that was in August?

A (WITNESS HARMON) Well, we had some other priorities come up, and we completed processing them. We haven't sent them out for identification, but it looks like we have very few large eggs that would even fall into the category of possibilities of being American shad eggs.

Q Do you have some?

A (WITNESS HARMON) There are a couple that are suspicious.

Q And you haven't gotten around to determining what species they are?

A (WITNESS HARMON) No, we haven't.

Q When do you think you might be doing that?

A (WITNESS HARMON) Some time in the next couple of months.

Q You were hull seining within the last couple of weeks in the Point Pleasant area. Is that correct?

A (WITNESS HARMON) I am trying to recall now when the last time it was, but I believe within the last month or so.

Q Well, could it have been last Wednesday?

A (WITNESS HARMON) I wasn't there. I wasn't there personally.

Q Is that crew under your supervision?

A (WITNESS HARMON) Yes, they are.

Q What size net were they using?

A (WITNESS HARMON) I am not sure it is our crew, for one thing. What Wednesday? Give me a date. This past Wednesday?

Q Yes.

A (WITNESS HARMON) No, we did not have a crew there. I was there with the surveyors on Wednesday.

Q You weren't setting out nets last Wednesday night, your crew?

A (WITNESS HARMON) I don't believe so. I think we terminated that work earlier.

Q When the work was being done, what size net

was being used?

A (WITNESS HARMON) Well, we had a couple of different nets. I believe the one -- one of them was 100 foot, about 100 feet long. And it had about a quarter-inch or three-eighths inch mesh on it.

Q And the other one?

A (WITNESS HARMON) Ten to 15 feet long and an eighth-inch mesh.

Q Now, have you ever had occasion to describe the size of shad eggs?

A (WITNESS HARMON) On a couple of occasions, yes.

Q Have you described them as the ripe, unfertilized, and not yet water-hardened shad eggs as being about 1.8 millimeters in diameter?

A (WITNESS HARMON) I may have.

Q Would you disagree with that number?

A (WITNESS HARMON) Were they ripe, unfertilized?

Q Right.

A (WITNESS HARMON) Not yet water-hardened?

Q Right.

A (WITNESS HARMON) 1.8 millimeters?

Q Yes.

A (WITNESS HARMON) Yes, I agree with that

figure. That is one of the figures I could have quoted.

Q You say that -- I think you have previously given as part of the basis of your opinion that the peak spawning period for American shad will have passed prior to the period of largest withdrawals. What is the extent of the peak spawning period of American shad?

A (WITNESS HARMON) Primarily in May.

Q Well, if the shad in your opinion, you have heard what Messrs. Kaufmann and Emery have said about it, and you have heard, or you have possibly read Mr. McCoy's and Mr. Miller's testimony. Have you read Mr. Miller's study?

A (WITNESS HARMON) Parts of it.

Q What would be your expectation with respect to the peak spawning period of shad that would be spawning in the area of Point Pleasant? When would that spawning period occur?

A (WITNESS HARMON) Similar time period, May, late May, maybe early June, depending upon water temperatures.

Q You would not expect that the shad that would spawn downstream would be late spawners?

A (WITNESS HARMON) In terms of a period of a week or two weeks difference, that may qualify them as

being late spawners.

Q When was your sampling done for eggs in the Point Pleasant area?

A (WITNESS HARMON) April, May, June, and July.

Q When were the large eggs found that are suspicious as being shad eggs?

A (WITNESS HARMON) I think it was some time in May.

JUDGE BRENNER: Mr. Sugarman, whenever it is convenient, we will break for lunch, either now or in the next few minutes.

MR. SUGARMAN: This is as convenient as any.

JUDGE BRENNER: Let's break until 1:30.

(Whereupon, at 12:10 p.m., the board was recessed, to reconvene at 1:30 p.m. of the same day.)

AFTERNOON SESSION

JUDGE BRENNER: We are looking at the stipulation concerning Contention y-16-B, signed by the cognizant parties. We don't understand the second sentence, because we don't know what the phrase, "once it becomes operational" modifies in that sentence.

MR. RUTBERG: That is opposed to the construction of the plants. Once it is in operational reservoir, we will want to consider what the environmental impacts are.

MR. SUGARMAN: I think that maintains the ambiguity. I think that Mr. Rutberg is inadvertently continuing the ambiguity that I also was concerned about.

JUDGE BRENNER: Well, you signed it.

MR. SUGARMAN: Yes, I did, but I did so on the basis that they added the phrase at the end of the sentence in connection with the Limerick application, the point being to tie the review into the present time, even though what they will be looking at will be the operational effects.

JUDGE BRENNER: Well, that is a part of your written sentence, because you can't tell from reading it which one of the two that means, and if it represents a point of disagreement between the parties as to what it

means as opposed to just a writing style.

MR. SUGARMAN: I was assured there was no point of disagreement.

MR. RUTBERG: We are in agreement as to what the sentence means.

JUDGE BRENNER: What you said it means, Mr. Rutberg, I agree with Mr. Sugarman, repeats the ambiguity.

MR. RUTBERG: Well, I will accept --

JUDGE BRENNER: Tell me when the staff will review the impacts of the Braidshaw Reservoir.

MR. RUTBERG: In connection with the Limerick application.

JUDGE BRENNER: Included in the FES?

MR. RUTBERG: Yes.

JUDGE BRENNER: And prior to the director of NRR authorizing the issuance of an operating license?

MR. RUTBERG: That is correct.

JUDGE BRENNER: All right. That would have been nice to have somehow been contained in there, if that is what it meant. All right, given that, we know what it means. If the parties are in agreement, we are happy to approve it, and we do so, and will bind it into the transcript at this point.

(The material referred to follows.)

INSERT #2

10/19/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
PHILADELPHIA ELECTRIC COMPANY	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station)	)	
Units 1 and 2)	)	

STIPULATION CONCERNING CONTENTION V-16b

Del-Aware agrees to withdraw its contention V-16b and understands that it does not thereby waive any right it might have to raise contentions concerning the Staff environmental documents when they are issued. The Staff will include water quality considerations associated with discharges from the Bradshaw Resevoir, once it becomes operational, in its Environmental Review in connection with the Limerick application.

Respectfully submitted,

Robert J. Sugarman, Esq.
Counsel for Del-Aware

Troy B. Conner Jr.
Troy B. Conner
Counsel for Applicant

Ann P. Hodgdon
Ann P. Hodgdon
Counsel for NRC Staff

Dated at Bethesda, Maryland
this 19th day of October 1982

JUDGE BRENNER: And we indeed thank the parties, consistent with the Commission's policy and our policy that it is better to resolve disputes among the parties, and unless we have an independent interest, which we did not in this issue. Can we get a time estimate, Mr. Sugarman?

MR. SUGARMAN: My time projection at this point is about two hours, depending on the answers to questions.

VINCENT S. BOYER,
W. HAINES DICKENSON,
PAUL L. HARMON, and
E. H. BOURQUARD,

the witnesses on the stand at the time of recess, having been previously duly sworn, resumed the stand, and were examined and testified further as follows:

CONTINUED CROSS EXAMINATION

BY MR. SUGARMAN: (Resuming)

Q To go back to you, Mr. Boyer, in the last set of hearings the week before last, I asked you when you had made your estimates concerning the anticipated velocities at flows below 3,000 CFS, and you answered that you had prepared that, made those estimates and prepared that information before filing your testimony, before the depositions. Is that correct?

A (WITNESS BOYER) Yes.

Q I would like to ask if this is your signature on applicant's answer to supplemental answers to Del-Aware's interrogatories, dated September 1, 1982.

A (WITNESS BOYER) Yes, that is my signature.

Q Did you read applicant's supplemental answers to interrogatories before taking the affidavit?

A (WITNESS BOYER) Yes.

Q Did you participate in preparing them?

A (WITNESS BOYER) They were prepared under my direction.

Q Were you familiar with their content?

A (WITNESS BOYER) Yes, I read them and agreed with them.

Q Interrogatory 1E requests the relationship in velocity, in the velocities of the water at flows of 3,000 -- 2,000, 3,000, and 2,500 at Trenton, and says, please provide in detail the basis for the determination. Your answer states, "With respect to the requested velocities, applicant has data only regarding only a flow of 3,000 CFS." Do you recall making that answer?

A (WITNESS BOYER) Yes.

Q Was that answer true when it was stated?

A (WITNESS BOYER) Yes.

Q And did you have data when you made your testimony the week before last regarding the velocity at flows less than 3,000 CFS?

A (WITNESS BOYER) Which interrogatory is this, please?

Q 1E.

A (WITNESS BOYER) I believe your question related to the statement of the second paragraph, which said, with respect to the requested velocities, applicant has data regarding only a flow of 3,000 cubic feet per second. That is true. We have measured velocity data in the river at 3,000, at the approximately 4,500 cubic foot per second. The others are extrapolations. This does not say anything about extrapolations, and I saw no need to include anything in there about those.

Q Well, if you look at the question, it says, "Please include in this answer the anticipated velocities at the water surface, et cetera, for each flow described in the previous sentence. Please provide in detail the basis for the determination." Are you saying that you regarded that as not relating to the calculations or extrapolations that you made?

A (WITNESS BOYER) We felt that it was pertinent to provide the data for the measured values which we

had, the 3,000 and 4,500, and we felt that that question related to that.

Q Where in that question does it say data?

A (WITNESS BOYER) Well, it says, as determined, please state the relationship between the flow as determined, and state the basis for such determination at flows of so and so.

Q So you don't regard your extrapolation as a determination?

A (WITNESS BOYER) Well, yes, but not in the vein of this interrogatory.

Q Now, addressing ourselves to the previous sentence of that answer, the previous paragraph, the statement is there, "The flow at Point Pleasant is about 97 percent of the Trenton flow under normal conditions." Is that correct?

A (WITNESS BOYER) That is what it says.

Q Is that correct?

A (WITNESS BOYER) Well, basically, that is the relationship of the drainage areas. We did not see the need to go into a full treatise on storage volumes and so forth. I took this to mean the equilibrium conditions. The correction for storage volume is the correction for a non-equilibrium to an equilibrium condition.

Q Well, is the normal condition in the Delaware River an equilibrium or a non-equilibrium condition?

A (WITNESS BOYER) That depends how the flows are varying.

Q And do the flows vary normally?

A (WITNESS BOYER) And it depends upon the relative magnitude of those flow variations, so you have to talk about the amount of the variation and the time over which they are varying.

Q Mr. Boyer, you gave considerable testimony on the basis of your hydraulic engineering background and expertise. Could you describe where in your biography you discuss your background in hydraulic engineering?

A (WITNESS BOYER) Well, it has been associated with the operation of power plants. I have been looking at intake systems and working with intake systems in power plants since the 1940's, first at Chester Station on the Delaware, then in the design of Crombie Station we conducted a model test for the design of the Crombie intake on the Susequehanna -- on, pardon me, the Schuykill River, and I was familiar with the tests that were going on and the model results. I operated the station. I put it in service. I wrote the description for the intake system and the screens. I designed changes to the intake screens to enable them to handle

debris in a more efficient manner.

I have been out in the river there taking measurements, watching flows. Then, at Peach Bottom, we had a big discussion with intervenors and others about the need for a closed cooling water system at Peach Bottom on the Susquehanna River. We have modeled that. It was the company's contention that a closed cooling water system was not required. Various agencies and opponents, including the Pennsylvania Fish Commission and the NRC, not that they are an opponent, they were not an opponent, but they recommended a closed cooling water system.

We have operated the plant since 1974. We have spent three-quarters of a million dollars a year, roughly, on the biological and temperature monitoring system, and have proven that the system as designed and as operated without a closed system is not detrimental to the aquatic life of the Susquehanna River. I have also been involved in Conowingo power plant, where there has been a lot of discussion over the years about fish ladders and fish attraction devices, and involved with pump storage projects at Muddy Run, and since the design of Limerick in the design aspects of it.

So, I have considerable hydraulic background in my 43 years of experience.

Q As an operator and as an executive in building nuclear power plants?

A (WITNESS BOYER) As an engineer in responsible charge of engineering work going on related to various aspects of the plant, including the hydraulic systems.

Q When were you in charge of the engineering work on any of these systems?

A (WITNESS BOYER) Well, Limerick, I was vice president of the engineering department from -- engineering research department from 1968 to 1980.

Q Just Limerick?

A (WITNESS BOYER) Well, that is all company projects, including the construction of Peach Bottom, the completion of the construction of Peach Bottom.

Q You were in charge of designing Peach Bottom?

A (WITNESS BOYER) I was the vice president of the department which had the responsibility for the design and construction of the plant.

Q When were you the vice president?

A (WITNESS BOYER) As I said, from 1968 to 1980.

Q But the plant was built, completed -- or when was the plant completed?

A (WITNESS BOYER) It went in service in 1974.

Q So it was designed when you became the vice

president of the department?

A (WITNESS BOYER) It was still under design in 1968. In fact, I was the construction permit -- the construction permit was about 1968 to '70.

Q Did you ever actually conduct the hydraulic modeling at any of those stations, at Crombie or at Peach Bottom or any other?

A (WITNESS BOYER) We had various laboratories do that, such as the Olin Hydraulic Laboratory at Worcester Polytech.

Q Did they do mathematical modeling, or physical modeling, or both?

A (WITNESS BOYER) Physical modeling.

Q Have you ever had occasion to use mathematical modeling for hydraulic purposes?

A (WITNESS BOYER) I have not, although I believe in Peach Bottom there was some mathematical modeling used in addition to the full-scale modeling, that Bechtel performed some mathematical modeling.

Q As consultant to PECO?

A (WITNESS BOYER) Yes. As our engineer.

Q Did PECO review -- strike that.

Did any of the panel review the report on shortnose sturgeon by Brundage?

A (WITNESS BOURQUARD) I read it, yes.

A (WITNESS HARMON) So did I.

A (WITNESS BOYER) Yes, we have all read it.

Q Are you familiar with Table 3-2 and 3-3 of that report, indicating that during the month of May, there would be pumping for as little as six days for PECO during the month of May, and as little as four days for NWRA during the month of May when the sturgeon are spawning?

(Whereupon, the witnesses conferred.)

JUDGE BRENNER: Excuse me, Mr. Sugarman. You are going to have to help us to find papers quickly. What was your prehearing exhibit number for Mr. Brundage's report again? Well, I guess we can get it through the staff.

MR. SUGARMAN: It is 35.

JUDGE BRENNER: Mr. Rutberg, is Mr. Masnik's Exhibit 1 the entire report?

MR. RUTBERG: No.

MR. SUGARMAN: It is Page 30, sir, of D-35.

WITNESS BOYER: I have Page 30.

BY MR. SUGARMAN: (Resuming)

Q Do you see Mr. Brundage is of the understanding that the pumping into the NWRA system could occur in as little as 4.2 days in May, and that PECO would be taking six weeks out of 16 in May for the

four-year period, simulated? Do you see that?

A (WITNESS BOYER) Yes.

Q Can you reconcile that with your letter of August 10, 1982, Mr. Bourquard, attached to your supplemental interrogatory answers, and marked as D-7, where you indicate the operation of the PPPS pumps under average conditions?

(Whereupon, the witnesses conferred.)

Q Do you have that letter in front of you?

(Whereupon, the witnesses conferred.)

A (WITNESS BOYER) Would you refer to whatever table it is and ask your question again?

Q I am asking you to reconcile the May projections on Page 30, Table 3-2 and Table 3-3, with the chart, I guess you would call it, attached to your letter of August 10, 1982, which is D-7, if you don't have it handy.

A (WITNESS BOURQUARD) What do you want to relate?

Q Well, if I understand that chart, how often would the pumps be operating in May under average conditions in the year 1990, for example?

A (WITNESS BOURQUARD) In the year 1990, in May, the average daily outflow during that month would be 13.7 million gallons per day.

Q Right. And how often would the pumps be operating?

A (WITNESS BOURQUARD) Well, I don't have it on a daytime basis here. What I am showing here is that one pump would cut on to provide this flow at an average of 13.7. One pump would run for twelve and a half hours and then be off for ten and a half hours, and then it would start up again and run for twelve and a half hours and then cut off for ten and a half hours.

Q What about the other pumps?

A (WITNESS BOURQUARD) They would sit there.

Q I beg your pardon? They would not operate?

A (WITNESS BOURQUARD) No.

Q So that the station would operate for twelve and a half hours on every average day in May?

A (WITNESS BOURQUARD) Roughly, yes.

JUDGE BRENNER: Excuse me. Mr. Bourquard, how do I get that from these tables? I don't understand how to apply that.

WITNESS BOURQUARD: Are you looking at -- The table is headed PPPS Pumps, Bradshaw Reservoir Operation Under Average Conditions.

JUDGE BRENNER: No, that might be my problem. Did you say Page 30, Mr. Sugarman?

MR. SUGARMAN: Page 30 gives you what Brundage

was assuming. Page 30 of Exhibit D-35.

JUDGE BRENNER: And didn't you direct the witness's attention to that?

MR. SUGARMAN: Yes, sir, and I asked them to compare that. I asked them to compare that to the projected plan of operation under average conditions, which the witness provided on August 10, 1982.

JUDGE BRENNER: That document is not in this case yet.

MR. SUGARMAN: It is not identified. I am sorry. I beg your pardon. It is Del-Aware Pretrial Number 7.

JUDGE BRENNER: You know your numbers usually better than we do.

MR. SUGARMAN: Not always, but usually. I understand that.

JUDGE BRENNER: If you are going to use it, I want it identified in this record, unless it is just a passing question or two, and you feel you don't need to identify it, but at least direct us to it. All right, I have got it now. This is this handwritten chart?

MR. SUGARMAN: Yes, sir.

JUDGE BRENNER: Okay. Thank you.

WITNESS BOYER: I would point out that on Page 30 it is days of pumping that are quoted there,

equivalent full 24 hour days of pumping, so if you are looking at May under the 10 million gallon a day utilization of NWRA in May, they would expect four equivalent full days of pumping to be required during the month.

WITNESS BOURQUARD: Not necessarily consecutive, though.

WITNESS BOYER: And for a 20 million gallon daily treatment plant, it would be 13.4 days. And for a 40 million gallon a day treatment plant, 15 days, or roughly half the month that would be pumping at full output.

JUDGE BRENNER: Again, that is just NWRA's portion for the north branch of Neshaminy Creek?

WITNESS BOYER: That's right, and the lower part of the Page 30 gives the weeks that water is withdrawn from the Delaware by Philadelphia Electric Company for Limerick.

JUDGE BRENNER: Thank you.

WITNESS BOYER: And Haines remind me that that is not for augmentation. That would be supplemented by in the winter months and summer months, if we were shut down for some pumping for flow augmentation as required by the Delaware River Basin Commission.

JUDGE BRENNER: This table does not include augmentation?

WITNESS BOYER: No, it does not.

JUDGE BRENNER: Thank you.

WITNESS BOYER: Now, the other document you were looking at, which shows the pump operation, was a calculation by Bourquard as to the mode of operation of the facility, sort of an operating plan for the facility.

BY MR. SUGARMAN: (Resuming)

Q Do you understand the purpose for which Mr. Brundage was interested in the information was to evaluate the likelihood of the sturgeon being spawning, being exposed to the operation of the intake and therefore it was of relevance to him that as he thought the intake would only be operating a small portion of the time during the spawning season? Did you understand that from his report?

MR. CONNER: Objection. I request again that the interrogator point the witnesses to where his paraphrased language appears, and look at it, and not accept his characterization.

JUDGE BRENNER: Well, if there is such a particular portion, that would be helpful, Mr. Sugmarman, but I won't require it if you were talking

about the entire report.

If there is a particular portion where it discusses the use of that table, as a matter of discretion I think it would be helpful to get a focused answer.

MR. SUGARMAN: Looking at my copied exhibit I see that I omitted part of the sentence in copying some pages out of Brundage, but it is on page 84 of what I did copy. And if I may read aloud the sentence prior to the one that is at the top of that page, which is on page 83: "Short-nose sturgeon of a size vulnerable to the intake would not be present after May. Moreover, since pumpages from Point Pleasant will supplement existing flows in other creeks (see Section 3.1, which is where those tables are) it is highly probable that actual withdrawals in April and May will be far less than the design maximum."

BY MR. SUGARMAN: (Resuming)

Q Now, isn't it -- did you ever inform Mr. Brundage that in the average -- under average conditions those pumps, that pump, or one pump at the intake would be operating 12 1/2 hours on the average day?

A (WITNESS BOURQUARD) I don't know that I did or that I didn't.

(Panel of witnesses conferring.)

Q While we are on that subject, Mr. Bourquard,

on that August 10th, 1982 letter can you tell us, looking at that chart there, what does average conditions mean?

A (WITNESS BOURQUARD) Average conditions mean average flow conditions in the North Branch and Pine Run.

Q It doesn't have anything to do with the flow into Limerick?

A (WITNESS BOURQUARD) It does to the extent that the flows that are used, at least the withdrawals for Limerick, cover a span of about four years which I used as being an average condition for Limerick.

Q You used that 1974 to '77 period as average for Limerick?

A (WITNESS BOURQUARD) Yes.

Q Under what conditions would the pumps be shut off altogether for a period of let's say 10 1/2 hours? Is that related to total flow for the average day?

A (WITNESS BOURQUARD) Under what conditions would the pumps be cut off, all pumps? It would be -- there would be no pumps operating for 10 1/2 hours. Is that what you're asking?

Q Right. And that is related to the 13.7 daily outflow.

A (WITNESS BOURQUARD) YEs.

Q So that if the daily outflow required in June

or July were 13.7, all pumps would be off for 10 1/2 hours on the average day?

A (WITNESS BOURQUARD) Yes. It wouldn't make any difference which month it was.

Q The same thing would be true in June then?

A (WITNESS BOURQUARD) Sure.

Q Do you have any idea of the return frequency of that operating sequence?

A (WITNESS BOURQUARD) The return frequency of which operating frequence?

Q Of 13.7 or of all pumps being off approximately 10 hours or more during the month of June.

A (WITNESS BOURQUARD) During the month of June? Well, it would be the same as the month of May. In other words, it would be on for 12 1/2 hours; it would be off for 10 1/2 hours, which means a cycle of 23 hours. So every 23 hours it would be 12 1/2 hours on, 10 1/2 hours off.

Q Yes. But what I mean is do you have an idea as to the return frequency? You're saying that that is the average condition for May. In June there is much less water elsewhere, and therefore you are taking much more out of the Delaware, right?

In June, if you look at your chart there, you're taking 53.5.

A (WITNESS BOURQUARD) In June, yes.

Q So the condition under which the pumps would be off for 10 hours or more out of 23 would not occur as often in June, correct?

A (WITNESS BOURQUARD) Well, if I took 53.5 MGD out on a daily average basis in June, two pumps would operate continuously, one pump would be on for five hours and off for 33 hours.

Q I understand that. What I'm asking you is if you can tell me, if you know, what the return frequency of your only needing 13 or 14 or 15 million gallons a day in June is, or some number less than that?

A (WITNESS BOURQUARD) What my return frequency is?

Q How often will it occur. Have you projected how often it will occur that you will need less than 15 million gallons a day out of the river in June?

(Panel of witnesses conferring.)

A (WITNESS BOURQUARD) We don't have that data. You would have to go back and make a statistical analysis for every month and route every month through the thing to see.

JUDGE BRENNER: Mr. Sugarman, don't you think you've passed the point where this record will not be intelligible unless we have this identified? That is my

point on all of these. You know how many questions you're going to ask from the outset, or approximately how many. And just identify it in the beginning if you're going to get into that kind of detail so it will go with the record. It is just a simple bookkeeping matter.

MR. SUGARMAN: I would like to mark -- yes, sir. I would like to mark this letter of August 10, 1982 from Bourquard to Dickenson as Del-Aware 14 for identification.

JUDGE BRENNER: Okay. You want the letter which consists of two pages and then one, two, three, four pages of attachments?

MR. SUGARMAN: Yes, sir.

JUDGE BRENNER: And the table you have been inquiring about most is the next to the last page.

MR. SUGARMAN: Actually, sir, if I may, I would just like to have Table --

JUDGE BRENNER: No. Let's get the whole thing in. I've had this trouble before in this case where then one page and then three days later the other page comes in.

MR. SUGARMAN: Very good.

JUDGE BRENNER: And it's only for identification, so it won't matter from an evidentiary

point of view.

(The document referred to was marked Del-Aware Exhibit No. 14 for identification.)

JUDGE BRENNER: We will bind Del-Aware Exhibit No. 14 into the record at this point.

(Del-Aware Exhibit No. 14 follows:)

E. H. BOURQUARD ASSOCIATES, INC. INSERT #3
WATER RESOURCES ENGINEERING
1400 Roosevelt Street
(East No. 2A Interstate 83)
Harrisburg, Pa.
17104-3497
TELEPHONE (717) 238-9585

WATER SUPPLY
WASTEWATER DISPOSAL
WATER RESOURCES
HYDRAULIC STUDIES
FLOOD INSURANCE STUDIES

FLOOD CONTROL
DAMS & RESERVOIRS
DRAINAGE-STORM
HYDROLOGIC STUDIES
ENVIRONMENTAL

August 10, 1982

Relevance 14

Haines Dickinson, Supervising Engineer,
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Philadelphia Electric Company,
Mechanical Engineering Division,
2301 Market St., 2N-1,
Philadelphia, PA 19101

Re: PPPS Pumps/Bradshaw Reservoir Operation

Dear Haines:

As I was leaving Sugarman's office last Friday, Vince Boyer asked for any additional information we have on (1) slope stability of the Bradshaw Reservoir dikes, and (2) number or frequency of drawdowns of the Reservoir pool.

The "Supplemental Data" and "Slope Stability" documents submitted at the depositions cover the slope stability data; however, we do have some general data on pump operation which I converted to drawdowns. This is explained in the following paragraphs.

The Bradshaw operating pool will contain 18 M.G. of storage and initially this was to be divided into four increments of 4-5 M.G. each for starting/stopping of the PPPS pumps. However, after examination of the operating characteristics, it was concluded that usage of a larger initial increment would reduce the number of stop/starts for most of the year. Shown on Sheet No. 1 attached is a tabulation of the start/stop elevations with increments of 6, 5, 4 and 3 M.G. Utilizing these increments, a graph of pump operations for various outflows from Bradshaw Reservoir was developed and is shown on Sheet No. 12 attached.

Sheet No. 2 shows the projected average daily outflows for each month in the years 1990, 2000 and 2010. These include both PECO's and NWRA's needs and a 10% loss allowance. By applying these outflows to the curves on Sheet No. 12, it was determined how many pumps would be operated at PPPS and the number of hours operating and not operating. For example, in January and February when the outflow is the same for all three projection years, one pump would run for 8 hours and then be off for 20 hours. During March, April and May, the number of hours on would increase and the number off would decrease; in May 1990, one pump would be on for 12½ hours and then off for 10½ hours. By May of 2010, one pump would operate almost continuously to keep up with outflow.

During June, July and August, increased outflows require two pumps to operate continuously and the third pump to recycle. For example, in June of 2000, the third pump would be on for 11 hours and off for 7 hours, thus making a cycle every 18 hours. In September and October, outflows require one pump to operate continuously and a second pump to recycle. For the last two months of the year, one pump will take care of the outflow.

The number and depth of drawdowns are developed in the last three columns. Only one pump and only the top increment of operating pool storage would be used from January through May. Thus the drawdown is 1.0 feet and the number of drawdowns during the month equals the hours in the month divided by the hours in the pump cycle. For example, in May of 2000, the number of drawdowns would be 30 x 24 = 720 hours divided by 8 + 19 or 27 hours, which equals 26.7 drawdowns during the month.

At the start of June when outflows require operation of 3 pumps, there would be a one-time drawdown to the bottom of the third increment for a total of 2.6 feet. After this and during June, July and August, the third pump would be recycling in the third increment with drawdowns of 0.7 feet. In September and October, the second pump would be recycling in the second increment with drawdowns of 0.9 feet.

The above pump operation and drawdown frequencies are, as previously mentioned, based on pool increments of 6, 5, 4 and 3 M.G. When in actual operation, it may be desirable to use other pool increments, which can easily be done. In fact, changes in increments for various times of the year would probably be in order so as to permit operation with a reduced force during certain seasons. Also, with only three pumps in the initial installation, there will probably be only 3 increments in the pool until the fourth is installed. In any case, the operating drawdown will be limited to 3.2 feet total.

The frequency of a drawdown of 14.2 feet when the Reservoir would be dropped to silt storage level (Elev. 420.8) is unpredictable, but once a year might be a reasonable guess. Completely draining the Reservoir to Elev. 414.5 could result in a drawdown of 20.5 feet; a frequency of once every 5 years for a periodic examination of the bottom and slopes might be considered possible.

Any questions, please give me a call.

Best regards,

EHB/bs
Encl.As Noted

E. H. Bourguard

COMPUTED BY [illegible] DATE 7-4-87 CHECKED BY

Brod. Res. Oper. Pool: 4 Units of 6, 5, 4 and 3

ΔWS	Elev.	Stor. MG	ΔStor. MG	Action at PP
	435.0	70		↑ 1st P
1.0			6	
	434.0	64		↓ 1st Pump On ↑ 2nd P
0.9			5	
	433.1	59		↓ 2nd Pump On ↑ 3rd Pu
0.7			4	
	432.4	55		↓ 3rd Pump On ↑ 4th P
0.6			3	
	431.8	52		↓ 4th Pump On

NOTES

1. The four operating pool increme... set up for four pumping units in o... tion which, for these computations, ... assumed to be the case by 1990

2. Common elevations for both starting ... stopping pumps are assumed to simp... the computations.

ADJUSTED RESERVOIR
ΔSTOR = 6,5,4&3

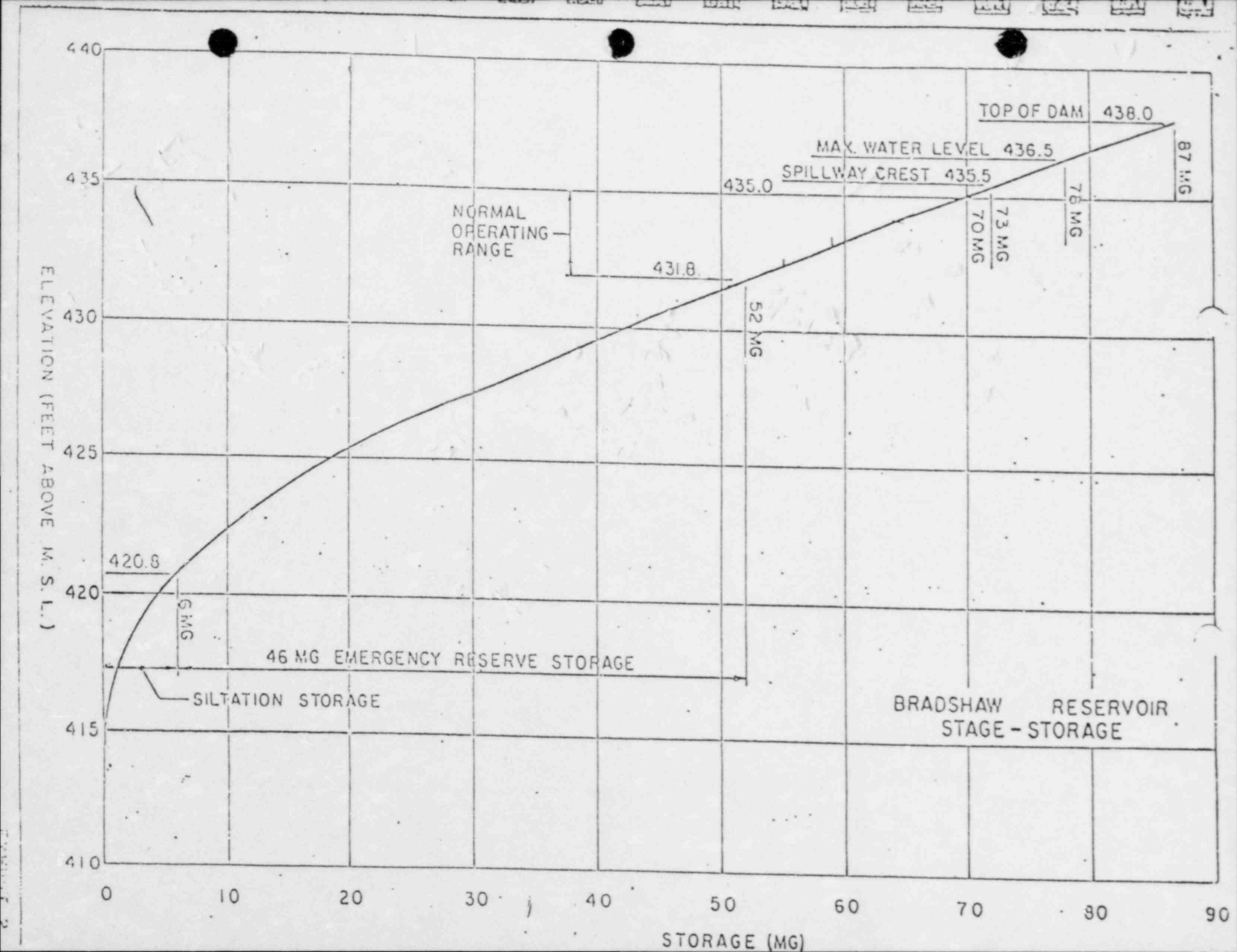
PPPS Pumps / Brad Res. Operation under Average Conditions

Month of Year	Average Daily Outflow in Calendar Year			No. of PPPS Pumps Operating in:			No. of Pool Drawdowns during Month in:		
	1990	2000	2010	1990	2000	2010	1990	2000	2010
Jan. 31	7.1	7.1	7.1	One pump on for 8 hrs. then no pumping for 20 hrs		8 hours	26.6 D.D. of 1.0 ft.		
Feb. 28	7.1	7.1	7.1			20 hours	24.0 "	"	"
				on / off	on / off	on / off			
Mar. 31	7.1	7.4	8.2	8 / 20	8 / 19	8½ / 18	26.6 - 1.0'	27.6 - 1.0'	28.1 - 1.0'
Apr. 30	8.1	10.1	12.1	8½ / 18	9½ / 14½	11 / 12	27.2 - 1.0'	30 - 1.0'	31.3 - 1.0'
May 31	13.7	19.0	24.0	12½ / 10½	24½ / 7½	Almost Continuous	32.3 - 1.0' (One drawdown of 2.6 ft.)	23.2 - 1.0'	1 - 1.0'
June 30	53.5	64.8	69.5	2 Cont. 1 - 5/33	2 Cont. 1 - 1/7	2 Cont. 1 - 2/5	18.9 - 0.7'	40 - 0.7'	23.2 - 0.7'
July 31	56.0	62.9	67.9	2 Cont. 1 - 5/15	2 Cont. 1 - 10/17½	2 Cont. 1 - 17/5	37.2 - 0.7'	42.5 - 0.7'	31.0 - 0.7'
Aug. 31	55.3	62.2	67.0	2 Cont. 1 - 5/10	2 Cont. 1 - 9/8	2 Cont. 1 - 17/6	35.4 - 0.7'	43.8 - 0.7'	32.3 - 0.7'
Sep. 30	39.3	39.3	39.3	1 Cont. 1 - 11/7	1 Cont. 1 - 11/7	1 Cont. 1 - 11/9	34 - 0.9'	34 - 0.9'	36 - 0.1'
Oct. 31	37.1	37.9	41.3	1 Cont. 1 - 7½/9	1 Cont. 1 - 10/9	1 Cont. 1 - 14/1	40.2 - 0.9	39.2 - 0.9	35.4 - 0.9
				on / off	on / off	on / off			
Nov. 30	7.1	8.1	11.8	8 / 20	8½ / 18	10½ / 12½	25.7 - 1.0'	27.2 - 1.0'	31.3 - 1.0
Dec. 31	8.1	7.7	10.3	8 / 20	8 / 18½	9½ / 13½	26.6 - 1.0	28.1 - 1.0	32.3 - 1.0

NOTES: "on" is no. of hours one pump operates and "off" is no. of hours no pump operates.

"2 Cont." means that two pumps operate continuously

"1 - 11/7" means one pump is on for 11 hours and then off for 7 hours, ...


440
435
430
425
420
415
410
ELEVATION (FEET ABOVE M. S. L.)
0
10
20
30
40
50
60
70
80
90
STORAGE (MG)
TOP OF DAM 438.0
MAX. WATER LEVEL 436.5
SPILLWAY CREST 435.5
435.0
87 MG
76 MG
73 MG
70 MG
NORMAL OPERATING RANGE
431.8
52 MG
420.8
6 MG
46 MG EMERGENCY RESERVE STORAGE
SILTATION STORAGE
BRADSHAW RESERVOIR
STAGE - STORAGE

BY MR. SUGARMAN: (Resuming)

Q Now, Mr. Harmon, you heard Mr. Emery --

JUDGE BRENNER: Mr. Sugarman, copies for the Reporter at your next convenience.

BY MR. SUGARMAN: (Resuming)

Q You heard Mr. Emery's testimony concerning the impact of on/off operation of the pumps as affecting the larvae in terms of the intake structure being an attractive place and causing fish to congregate. Did you consider an on/off operation in May and June in considering your biological opinion, 12 hours on/12 hours off, that kind of sequence? And if so, where is it reflected in your report?

A (WITNESS HARMON) No, I did not consider the on/off operational mode of the pumps.

Q Were you aware that there would be an on/off operational mode?

A (WITNESS HARMON) Yes. I believe I was generally aware of it, but in my evaluation I didn't reflect that because I remembered the testimony that they gave, [illegible] the types of fishes that you are talking about [illegible] size ranges you are talking about remaining near this intake in the current pattern that is out there would essentially be invulnerable to entrainment and impingement of this intake design.

Q And what current pattern that is out there?

A (WITNESS HARMON) In the predominant velocities that we have.

Q What are the predominant velocities that you have that you are basing that on? One foot per second or more do you mean?

A (WITNESS HARMON) Not necessarily. More generally one foot per second. If they are somewhat less, if they are down to .5 feet per second, that again is a sufficient bypass velocity to afford a substantial protection to these fishes that will be able to be entrained.

A (WITNESS BOYER) Secondly, I would not classify this once per day putting the pumps on or twice per day as being an on/off operation in the context that you might have asked someone else about on/off operation.

Q What would you consider an on/off operation?

A (WITNESS BOYER) Where they are going on more frequently than once an hour.

Q You're talking about in terms of impact on fish?

A (WITNESS BOYER) On anything just in terminology, on/off operation.

Q Well, whatever you characterize it, Mr. Boyer, are you testifying as to the effect that this pattern of

operation will have on fish?

A (WITNESS BOYER) I am not. I am clarifying your statement as to on/off and how you might have used it with some other witness in the context in which he might have understood on/off operation.

Q I understand your clarification.

Mr. Harmon, are you now testifying that a half a foot per second velocity in the area of the intake is not a problem for fish?

A (WITNESS HARMON) What I am testifying to is that a half foot per second bypass velocity with the type of average and maximum through-slot velocities we have will afford a substantial margin of protection for the types of fish that we have in this area of the river.

Q Have you ever given that opinion before today?

A (WITNESS HARMON) Many times to my client.

Q Have you ever reported it any of your reports?

A (WITNESS HARMON) Well, since I only made, that I can recall, basically this one report to Mr. Bourquard a couple of years back, I would have to say no.

Q Did you say this at your deposition?

A (WITNESS HARMON) What I said at my deposition, and I repeated this morning, that I had discussed with you that the one foot per second bypass velocity was not a magical figure; that even velocities

of .5 feet per second would afford between .5 and 1. You are going to get substantial protection for fishes of the size that could be entrained.

Q Of the size that would be entrained?

A (WITNESS HARMON) That's right. Or could be entrained potentially.

Q What about impingement?

A (WITNESS HARMON) Impingement -- virtually all fishes will be completely protected fro. impingement on this type of intake device.

JUDGE BRENNER: Mr. Harmon, all fish of all ages or did you mean just adult fish?

WITNESS HARMON: The sizes that would not go through the slots once they were above a potentially entrainable size. After a very short time most of them would be afforded complete protection -- your juveniles, your adults.

WITNESS BOURQUARD: One thing I would like to add in connection with the fact of this off and on is that there is only one pump operating; that is, for the intake. The through-slot velocity would be only one-fourth of this .5 percentum that has been mentioned previously.

BY MR. SUGARMAN: (Resuming)

Q Are you aware of any impingement tests of

larvae in connection with the Johnson screens?

A (WITNESS HARMON) Yes. I'm aware of several pieces of research dealing with the Johnson wedge-wire screens.

Q Dealing with impingement?

A (WITNESS HARMON) Yes.

Q Dealing with shad?

A (WITNESS HARMON) Not with shad.

Q Are there any studies dealing with entrainment of shad with the Johnson screens?

A (WITNESS HARMON) Not to my knowledge.

Q You were saying that a ratio of one to one in river velocity versus -- or ambient velocity versus intake velocity would be sufficient to protect larvae?

A (WITNESS HARMON) It will afford a substantial margin of protection.

Q When you say "substantial margin of protection," and you used that phrase before, do you mean that there will be no risk because the protection will be complete with a substantial margin beyond it, or do you mean it will be or it will reduce the losses substantially?

A (WITNESS HARMON) It will reduce the losses. It will reduce the potential losses substantially. In other words, you may have a 20 to 80 percent protective

factor above the fraction that might be expected to go in. In other words, if you are removing 5 percent of the river, you may expect 5 percent of the entrainable objects to go into this intake. And if you have a 20 to 80 percent improvement, it would be a 20 to 80 percent protective factor applied to that small proportion that would have the original potential to enter this type of intake.

Q As to the shad eggs, what is your -- as to shad eggs, you heard Mr. Emery's testimony concerning the potential for entrainment of shad eggs. Do you have any basis to disagree with his testimony in that respect?

A (WITNESS HARMON) I can't recall exactly what his testimony was on that point. We covered it a number of times.

JUDGE BRENNER: Mr. Sugarman, the witness is absolutely correct. You're talking about a lengthy, wide-ranging examination. If you want him to agree or disagree with something, give him a statement or state the proposition yourself.

BY MR. SUGARMAN: (Resuming)

Q Do you agree that there could be entrainment of shad eggs in the intake or impingement of eggs as well?

A (WITNESS HARMON) Yes, I would have to agree

that there would be a possibility for that to occur if the eggs were spawned sufficiently close to encounter the intake.

Q When you said in your biological evaluation that data from a river velocity survey illustrate that ambient currents at this location are generally one foot per second or greater, even at low flow, and are sufficient to maximize efficiency for screens with a 2 millimeter slot size, and the flow that you are referring to is 3000 CFS, did you mean to say that at lower flows, lower velocities would also be sufficient?

A (WITNESS HARMON) No, that is not what I said there.

Q What did you say?

A (WITNESS HARMON) I said that the velocity survey that was conducted illustrates that the ambient currents are generally one foot per second or greater, and I gave a flow citation of 3000 CFS being low flow, and are sufficient to maximize efficiency for screens with a 2 millimeter slot size.

Q And now you're saying if it was a half a foot per second that would be sufficient, too?

A (WITNESS HARMON) Well, the difference in the protection afforded to the fishes between a .5 and the one foot per second bypass velocity is in the same

range, to my way of thinking, of maximizing the efficiency of this type of 2 millimeter slot size in the context that it was being described here.

Q What was the context it was being described here?

A (WITNESS HARMON) Well, we were also talking in this description of the intake about the location of the water column, the location with respect to the presence, the various populations of fishes. We got into several design criteria in this.

Q Do you agree that the Johnson wedge-wire screen efficiency depends on its location in relationship to the current as well as on the design of the intake itself -- is that not correct -- in protecting fish?

A (WITNESS HARMON) Could you repeat that?

Q You will agree, will you not, that the efficacy of the Johnson screen in protecting fish depends on its location as well as the characteristics of the design of the intake?

A (WITNESS HARMON) Yes.

Q And positioning the intake in the main river current and not in the back eddies along shore where young fish, including American shad, appear to congregate is important for minimizing the potential for

interaction of species with the intake structure, is that correct?

A (WITNESS HARMON) It would be best to place the intake out from the areas that the fish appear to congregate in.

Q And in the main river current?

A (WITNESS HARMON) You want to place it in an area where you have some bypass velocity to maximize the protective features of this type of screen, yes.

Q Well, did you use the words "main river current" to describe that an earlier point?

A (WITNESS HARMON) At an earlier point in this report?

Q No. At an earlier point before today. It is the last sentence of your report.

A (WITNESS HARMON) What were you asking me, whether I'd made this statement?

Q Yes. That to minimize the potential for damage the intake should be placed in the main river current.

A (WITNESS HARMON) Yes, that would help. I made that statement.

Q Thank you.

Now, you made the velocity measurements that have been talked about before on November 7, 1980. You

also indicated that you made some measurements on September 10, 1980. Did you make those, or it says additional data was obtained on 10 September at about 180 to 200 feet from the Pennsylvania shore.

A (WITNESS HARMON) Yes. I obtained this very rough velocity measurement -- rough in the sense of distance which we indicated in the bottom of this table here.

Q Did you ever verify that against flow or correlate that with flow?

A (WITNESS HARMON) Correlate this one measurement we made in September of '80?

Q Yes.

A (WITNESS HARMON) No. The purpose of obtaining this item of data was very limited. Myself and an associate went up to the intake location and reviewed the area, visually calculated how far we might be out from shore, where the intake was going to be located, saw what the prevailing velocities were at that point, and made some current measurements.

Q Mr. Boyer, you testified yesterday, I believe, in trying to define the location of the bank and the basis for those contours on Policastro 1, you testified with regard to the location of the stake and the location of the shore on page 2206 and 2207 of your

testimony. These measurements were taken in November 1981, or July, pardon me, in November 1980 and July 1981, which goes back almost a year and a half ago. And the river banks, due to the effect of erosion, wind, rain, et cetera, are going to change over the time period. And it could be one foot or it could be five foot.

Mr. Boyer, do you feel comfortable in relying on the contours that were prepared in 1967 by Mr. Major as a basis for evaluating the bottom contours and the shoreline contours for the river?

A (WITNESS BOYER) Yes. As a direct answer to your question, since Mr. Bourquard had made some written measurements or core borings and had confirmed that the contours were essentially the same. Also, we are not -- at various spots. And also, we are not really concerned with whether there is a change 200 feet, 300 feet upstream or downstream. What we are really concerned about is the data at the cross-section of the intake. And we had these velocity profiles and depths taken simultaneously which generally confirmed the contour and gave us the contour, actual contour of the river bed, showed that the intake location as proposed was in a reasonable velocity area and in the channel depth, in the depth of the channel, and therefore was in a good

location.

I might add that the quotation from my testimony yesterday referred to was trying to help straighten out a difficulty that you had in relation to determining river bank characteristics and the problems of taking a couple of data from charts to determine a river's edge and changes in elevation, which introduced some confusion.

Q And you're saying, Mr. Boyer, that you were trying to help me out?

A (WITNESS BOYER) Yes, sir.

Q Thank you very much.

JUDGE BRENNER: You see, every time he gives you a helping hand, you turn on him.

(Laughter.)

BY MR. SUGARMAN: (Resuming)

Q Now, Mr. Harmon, in your direct testimony you stated that there is no evidence of shad spawning in the pool. Do you believe that that statement is still true as a result of your testimony this morning?

A (WITNESS HARMON) We don't have any direct evidence that it is used as a spawning area for American shad.

Q Do you have indirect evidence?

A (WITNESS HARMON) I don't have any evidence

that it is used as a spawning grounds.

Q Well, what do you call these suspicious eggs?

A (WITNESS HARMON) They may be eggs. They may be -- we don't know exactly what they are. You asked me if I had looked at them. They are suspicious. I haven't measured them exactly. I was looking over some of the collections earlier in the year, and it is a suspicion. Whether they are plastic, pieces of plastic spheres -- I've run into that in my experience before -- I don't know what they are. I'd have to go look. And we haven't done it yet.

Q Well, would it be true that you wouldn't want to have evidence of shad spawning in the pool?

A (WITNESS HARMON) No. I would be very happy if they did spawn there. And when we went through this intake design, personally and as a fisheries biologist when we went through the intake design we designed it in mind that shad would eventually reinhabit this area as a spawning grounds; and we designed it to afford substantial protection to the early life stages of, among other things, American shad.

Q Isn't it true that after you designed it you moved it twice?

A (WITNESS HARMON) I didn't move it.

Q I thought the "we" that designed it was the same "we" that moved it.

A (WITNESS HARMON) I guess I was speaking collectively.

Q I thought so, but it seemed to me that the collective changed personnel from one question to the next.

A (WITNESS HARMON) I'm sorry.

JUDGE BRENNER: Well, let's pursue that, not along the same vein you were, but when you talked about the redesign that you were involved with, Mr. Harmon, you meant the change from 200 to 245? Is that what you meant?

(Panel of witnesses conferring.)

Wait a minute, I'm asking Mr. Harmon.

WITNESS HARMON: We were involved -- prior to this report I was involved on a verbal basis in commenting on the vertical traveling screen. We went up to meet with Fish and Wildlife Service.

JUDGE BRENNER: I think you're giving me more than I want to know. I just want to know what changes you had in mind when you talked about the redesign that

you were involved with, which had in mind affording substantial protection for the future possibility of shad spawning in the vicinity.

WITNESS HARMON: Changes from a vertical traveling screen which was shore-mounted at this location, to a Johnson type screen located -- at that time it was going to be located out in the river current at 200 feet out. That is basically what we talked about.

JUDGE BRENNER: And as long as I have interrupted, does it usually take a long time to analyze eggs that you collected months ago?

WITNESS HARMON: Oftentimes we do not have a full-time ichthyioplankton identification specialist onboard at this point.

JUDGE BRENNER: Well, let me suggest that it doesn't sound like you are very eager to analyze the eggs, and what would you say in response to that suggestion?

WITNESS HARMON: Well, there are other factors. I've been tied up myself. Our specialist has had some personal problems and we saw no great urgency -- I saw no great urgency personally to get these done other than in a normal time during the winter months when we have a slow period.

JUDGE BRENNER: You didn't think the question

would come up as to whether or not you found shad eggs in the vicinity of the proposed intake?

WITNESS HARMON: I thought it would come up but I thought, personally, that I covered it in the prepared testimony of assuming that shad would spawn there, do spawn there or would spawn there.

JUDGE BRENNER: All right, I understand. If we perform our assessment and determination, we should do so on the basis that shad spawn there, and therefore, we don't have to worry as to whether or not you found eggs? Is that your approach?

WITNESS HARMON: I tried to make the conservative assumption in the assessment that I took that they do spawn there.

JUDGE BRENNER: All right, thank you.

JUDGE COLE: I would like to pursue that just a minute. What was the purpose of collecting the samples and what will be done when they are eventually analyzed? What will be done with the results?

WITNESS HARMON: We would provide then documentation one way or the other based upon this one-year sample, and we also, -- as to what spawns there, not just American shad -- we would be looking at relative densities of the early life stages of fish in this area. And there will also be other questions, I'm

quite sure, that will be coming up on the impacts of this intake, the water transfer system and those sorts of things. We will be using this information for additional background.

JUDGE COLE: As a baseline?

WITNESS HARMON: In a way of thinking, yes.

MR. SUGARMAN: I would just like to state that I asked the witness these questions at his deposition on August 6th.

JUDGE BRENNER: Well, we heard your earlier questioning of him in which you made this point.

MR. SUGARMAN: I thought it was worth reiterating.

JUDGE BRENNER: Not to me it wasn't.

BY MR. SUGARMAN (Resuming):

Q In your testimony, Mr. Bourquard and Mr. Harmon, you say the location of the intake might best be described as being in the lower section of the rapids or swift water that define the high gradient section of the river near the mouth of the Tohicken Creek. Are you saying that the location of the intake is in the lower section of rapids or swift water?

A (WITNESS BOURQUARD) I don't remember saying all of that.

MR. CONNER: We keep coming back and cycling

back around topics over and over again, and I cannot remember, anymore than the Board, what has been covered specifically or not. But I object to this question as having been asked and answered.

JUDGE BRENNER: Well, I missed the question so I'm going to have to get it read back. Can you repeat it?

MR. CONNER: I will withdraw the objection so we can get on.

JUDGE BRENNER: Well, Mr. Conner, one word of advice. If your objection is serious enough to make, stick with it. If it is not so serious that you are willing to withdraw it right away, then don't make it in the first instance.

MR. CONNER: Mr. Chairman, we have to make a judgment between how long -- how much hearing time it costs each time we do this. I'm very serious on the objection and I do object to this cycle type of cross examination. But I have to evaluate it against the loss of time.

JUDGE BRENNER: I understand that. I'm just suggesting you should evaluate that before making the objection. Anytime you make an asked and answered objection it always involves the judgment as to how close in wording the previous question was. And I

recognize you are laboring under the same problem we are; some of these questions were two weeks ago. So I am sympathetic to your wanting to make that point. But if you want to make it, I will stick with it and get the question read back. If you don't want to, we will move on.

I take it you want to move on in this instance.

MR. CONNER: Yes.

JUDGE BRENNER: Why don't you ask it again anyway, Mr. Sugarman.

BY MR. SUGARMAN (Resuming):

Q The question was, and I will address it to paragraph 9 of your testimony. You state that the location might best be described as being the lower section of the rapids or swift water that define the high gradient section of the river near the mouth of the Tohicken Creek.

Now, are you saying that that location around the intake is in rapids or swift water of that high gradient section of the river?

A (WITNESS BOURQUARD) Yes, I'm saying it is in a higher section than that further downstream.

A (WITNESS BOYER) Furthermore, that statement is a macroscopic description of where the intake is, and not a microscopic identification of its location.

Q Doesn't it make a difference whether it is in the area that is hydrologically controlled by the Lumberville wing dam or not?

A (WITNESS HARMON) We tried to clarify the difference between eddy and pool in this paragraph.

Q Were you saying it is a pool but it is not an eddy?

A (WITNESS BOYER) There's been a lot of confusion between pools and eddies. We are saying that the intake is in the upper part of the pool which is backed up by the Lumberville dam, and that the eddy that is referred to as the small, relatively small in comparison to the size of the pool, area on the Pennsylvania shore side of the intake.

A (WITNESS HARMON) And furthermore, we defined the pool in this paragraph as extending upriver from Lumberville wing dam to the riffle or rapids at the mouth of Tohicken Creek, and for basically a biological common sense type workign definition.

Q But my question here is it is very unclear to me in this paragraph as to whether you are testifying that the intake location is in the area of the pool or in the area of the rapids or swift water.

A (WITNESS BOYER) Well, you are taking more out of that, and I don't see quite how you are determining

that.

Q Well you see, it says, the sentence says, the intake is located near the upstream limits of the Lumberville pool.

A (WITNESS BOYER) Correct.

Q By itself that doesn't tell me, when you say near, whether that means in the pool or near the pool but outside of it.

A (WITNESS BOYER) No. Okay, it is if -- anyone with any reasoning and knowledge of this application would know that it was in the pool, and this was defining that it was up near the upper limit.

Q Okay, but if it is in the pool, then how can it be in the lower section of the rapids or swift water?

A (WITNESS BOYER) The rapids are above it, and this is sort of immediately below by a few hundred feet, the rapids, as a further macroscopic identification of where this is so that people in testimony or reading it who are not as familiar with those who have been a part of this for so long would be able to focus in and get a general idea of where the intake is located.

Q I really wasn't calling for that justification but only to clarify the testimony, and it is now clarified for me.

A (WITNESS BOYER) Thank you.

JUDGE BRENNER: Mr. Sugarman, let's try to avoid the use of the word "pool" in the future unless you are questioning their usage of the word, because as this paragraph states, "pool" is used differently to mean different things. So if you are talking about the area of the slack water and you want to call it an eddy, I think we will understand that better than the word "pool", if you mean the eddy.

I just want to avoid the continuation of this ambiguity which, as I read this paragraph, was designed to describe that people use "pool" differently.

BY MR. SUGARMAN (Resuming):

Q Now, you've testified, Mr. Harmon, that the Point Pleasant area is a nursery area, and you've also indicated that it is not in any way -- is not of unique biological significance.

Now, have you any basis for evaluating whether it is a significant or a major area, nursery area for shad?

A (WITNESS HARMON) I've seen the results of other researchers that have indicated that the majority of the shad population in the Delaware exists further upstream; they spawn further upstream than this location, and that they make use of a substantial, if not major, portion of the river.

This is both written and I have talked to several researchers that still have work in progress. For example, the people from the U.S. Fish and Wildlife Service.

Q Do you consider that the only measure of significance is numerical? Is it of some value to have a diverse shad population which uses upstream and downstream locations?

A (WITNESS HARMON) It is of value to have a shad population that is throughout the river, I would think.

Q Well, you indicated a few minutes ago that as a biologist and a researcher, you thought it would be good to have shad spawning in this area. Are you saying that as a biologist and a researcher, you would be happy to see shad spawning anywhere? Or were you saying more than that? Were you saying that it would be a good thing to have the shad population restored in its native form to the lower non-tidal stretch of the Delaware River?

A (WITNESS HARMON) I am not against continued expansion of the Delaware River American shad population, and if it can expand to its complete native territory or nursery and spawning grounds, I think that would be wonderful.

Q Thank you. In your sampling for shad in this

area, what have you found with respect to the incidence of shad, juvenile shad, in June, July, August and September?

A (WITNESS HARMON) We found, through our seining and electrofishing operations, that juvenile shad utilize this area. The area around Point Pleasant this year particularly. I believe it was late July. And up until last week I know there were shad still in the area.

Q Do you agree that shad, that larva shad, in the 20 to 25 millimeter size range will be susceptible to being impinged or being bruised and descaled by interaction with the intake?

A (WITNESS HARMON) They would have some potential for involvement with the intake, yes.

Q And if the water in that area, which has been described as the eddy or the backwater in the Point Pleasant intake vicinity, is recirculated past the intake during that period of time could that involvement be significant?

A (WITNESS HARMON) No, I don't believe it would be significant because when the fish achieve this general size range, they are pretty strong swimmers and they would be able to avoid directly interacting with the intake, if they so chose to.

Q If you compound the operation of the intake

with a pattern of operation in which the intake is completely turned off for a period of up to 10 or 12 hours and then turned back on, are the larvae at that age likely to be attracted to the intake as a congregating area during the off-period?

A (WITNESS HARMON) I don't see how the on or off operation would affect them very greatly at all primarily because the velocity field around this type of intake decreases so greatly as you get a short distance away.

Q Well, if they congregate around the intake as an attractive structure, won't they be within that velocity field?

A (WITNESS HARMON) If they are able to maintain themselves around this intake during the times of year when you find them most abundantly, they should certainly be able to avoid the very low intake velocities.

Q When you talk about the time of the year when you find them mostly abundantly, you're talking about August and September?

A (WITNESS HARMON) August and September generally more you find more than at other times.

Q I would like you to address yourself to the time in July when they are in the 17 to 25 centimeter

range in size, and they are -- and the intake is operating at that point on for 12 hours and off for 12 hours; to the extent that occurs.

JUDGE MORRIS: Was that millimeters or centimeters?

MR. SUGARMAN: That was millimeters.

WITNESS BOYER: I would note that when the pump starts it has a variable speed device to start the pump so it would start slowly and there would not be a sudden rush of water through the intake.

WITNESS HARMON: And also, during this 12-hour period the fish that would be right around the area -- I don't believe they would preferentially congregate right at the intake, and if you did get some limited impingement that would be it; impingement or entrainment, if they were able to be entrained. That would be it for those. They would be cleared out.

And any others that might encounter it during this 12-hour operational period would not know that it was off beforehand, and then you have the 12-hour period when there is no pump operating, which would be 100 percent no effect.

(Panel of witnesses conferring.)

I might add to that that the pumps start one pump at a time, which is, again, a very low velocity

drain with one pump. And even with four pumps it is a very, very low intake velocity.

BY MR. SUGARMAN (Resuming):

Q All of which, in your judgment, tends to reduce the amount of entrainment, or rather, impingement?

A (WITNESS HARMON) Reduced from what?

Q From what it would otherwise be.

JUDGE BRENNER: I don't understand the question, Mr. Sugarman. From what it would otherwise under what assumed circumstances?

MR. SUGARMAN: If there were a higher intake velocity or if the pumps were operating all of the time and the intake wasn't operating as an attractant.

JUDGE BRENNER: You're going to have to break that down.

MR. SUGARMAN: I'm going to strike the question. That is comparing apples and oranges.

BY MR. SUGARMAN (Resuming):

Q Now, Mr. Bourquard, you have offered testimony as to the impacts of the intake, and I want to ask you if you have any expert experience with designing intake structures, and in evaluating the impact of intake structures for withdrawing water from a river by pumping. First of all, have you ever done that?

A (WITNESS BOURQUARD) Yes, I have designed an

intake for withdrawing water from a river, yes.

Q I beg your pardon?

A (WITNESS BOURQUARD) Yes, I have.

Q And did you have occasion to evaluate the impacts on fish of an intake operation?

A (WITNESS BOURQUARD) No.

Q Have you any academic training in that field?

A (WITNESS BOURQUARD) Of evaluating the impact on fish of intakes?

A (WITNESS BOYER) Intakes on fish.

A (WITNESS BOURQUARD) Intakes on fish. No.

Q So, Mr. Harmon, you've indicated that the area between Belvedere and Riegelsville and extending downstream appears to be of minor importance as a nursery area, and you previously testified that you found increasing numbers of shad at Point Pleasant this year. What would constitute an area of major importance as a nursery area?

A (WITNESS HARMON) Historically, over the past research that has been published, say, within the last 17 years or so, and in conversing with the Fish and Wildlife people, the Pennsylvania Fish Commission, it has been quite clear that the major shad spawning area has been upstream of the water gap area. And I don't believe I said increasing importance this year. I said

we had found young shad this year. That is what I basically reported to you.

Q You testified that other members of the genus alosa at a size small enough to entrain have shown resistance to entrainment and impingement by wedge wire screens, at a size less than necessary to achieve physical exclusion. What data and what studies were you referring to?

A (WITNESS HARMON) I was referring to studies done for DP&L. That's Delmarva Power & Light.

Q And of what species were they?

A (WITNESS HARMON) I believe they were alewife and blue-back herring.

Q And who were these studies done by and when?

A (WITNESS HARMON) Within I believe the last three years, and they were done by a William Basin, and Mr. Hanson from the Delmarva Ecological Lab.

Q And when you say they have shown resistance, what does that mean?

A (WITNESS HARMON) They have shown behavioral resistance. In other words, they have displayed some type of behavior that would allow them to be partially protected.

Q And what size or what age were these alewives and blue-back herring?

A (WITNESS HARMON) If my memory holds, I think they were in the range of 10 to 15 millimeters or so.

Q And how old were they?

A (WITNESS HARMON) Probably around two weeks old, starting from the egg.

Q And when you say show resistance, does that mean there was no entrainment and impingement?

A (WITNESS HARMON) No, there was some, but they showed resistance as a group.

Q I beg your pardon?

A (WITNESS HARMON) As a group.

Q Do you have any numbers?

A (WITNESS HARMON) Not right at my fingertips.

Q When you say that larvae are able to detect and avoid the screens are you talking about all larvae from the moment of birth?

A (WITNESS HARMON) I believe we are talking about the alosa larvae, and that is based on these results we are discussing now.

Q But are all larvae, from the moment they become larvae, able to detect and avoid the screens?

A (WITNESS HARMON) No. Some of them will try to go into these types of screens.

Q And some of them will be drawn in despite themselves? Some are not able to detect and avoid?

A (WITNESS HARMON) Some have no desire to avoid it, also.

Q And isn't it also true that the larvae are incapable of controlling their movement during their first two weeks or so?

A (WITNESS HARMON) When they are still in the egg they can't control their movement. That would be about the first week. And then the week after, they are in a transition to the point where they can move about fairly well.

Q You wouldn't agree, then, that at 18 days old they will be attempting to swim a little bit and can be caught in the currents and drift with them at 18 days old? That they are at the mercy of the current under 20 millimeters?

A (WITNESS HARMON) Are we talking about shad larvae?

Q I'm talking about shad larvae.

A (WITNESS HARMON) Under certain temperature conditions it could happen, yes.

Q Well, in your testimony in paragraph 16, are you talking about shad larvae or are you talking about larvae in general?

A (WITNESS HARMON) We're primarily talking about American shad larvae.

Q So you're talking about larvae that are in excess of 20 millimeters?

A (WITNESS HARMON) I would say 20, to the high twenties. It is a generalization there.

Q What I mean is when you say that the larvae are at the mercy of the current, are you talking about larvae up to 20 millimeters?

A (WITNESS HARMON) Where am I?

Q I thought you agreed with that statement. I read you a statement that was Mr. Emery's statement in response to Judge Cole yesterday. Mr. Emergy said they are usually quite at the mercy of the current at that stage, under 20 millimeters. I asked you if you agreed with it, I thought you said you did.

A (WITNESS HARMON) To some extent. As a generalization, they may be, yes. As a generalization, they may be at the mercy of the current if they are on in the current.

Q So that would be up to 18 days old?

A (WITNESS HARMON) I'm not sure how old they would be, depending upon the temperature.

Q And at that point, or until that point until they get past that point, they are not able to detect and avoid the screens? Is that correct?

A (WITNESS HARMON) They would have some ability

to avoid areas where they did not want to go. For example, in the experimental test that we talked about earlier, there were larvae that were slightly smaller than that that were able to detect a velocity gradient and avoid being passed through this type of screen.

Q Was this for shad?

A (WITNESS HARMON) No, these were not shad; these were alosa which are very similar. They belong to the same genus.

Q So you would then differ to that extent, you say, when they are slightly smaller than that? You would differ with Mr. Emergy on that, is that right, with respect to other alosa or with respect to alosa maybe including shad?

A (WITNESS HARMON) I would differ that they would be completely unresistant to passing through this type of screen.

Q Now, it is your opinion that they have protection because the wedge wire screen functions is also dependent, as I read your testimony, on the ambient river current; that is, the bypass velocity, the perpendicular to ambient current orientation of the screen slots and the small size of the slots.

Now, taking only the first two of those factors, is it true that if there is not an ambient

river current or if the screens are not perpendicular to the ambient current, that degree of assistance will be obviated or lost?

A (WITNESS HARMON) They will still be able -- they still would display an avoidance response to entrainment but they would not be assisted from being entrained by ambient river currents if there were no ambient river currents.

Q So then, they would be more susceptible to entrainment or impingement? Is that correct?

(Panel of witnesses conferring.)

A (WITNESS HARMON) They would still be able to avoid.

Q But they would be more susceptible, wouldn't they, if they didn't have that degree of assistance?

(Panel of witnesses conferring.)

A (WITNESS HARMON) They would be less susceptible with an ambient bypass current.

Q And more susceptible without it?

A (WITNESS HARMON) The ones that were in the velocity field of the intake.

Q [illegible]. Now, with respect to the shortnosed sturgeon, did your sampling include bottom sampling for shortnosed sturgeon?

A (WITNESS HARMON) Our sampling included the

taking of samples on or very close to the bottom. It was not specifically directed toward shortnose sturgeon.

Q Do you know if Mr. Brundage sampled for shortnosed sturgeon in the spring of the year?

A (WITNESS HARMON) I believe he sampled for the adults in March, I believe it was. It may have been the last sampling he conducted. I am unsure of the month. I know it was for adults and not for young.

Q When do shortnose sturgeon spawn?

A (WITNESS HARMON) During the springtime.

Q What months?

A (WITNESS HARMON) Primarily in this latitude it would be April; early May perhaps.

Q When do they come up the river?

A (WITNESS HARMON) They are said to come upriver early in the spring.

Q April and May?

A (WITNESS HARMON) Maybe even a little earlier than that.

Q But more likely when?

A (WITNESS HARMON) March, April, early May.

Q And you say Mr. Brundage sampled in March?

A (WITNESS HARMON) I recall from his testimony that he sampled -- I don't have his report here.

Q Do you think it is in his report?

(Panel of witnesses conferring.)

A (WITNESS HARMON) I'm not sure. I'm not real clear on that, or where it was reported. I just can't recall where it was reported.

Q Mr. Bourquard, or anyone, you've testified that the intake operation would be a maximum velocity of a half a foot per second through the screens. Is that correct?

A (WITNESS BOURQUARD) When it is running off or pumps are operating, yes.

Q I beg your pardon?

A (WITNESS BOURQUARD) When it is operating at 95 million gallons a day, yes.

Q Will that also occur when some of the screens or some portion of the screens are closed by collection of debris?

A (WITNESS BOURQUARD) Well, we don't anticipate that they're going to be closed that much. If they do start closing down we would backwash the screens and clean them off.

Q Well, Mr. Bourquard, did you tell the U.S. Fish and Wildlife Service at a meeting on May 23, 1980 that the small size of the screen and its location underwater makes it very susceptible to closure by a collection of debris?

A (WITNESS BOURQUARD) I don't remember saying that, no.

Q Did you also say that the usage of an air backwash was reviewed by we explained that the effectiveness of such a backwash has not been proven in prototype operation?

A (WITNESS BOURQUARD) When was that?

Q May 23rd, 1980.

A (WITNESS BOURQUARD) It is quite possible I said that then.

Q Is that not true anymore?

A (WITNESS BOURQUARD) No. Now we feel like it is effective from what we have been able to find out about it. At that time, we were in the stage of investigating the wedge wire screens.

Q Did the Fish and Wildlife people urge you to use it?

A (WITNESS BOURQUARD) I would not say they urged us, no. They indicated that it was the state of the art, it was the best thing that could be used.

Q Did you explain that you were not at all sure that usage of such a screen was operationally possible in the Delaware River at Point Pleasant?

A (WITNESS BOURQUARD) It is possible because we were still investigating it at the time.

Q Did you ever write a report as to the basis for concluding that it is operationally possible?

A (WITNESS BOYER) Operationally possible for what?

Q To use such a screen in the Delaware River at Point Pleasant.

A (WITNESS BOURQUARD) I don't remember such a specific report, no.

Q Didn't you say, where I quoted design report number 2 to you the other day, or two weeks ago and you may have forgotten it. But didn't you say there that was a particular problem with ice and debris coming down the Tohicken Creek in that area?

A (WITNESS BOURQUARD) Design report 2, as I recall, was written in 1973 and 1974, and I didn't even know that a wedge wire screen existed then.

Q Well, I understand that, but what I'm saying is wasn't the area susceptible -- or isn't this an area of high susceptibility to debris and interference from the environment because of its intersection with the Tohicken Creek, et cetera?

A (WITNESS BOURQUARD) It might have been when it was on the shore line.

Q Well, if the intake area, as it presently exists, is in the flow pattern from the mouth of the

Tohicken Creek, wouldn't that still be true?

A (WITNESS BOURQUARD) Not necessarily. It is -- part of the flow coming down would be from Tohicken Creek, but not a major portion.

Q But it might be?

A (WITNESS BOURQUARD) Some of the flow coming down could be from there, yes.

Q And also, doesn't the flow come towards Pennsylvania from New Jersey at that location?

A (WITNESS BOURQUARD) I might point out that debris --

Q Of the main river, I'm talking about.

A (WITNESS BOURQUARD) I might point out that during floods is when you get debris coming down, and when you enter a flood, that bar would be topped and most of the flow would be going down alongside of the west shore line of the river. In fact, that photograph that I gave you during the deposition showed that; that just about in that picture was at a relatively high flow, there was mud coming down Tohicken Creek and you could see it travel right on down along the west bank.

Q Couldn't you also see it fanning out into the river?

A (WITNESS BOURQUARD) I don't have the picture in front of me, but I don't remember it fanning out that

far. It seems to me it clung pretty close to the bank there.

JUDGE BRENNER: Mr. Sugarman, whenever it's convenient, we will take a midafternoon break.

MR. SUGARMAN: Any time.

JUDGE BRENNER: You're always so agreeable on our breaks. All right, let's break now until 3:30.

Before we go off the record, I noticed that the reporting service picked up the pages -- you may notice people shuttling in and out from time to time; that is why it is important to have the exhibits available at the time we identify them.

I want to make sure you get complete Delaware Exhibit 13 which was missing the first page, sheet one of four, and also get the copies of Delaware Exhibit 14 so they can bind it in where we said we would bind it it. And I would appreciate if you can do that. If you need Xeroxing assistance, hopefully the staff can somehow get you access to where the machine is.

Let's come back at 3:35. I'm getting concerned with completing this panel today because of the staff's opportunity and the applicant's opportunity. But let's see what happens.

(A short recess was taken.)

JUDGE BRENNER: What do you think about time, Mr. Sugarman?

MR. SUGARMAN: Well, I would say I have covered most of the questions with the exception of the alternatives and timing issues, and I don't really know what to do about those.

JUDGE BRENNER: Well, --

MR. SUGARMAN: I want to get into those areas but I'm not sure that the Board -- the timing question is in their direct testimony.

JUDGE BRENNER: I know. I understand. I also understand your comment. What do you mean by the alternative issue?

MR. SUGARMAN: That with Unit 1 there are alternatives available that do not involve the construction of the intake.

JUDGE BRENNER: Do you mean assuming no Unit 2?

MR. SUGARMAN: I mean without Unit 2, right.

JUDGE BRENNER: Don't get into that. We are deciding on your contention now and may have one or two questions for all parties before we finally rule on the admissibility of the contention. Right now that contention is not an admitted contention.

MR. SUGARMAN: I understand that. That is why I raised the point.

JUDGE BRENNER: Well, don't ask about it.

MR. SUGARMAN: I would just like to inform the Board, if I may, of a new development with respect to Unit 2.

JUDGE BRENNER: Well, not now. I will allow you an opportunity to do that this week. If I forget, remind me. Is it something we could get in writing?

MR. SUGARMAN: I eventually can get it. Mr. Conner probably has it now.

JUDGE BRENNER: We are not going to do it now here again unless there is some surprise. Discuss it with the parties and see what you can do. We're going to come back to the parties on our own in any event Thursday or Friday with some discussion, I hope brief, as to our deliberations on your three contentions, and primarily, that last one, the one unit versus two units. So that might be the time for you to bring up whatever it is you want to bring up. But let the other parties know first so we don't spend a lot of time with people posturing because they are hearing it phrased somewhat differently than they might have expected it and that type of thing.

So let's pick up the examination. Do you think you will finish in half an hour?

MR. SUGARMAN: Possibly.

JUDGE BRENNER: Well, if you got an answer like that from a witness you wouldn't like it.

MR. SUGARMAN: I hope so.

JUDGE BRENNER: Okay, let's get going. It is not unlikely that you will finish in a half an hour?

MR. SUGARMAN: Right.

JUDGE BRENNER: I liked it better the way I said it. Go ahead.

BY MR. SUGARMAN (Resuming):

Q With respect to maintenance it is true, is not, that you're going to have a maintenance access road down to the gatewell?

A (WITNESS BOURQUARD) Yes.

Q And that you have acquired a permanent easement across the Pennsylvania Canal from the state of Pennsylvania?

A (WITNESS BOURQUARD) Yes, we have permission to cross the canal.

Q What purpose do you have for having -- for building a road down to the gatewell on the river bank?

A (WITNESS BOURQUARD) For access.

Q Why do you need access?

A (WITNESS BOURQUARD) For one thing, when the screens are backwashed, the operator that is performing the backwash will be utilizing valves at this gatewell.

Q And that will be happening how frequently?

A (WITNESS BOURQUARD) Well, we don't really know how frequently. In the leaf season it will probably be once a day or so.

Q And how frequently will you need to go out and manually clean off the screens, do you figure, into the river?

A (WITNESS BOURQUARD) I don't have any anticipation of really going out, ever going out, but it may be necessary.

Q If the intake is damaged by frazzled ice -- if frazzled ice gets into the intake and clogs it, what will be the procedure for cleaning the intake or getting the frazzled ice out of the intake?

A (WITNESS BOURQUARD) We would probably use the air backwash.

Q What experience do you have with using an air backwash system to clear frazzled ice in winter freezing conditions?

A (WITNESS BOURQUARD) Well, the intake should be down below, much below, the water level. We don't really anticipate very much frazzled ice. And I might point out that during the winter conditions pumping is very limited.

Q You say pumping is very limited during winter

conditions. What do you mean by that?

A (WITNESS BOURQUARD) Well, about all of the pumping -- just a minute. If you will refer to your Delaware Exhibit 14 which is a letter I wrote to Mr. Dickenson and review the second sheet of attachments to that letter, you will see that during the winter months of December, January and February the anticipated pumpage during the initial years is only 7.1 mgd, and only goes up to about 10.3 in the year 2010.

Q Is that to flow to maintain for the Perkiomen?

A (WITNESS BOURQUARD) Yes, primarily, it is for maintenance of the 10 cfs in Perkiomen Creek.

Q So that you won't be able to maintain that 10 cfs if the intakes get clogged with ice, right?

A (WITNESS BOURQUARD) I would say it would have to be almost closed down before we couldn't get 10 cfs through it.

A (WITNESS BOYER) And remember, there is a day's storage in Bradshaw Reservoir.

Also, I might add that our experience with intake screens has shown that air jets are relatively effective on the few times that frazzled ice creates problems.

Q This represents average conditions. What is the return frequency with which you would be requiring

water from the Delaware River to operate Limerick in the months of January, February, March and December?

A (WITNESS BOYER) We would expect to use from the Schulkill during those months so we would have flow augmentation also.

Q I understand that. But are you saying it would never occur that you would need water from the Delaware River, based on past history?

A (WITNESS BOYER) No. Some conceivable set of circumstances could arise that it would be needed.

Q Well now, I'm asking based on past occurrences. How often would you be needing minimum flow from the Delaware River? You would be needing flow from the Delaware River for the Limerick station in those months based on past flow records in the Schulkill River?

A (WITNESS BOYER) Well, without looking it up, it's something like once in ten years or something of that nature.

Q On the assumption -- and if you make the assumption for the moment that debris and boulders, what have you, coming down the Tohicken Creek coming over top of the bar in storm events are low enough in the water column to back up against the intake as they come over, what procedures will you employ for cleaning out the

area below the intake, if any?

A (WITNESS BOYER) To me, that is an impossible scenario.

Q Do you disagree that debris -- boulders, trees, all kinds of stuff -- come down the Tohicken Creek and across that bar?

A (WITNESS BOYER) Well, they can't be great sized trees, at least as compared to what comes down the Delaware River. But again, if it is high flow there will be more greater elevation of river level, and we don't expect a problem with debris with the intake as it is located.

A (WITNESS BOURQUARD) Anyway, if they go over that bar they're going to fill up your eddy; they won't be at the intake.

(Laughter.)

Q It's your eddy, too, Mr. Bourquard.

(Laughter.)

Well, say that those impossible events occur. What would be the procedure for clearing that material out from under the intake, or would it be left there, against the intake?

A (WITNESS BOURQUARD) I would say if it caused a problem it would be done from boats in the river or divers.

Q Are divers going to pick up the trees and boulders?

A (WITNESS BOURQUARD) No, but the diver would probably put a hook around them and have a boat out there with a lift on it and lift them out.

A (WITNESS BOYER) Or a diver could put whatever tools, attachments are necessary and you could pull them toward shore from the shore.

JUDGE BRENNER: Mr. Sugarman, I don't mind a little bit of hypothesizing because you are entitled to put the record together at the end, but I've got to ask you what boulders do you have in mind? I mean, I was with you on trees and debris, but what size boulder are you talking about moving down along the bottom of the river with sufficient -- I assume you don't have floating boulders.

Are you going to put in any testimony through cross examination or anything that you've got big boulders moving in this river at that point?

MR. SUGARMAN: Well, maybe let me modify the term boulder. Let's call them rocks of half a foot to a foot in diameter.

JUDGE BRENNER: Why don't you ask the witnesses about their experience with that object in that reach of the river?

BY MR. SUGARMAN (Resuming):

Q Yes. What is your experience with respect to rocks of a half a foot to a foot in size as to whether they come down the Tohicken Creek?

A (WITNESS BOURQUARD) I would say if they came down there they must have kept going.

Q And wouldn't they keep going until they hit the intake?

A (WITNESS BOURQUARD) Well, if they hit the intake they would hit around its surface, and in all probability go to one side or the other and continue rolling.

Q And you've already testified as to what you would do if they don't keep rolling.

A (WITNESS BOURQUARD) Yes.

Q Are you going to have a dock on shore next to the -- near the intake?

A (WITNESS BOURQUARD) No, we don't plan to.

Q Are you going to have any point of access to the water that is designed to get in and out of the water there?

A (WITNESS BOURQUARD) No. No particular point of access, no.

Q What type of equipment is that access road to the river designed for?

A (WITNESS BOURQUARD) Primarily pickup trucks. There is a loading limitation. I don't remember exactly what it is, that is imposed by DER.

Q How wide is the access road going to be?

A (WITNESS BOURQUARD) I would have to look at the plans to see.

(Pause.)

JUDGE BRENNER: Mr. Sugarman, while he's looking, I'm sure you know why this question is material or you wouldn't have asked it.

MR. SUGARMAN: It goes to the extent of the operation that they contemplate there.

JUDGE BRENNER: How?

MR. SUGARMAN: Well, if they are building a 20-foot road and it's designed for pickup trucks, there is something wrong.

JUDGE BRENNER: Wait a minute, you lost me. What does this have to do with possible maintenance of the intake?

MR. SUGARMAN: The suggestion is the road is being designed to accomodate substantially larger vehicles.

JUDGE BRENNER: What if it was?

MR. SUGARMAN: Then the inference is they anticipate the possibility of substantially larger

vehicles.

JUDGE BRENNER: And?

MR. SUGARMAN: And that begins to suggest a much more substantial operation than has been described.

JUDGE BRENNER: Operation doing what?

MR. SUGARMAN: Well, I don't know.

JUDGE BRENNER: I tell you, I'm worried about the time this week, and if that is as material as you think this question is, I hope you're going to finish with this line quickly.

Q I did not think it would take them that long to figure out how wide the access road would be. The access road is about 25 to 30 feet wide?

A (WITNESS BOURQUARD) The paved section is about fifteen feet wide -- twelve to fifteen, the nearest I can scale it.

Q And the landscaping of the area between the river and this area is going to be grass and Crown Vetch, is that right?

A (WITNESS BOURQUARD) No. I think they want to let it roll back to natural vegetation.

Q Have you made any -- had any reports as to the operational problems of Johnson screens in river conditions such as that involved here?

A (WITNESS BOURQUARD) The only report I have is from Eden, North Carolina, where I visited a screen that is in place in the Dan River there, and I might add they are more than pleased with their screen. They seem to have very little trouble with it.

Q And what is the flow conditions there?

A (WITNESS BOURQUARD) The river is about five feet deep, I think it is. I think it is about 200 feet wide, and, as I recall, the screen is about fifteen or twenty feet offshore, off one bank of the river.

Q Do they have any shad in the river?

A (WITNESS BOURQUARD) I don't know.

Q With respect to timing, what is the projected commercial operation date for Limerick-1?

A (WITNESS BOYER) Between July and October. Fuel loading is scheduled for July and October 1984.

Q I asked about commercial operation.

A (WITNESS BOYER) That would be six months later.

Q Has the company updated or modified the report prepared for it by Cresap, McCormick and Padgett in January 1981?

A (WITNESS BOYER) What report?

Q Projection of total project cost for the Limerick Nuclear Generating Station, January 1981.

A (WITNESS BOYER) We do forecast periodically, forecast. Our forecast is current in the final stages of completion.

Q The Cresap, McCormick forecast?

A (WITNESS BOYER) No, the Bechtel-Philadelphia Electric Company forecast.

Q Has Cresap, McCormick done a subsequent forecast since 1981?

A (WITNESS BOYER) No.

Q Did Mr. Wass testify at the PUC hearings?

A (WITNESS BOYER) Yes.

Q Is he the Vice President of Cresap, McCormick?

A (WITNESS BOYER) Yes. Now I'm thinking as to what hearings he testified. Yes, it was the PUC hearings.

Q And did he testify that the projected in-service date for Unit 1 of Limerick would be the fall of 1985?

A (WITNESS BOYER) He had a date that was a few months beyond our expected date, but I am pleased to report that as of today we are on target for the dates that I mentioned.

Q Were you on target for those dates at the time he made his report?

A (WITNESS BOYER) We were.

Q So he felt that your target was not realistic, right?

A (WITNESS BOYER) He felt it was a little optimistic, but he didn't know the gumption and gung-ho and ability of our troops.

Q You provided his testimony to the PUC, is that right? You sponsored him as a witness before the PUC?

A (WITNESS BOYER) Well, the PUC had directed us to have a review conducted and so I'm hesitating as to whether he really conducted it. We paid for it, but I

think he made it for the PUC and it was submitted to the PUC as well as to us.

Q Didn't you advise this Commission or the Staff of the Commission on September 21, 1982, that the projected fuel loading date for Unit 1 was October 1984?

MR. RUTBERG: Excuse me. I have an objection, Mr. Chairman. I'm not sure where this questioning is going and how it's relevant to the three contentions we have.

JUDGE BRENNER: Well, the objection is overruled because the Applicant saw fit to put it in as direct testimony.

MR. CONNER: If the Board please, we would point out that we did this at the specific request of the Board.

JUDGE BRENNER: Well, that's incorrect, Mr. Conner, and the objection is overruled.

MR. CONNER: Then we will withdraw the testimony if you don't want it.

JUDGE BRENNER: It's too late.

WITNESS BOYER: The official date that we have submitted to NRC is October 1984 for fuel loading. The project is moving on a schedule for completion of construction by July 1984, and we are basically on

target for that date right now.

BY MR. SUGARMAN: (Resuming)

Q How long will the preoperational testing take if you finish construction in July '84? When will you finish preoperational testing?

A (WITNESS BOYER) Preoperational testing will be completed by that date. We are already into the preoperational testing. We have energized some of the busses, electrical busses in the plant, and are conducting some of the preoperational tests.

Q Yes, but when will preoperational testing be completed? That is what I asked.

A (WITNESS BOYER) Probably the day we get the operating license. In the definition of the NRC, the tests will be completed, but they have to be reviewed and approved and so forth by the NRC and questions responded to, et cetera. So the actual test will be completed a few months before the October '84 date.

Q Why is it that you projected as late as the beginning of this year that you would not have the Point Pleasant diversion available and would not need it until April 1985?

A (WITNESS BOYER) We did not project that. What is your basis?

JUDGE BRENNER: Mr. Boyer, while he is looking

that up, this consultant who testified at the PUC hearing and gave that March 1985 date, I missed personally whether that was fuel load or commercial operation in that consultant's estimate.

WITNESS BOYER: It was fuel load. He was about five months back of ours.

JUDGE BRENNER: Did you say five months back of yours? I take it you would go with the October 1985 date rather than the July '84 date?

WITNESS BOYER: Right. We haven't done too much publication of the July '84 date. It was in an internal target that we have been shooting for so that we can identify items that may be of concern and hop on them and keep them on a critical path and keep working on the critical path items.

And as of this date, why we think there is a possibility of maybe even bringing the total project in on that. If we continue to feel that way, we would have to go to the NRC and change our official date so that hearings and other things could be moved up, and we will be keeping our eye on that as the months go by and do that at the appropriate point in time, if we still think it is feasible.

BY MR. SUGARMAN: (Resuming)

Q If you would refer to Exhibit Del-Aware Trial

Brief number D-37-1, this is a memorandum from Mr. D. L. Morad -- M-o-r-a-d -- dated December 16, 1981. If you will read the first paragraph of that memo, it says here competion of the overall system is scheduled for the end of 1984. The system is required to be in operation by April 1985 since the Schuylkill River can be expected to become unavailable in April or May.

A (WITNESS BOYER) This was back in December '81 when the October date was the more likely date -- October '84 -- and it was based upon sort of the maximum time that we could go without getting caught and is based upon having water available from the Schuylkill during that first winter. So it is really not the construction schedule but it is sort of an outside construction schedule, if you want, by one of the engineers who has been following that work.

Do you want to add anything to that, Haines?

A (WITNESS DICKENSON) Well, in my group in the engineering department we have been trying for a number of years. This is an update of previous similar schedules, and it was a generalized construction schedule of all components for the diversion system. By that I mean the Point Pleasant facilities, the Bradshaw Reservoir, and the connecting pipelines, some of which were to be done by Philadelphia Electric and some by the

NWRA.

So in an attempt to keep our managment appraised of the situation we prepared this bar graph schedule and notes or memoranda, as Mr. Sugarman is referring to it, to advise them of the status of the project and the time constraints based on a standard 40-hour, one shift a day type operation, so that if things got critical, if we got permission to move, we would then be able to adjust from that schedule and at that time, in my group, at my level of knowledge of the rest of the plant, we were working on the official, at that time, dates of October for fuel load and April of '85 for commercial operation.

So we backed into the schedule from those dates.

Q Those are the dates, then, that were required for operation as of the time that the unit was planned to be completed -- the fuel loading for October 1984, right, is what you are saying?

A (WITNESS BOYER) This was the outside dates that the system would be required by, yes.

Q Well, aren't these the dates that you have been giving the NRC as the basis for processing your application for an operating license?

A (WITNESS BOYER) The October 1, 1984 date for

fuel loading is the only date that we have given them.

Q Yes. And as Mr. Dickenson just testified, this date, in-service date for the intake system is a function of that date, is it not?

A (WITNESS DICKENSON) It shows that we wouldn't be ready by the October 1 date and, as we said earlier, we would have to be taking -- in the beginning of that memo -- we would probably have to take water from the Schuylkill River until April or May of '85 because this wouldn't be available.

A (WITNESS BOYER) This was prepared by the engineers to the management as a summary of where the status is and was an indication that let's get the lead out and get the hearings going and get the thing over with so we can start building it or else we are going to be late.

Q Where does it say that?

A (WITNESS BOYER) That is the result of it when it hit management's table.

Q Where do the results show up?

A (WITNESS BOYER) Well, we are here today.

Q And you are here today because of this memo?

A (WITNESS BOYER) No.

Q You are here today because you decided to rush this completion of the makeup cooling water system?

A (WITNESS BOYER) No.

Q I thought that is what your testimony just was.

A (WITNESS BOYER) No.

Q Well, why don't you rephrase it, then? You said that it was the result of --

A (WITNESS BOYER) I think it stands in the record.

JUDGE BRENNER: May I interject, Mr. Sugarman?

MR. SUGARMAN: I beg your pardon?

JUDGE BRENNER: May I interject with a few questions?

MR. SUGARMAN: Certainly.

JUDGE BRENNER: It sounded like you were winding down, so I thought maybe I would jump in here with some things that I have on my mind.

MR. SUGARMAN: I have a little ways to go, but if you want to, go ahead.

JUDGE BRENNER: As I understand the combined testimony that we have heard here today, assuming the October 1984 fuel loading date, you need the Point Pleasant diversion operational by April 1985. Is that correct?

WITNESS BOYER: That is the outside date. We

would like to have this facility available prior to fuel loading so that it can be tested out, verified that there are no operational problems associated with the pumps, the piping system and so forth. If such occurs, you need time to make corrections and modifications to that.

JUDGE BRENNER: Why couldn't that be done in the period between fuel loading and commercial operation?

WITNESS BOYER: No. When we have power generation, unless there is water available from the Schuylkill, we will need this facility and water availability from the Schuylkill depends on average flow years and weather conditions and so forth. So actually we are late right now in starting this thing. We should be under way with construction right now.

JUDGE BRENNER: Wouldn't you have water available from the Schuylkill based upon historical -- the same records that you have been relying on for showing us your maximum estimated withdrawals and typical withdrawal schemes? Given that same evidence, wouldn't you have water available from the Schuylkill during October and through the end of March?

WITNESS BOYER: Yes, and that is what this really is saying, that that is the · f it is available

and assuming that it is on an average year, but if it isn't an average year we are sitting idle with a $4 billion plant.

BY MR. SUGARMAN: (Resuming)

Q I thought you said only once in ten years could you not get the water you needed from the Schuylkill River between December and March.

A (WITNESS BOYER) I would say can you guarantee that this next -- '85 is not going to be the tenth year?

Q You just told Judge Brenner if this is an average year you are all right, and if it is not an average year you are not all right. Are you saying that once in ten years as a non-average means once in ten years?

A (WITNESS BOYER) Let me put it another way. We are definitely taking a risk if we depend upon the Schuylkill River as the source of water for the plant from September-on. How much of a risk is a matter of interpretation and we have reviewed all of the statistics and everything else, but it is definitely a risk that should not be taken for a plant of this magnitude and of this importance.

JUDGE BRENNER: Mr. Sugarman, let me stay with this. The reason I asked some of my questions, Mr.

Boyer, is in paragraph 57 of your testimony, the second sentence reads: "The completion of preoperational testing will require the availability of supplemental cooling water from Point Pleasant at least three months prior to the fuel loading date."

Is that an accurate statement?

WITNESS BOYER: That is an accurate statement as far as our desires. Now if you pin me down and say do you absolutely have to have it and will you not be able to finish your preoperational tests if you do not have this facility, I cannot really tell you what regulatory authorities and other things may say about that mode of operation in the future.

JUDGE BRENNER: Well, do you think the sentence is accurate as written, given what you just said?

WITNESS BOYER: Well, if you are going to pin me down to that, I'd better read it again, if you would tell me where it was.

JUDGE BRENNER: It is paragraph 57, which is on page 27 of your testimony, sir, the second sentence.

WITNESS BOYER: I would say that "will require" is a 90 percent accurate statement. There is a ten percent chance that we might be able to get by and complete the operational test without it.

JUDGE BRENNER: Well, that confuses me, because I thought it was the other way around, that it is just the odd bad year when you would require Point Pleasant for preoperational testing.

WITNESS BOYER: That is in the fall. It depends on if we can get this plant completed. We would be ready for and need water prior to the October date and then it would not be available in the Schuylkill based upon the temperature restriction and we would absolutely need it from the Delaware.

JUDGE BRENNER: Why do you need supplemental cooling water prior to fuel loading -- three months prior to fuel loading?

WITNESS BOYER: Well, you would need that for a reasonable period to test out the equipment and to check the pumps and the control system and everything else and make sure it is operational and give you some little time for making adjustments.

JUDGE BRENNER: Okay, thank you.

BY MR. SUGARMAN: (Resuming)

Q If that is so, then why did you not take action on the Perkiomen intake which was scheduled to be complete at the end of 1984 to start to have startup and testing at the end of 1984 -- too late for your purposes?

A (WITNESS BOYER) We will have the Perkiomen intake ready when we need it because it is under our complete control and in conjunction with the Delaware intake the Perkiomen doesn't really do much for us until the Delaware intake is ready. We were going to start the Perkiomen intake this spring -- this last spring. The only reason we didn't is that we wanted to spend the dollars that we would invest in the Perkiomen intake and its facilities on the completion of Unit 1 and get it further along since we were restricted in total cash availability that we could raise for the project.

We figured that we would spend it on the critical path items rather than on the intake item, which we can bring along at a faster pace later if proved desirable to do so.

Q Well, if you look at page -- the attachment to Mr. Morad's memorandum, the calculation sheet, the critical path shows that the Perkiomen facility is the limiting factor for the supplemental cooling water system.

A (WITNESS DICKENSON) The attachment which you are referring to up on the top righthand corner has a date of December 9, 1981.

Q That's right.

A (WITNESS DICKENSON) And this has been updated

to reflect more current information and the copy you have in your files is dated 6/14/82 and it shows that the Perkiomen intake facilities should require less time from start to completion to build than the Point Pleasant facilities.

The reason for that is that they are smaller. That is, the pumping capacity is approximately only half, and they don't have the involvements with the canal, the canal crossing, the higher flows in the Delaware River, and things of that sort. So one of the reasons we were able to postpone starting the Perkiomen facilities is because they will take less time to build and if both Perkiomen and Point Pleasant were started at the same time Perkiomen would be ready.

Now if you will take the updated schedule instead of the old one, you would see those bar graphs are different.

Q The updated schedule was prepared after this Board issued its order of June 1, 1982, asking the Applicant, among other things, to provide a schedule of when it intended to start construction and to have the cooling water system in operation, isn't that correct?

A (WITNESS BOYER) If it is, it is coincidental.

Q Is it also coincidental that -- and now I

refer to D-35A -- Del-Aware Prehearing Exhibit, and I would ask that this be marked as Del-Aware 15 for identification.

JUDGE BRENNER: What prehearing number again?

MR. SUGARMAN: D-35A.

JUDGE BRENNER: Do you want to identify it, Mr. Sugarman?

MR. SUGARMAN: Yes, sir. It is a memorandum, four-page memorandum, from Dickenson entitled "Mechanical Engineering Division" dated May 14, 1982, subject Point Pleasant project, Limerick Generating Station.

(The document referred to was marked Del-Aware Exhibit 15 for identification.)

BY MR. SUGARMAN: (Resuming)

Q Mr. Flowers said in here that at present two Bucks County commissioners still support the Point Pleasant project, but as the opposition's pressure increases and as election time approaches, their commitment may decrease. He therefore desires to issue specifications as soon as possible. The completion of final design is quite urgent. Isn't it coincidental that that had anything to do -- that that meeting might

have had something to do with the change in the schedule for completion of the Point Pleasant project of construction?

A (WITNESS DICKENSON) No, it does not. The schedule -- the bar graph schedule that shows the construction sequences was made by a man in my group who knows nothing about some of these Board hearings and things of that sort. He was merely, as he has several time, updated the schedule on the latest available information.

Q And you are saying that this memo that you wrote on May 14, 1982, had nothing to do with any scheduling decisions?

A (WITNESS DICKENSON) It had nothing to do with the schedule that you were previously referring to. I can't speak to any other parties, such as Mr. Flowers or others.

Q It says here in paragraph 5, "final designs and specifications are scheduled for completion about June 15, according to E. H. Bourquard. Completion had been expected earlier, but PECO request for review studies and changes of design delayed work. Mr. Bourquard listed the following areas as most time consuming." And then it lists three areas -- change from dual electric service to single service; studies

and changes in HVAC; review of the need for an emergency diesel generator.

It was Mr. Bourquard's opinion that this is necessary but PECO still questions that decision. Then it says Mr. Flowers was very emphatic that completion of design is critical and stressed that no further changes shall be made unless the present design is definitely unworkable. No changes shall be studied or requested solely as a cost-saving measure. Design is frozen.

Does that indicate to you or did PECO accept that decision?

A (WITNESS BOYER) Accept what decision?

Q That design is frozen?

A (WITNESS BOYER) We have one single service with an additional cable. I believe in the testimony that I made a week ago, when there was a discussion about the diesel generator, I said there was a dual service. We had been considering single and dual service. We in essence have dual service in a single fashion. That is, we are installing four single phase cables, three of which will be connected and the other one will be an installed spare so that it will be available in case any failure occurs to the one service.

The heating and ventilating drawings were commented on and appropriate updating of the design was

made. The diesel generator has remained eliminated.

Q My question is was it agreed at that time that no design changes would be made unless the present design was definitely unworkable because of the desire to get on with the project because of the concern about the county commissioners?

A (WITNESS BOYER) We basically had that principle in force prior to this meeting and Mr. Flowers just emphasized another reason for maintaining the schedule. But in my view, the schedule was necessary to be maintained to make the water available and to get through this rigorous ordeal which we go through to get a final approval.

Engineers always want to make changes to improve things, but they always have to accommodate to a schedule. The time had come where you must move to meet the schedule.

Q Now the schedule at that time called for the operation of the Point Pleasant pumping station and supplemental cooling water system to be available in April of 1985.

A (WITNESS BOYER) No. That memorandum said that that is when the system would be completed under the current movement of various facets of the program and on a straight time shift work.

Q Well, as of May 1982 no change had been made in that schedule, isn't that correct?

A (WITNESS DICKENSON) It had not been reissued. We keep track of the dates and the slippages and the changes as they go along. Mr. Morad was asked periodically to update his memo so that we would have a current status report and when sufficient things occured or dates firmed up he redid it.

As I say, somewhat after this meeting you have been referring to he was informed of a schedule whereby the spec could be issued about -- well, as shown on this other schedule. It looks like in August, the beginning of August. And so then he drew in his various items and the water would be then available on a standard schedule, not with any consideration of overtime, weekends and so forth, but just a standard construction operation by the April 1985 date.

Q And looking at the calculation sheet again -- and I guess I haven't marked this.

MR. SUGARMAN: I would like to mark this December 15, 1981 memo, subject Limerick Generating Station Units 1 and 2, Makeup Water System Status Report, by D. L. Morad, dated December 16, 1981, consisting of four pages and a table, as Del-Aware Exhibit 16 for identification.

JUDGE BRENNER: All right.

(The document referred to was marked Del-Aware Exhibit 16 for identification.)

JUDGE BRENNER: Mr. Sugarman, you are going to take care of copies of this for the record, is that right?

MR. SUGARMAN: Yes, sir.

JUDGE BRENNER: Because when we adjourn, the reporter is going to cart all of this stuff off.

BY MR. SUGARMAN: (Resuming)

Q Looking at that table, what is the time --

JUDGE BRENNER: Mr. Sugarman, you are a little too fast for me or it's late in the day for me -- I am not sure which. What did you include -- the memo and the attachment?

MR. SUGARMAN: Yes, sir.

JUDGE BRENNER: And you included the attachment dated December 9, '81?

MR. SUGARMAN: Yes, sire.

BY MR. SUGARMAN: (Resuming)

Q This memo indicates that you anticipate construction to be completed in approximately -- construction of the pump house to be completed in

fifteen months or eighteen months, and that construction of the pipeline -- where in this schedule do you project construction of the pipeline?

A (WITNESS DICKENSON) The second item down. Are you referring to the Bradshaw to Perkiomen pipeline?

Q No, the Point Pleasant facilities.

A (WITNESS DICKENSON) That is part of the Point Pleasant facilities. That is not under our control and it was all in the same specification, as far as we knew. It says -- it is under Point Pleasant facilities, one, two, three -- the fourth item is the breakout of the pipeline, if that is the one you are talking about.

Q Yes. Where would I see two winters in the river to construct the pipeline -- that you need two seasons in the river? Where do I see that on that bar chart?

A (WITNESS BOYER) This was done in 1981 and it was estimated we would be able to start in January of 1982.

A (WITNESS DICKENSON) If I might interrupt, the two winters aren't necessary for the pipeline. They are for the intake. That is considered part of the pumphouse and you will notice that the bar for the construction of the pumphouse begins and goes for the

full length of the winter of '82-'83, and then picks up two more months in the end of '83 for any completion work.

Q And why wouldn't it be possible to move that bar chart over one year and start in the summer of '83 and finish up at the end of December in '84 at the same time that you project to finish the Perkiomen?

A (WITNESS BOYER) If you would like to give us a fixed price contract and a penalty clause associated with it, on that basis we would be glad to consider it.

JUDGE BRENNER: Mr. Boyer, in addition to that, can you answer his question?

WITNESS BOYER: Well, there isn't that much time available is the reason.

BY MR. SUGARMAN: (Resuming)

Q Well, if the projection was to have the Perkiomen finished at the end of 1984 and that is four months before commercial operation of Unit 1, why wouldn't it do to have Point Pleasant finished at or about the same time?

A (WITNESS BOYER) Mr. Sugarman, this is not an official construction schedule. It was a memorandum summarizing the various facets of the overall program, the status of them, at the current status of December 1981, with estimated times for review and issuance of

permits, et cetera, and with normal construction times to come out to see what the ends results are, so that management could review that and see what steps were necessary, if any, to affect a completion of the projects when needed.

You are placing too much weight on each individual line on that. That was an engineer's analysis based on the data in his memorandum. It is not an official PE or NWRA construction schedule.

Q Well, you were planning it in order to do what you had to do to make Limerick operate, did you not?

A (WITNESS BOYER) That is not clear.

Q Now if you look at Del-Aware pretrial brief number D-39, that is the memo by which Mr. Morano circulated Del-Aware 14 to 22 individuals within the company, isn't it?

JUDGE BRENNER: Wait a minute, Mr. Sugarman. I don't think you mean Del-Aware 14. What do you mean? Which document do you mean he circulated?

MR. SUGARMAN: The December 16 memo. I'm sorry. That's Del-Aware 16.

BY MR. SUGARMAN: (Resuming)

Q Isn't this December 21 memo from Mr. Morano to all of these people, including yourself, the memo by which he circulated Del-Aware 16?

A (WITNESS DICKENSON) Yes, it is.

Q And is there any written indication that the schedule that is encompassed within Del-Aware 16 was changed anytime prior to June 1982?

A (WITNESS DICKENSON) This letter was December '81. It couldn't infer a change in 1982, if I understand your question.

Q What I'm asking you is do you have any documentation of the company having made any change in the schedule prior to the document that you referred to, which was dated June something 1982?

A (WITNESS DICKENSON) The company made no change, to my knowledge, in the commercial operating date or the fuel load date for Limerick-1 in that interval.

Q Was any change made in the date for projecting the completion or for procuring the completion of the supplemental cooling water system?

A (WITNESS BOYER) Verbally, following this memo, and it is not our custom to write memos on everything. We try to effectively use our time in doing work rather than spending a lot of time writing things, but sometimes in today's environment that is difficult. But anyway, as a result of this memo we had verbal conversations to indicate that we needed to keep all of

these items moving on an accelerated schedule and work -- have our people work with Bourquard to finalize designs, minimize changes, work with the permitting and licensing people to get their work accomplished, and keep moving on it.

It was a verbal discussion and no memorandums were felt to be necessary following that.

Q All right. Let's turn to the question of the sequence of construction and issue of two winters in the river. We have Mr. Bourquard's letter of September 9, 1981 to the Corps of Engineers, which has been provided as trial brief exhibit D-49, and that sets forth as an attachment -- Mr. Bourquard sets forth in four pages the general construction procedures.

Now the first phase of the procedures was the installation of the intake conduit under the --

A (WITNESS BOURQUARD) I don't have that, if you are going to ask me a question.

Q You don't have it with you?

A (WITNESS BOURQUARD) No.

Q It is D-49.

JUDGE BRENNER: Mr. Sugarman, can I interject a few questions? There are some facts I want to get and I'm going to let you go back to your line if you insist, but I am afraid your zealousness and enjoying the

questioning of this subject is not the most efficient way of getting information. I'm not saying you are not getting the valuable information, but I think I want to get a few things that I need to know in less questions than it's going to take you.

MR. SUGARMAN: Go ahead.

JUDGE BRENNER: Well, I'm continuing the dialogue with you for a moment. The areas you haven't gotten to yet is the number of in-river days needed and why.

MR. SUGARMAN: I was just about to get to it, but indirectly.

JUDGE BRENNER: But you are going to get to it much longer than I am going to get to it. Gentlemen, how many days of in-river construction do you need and if there is a range, give me a range.

(Witnesses conferring.)

WITNESS BOURQUARD: There are attachments with this, which I don't have.

JUDGE BRENNER: I can't hear you, Mr. Bourquard.

WITNESS BOURQUARD: There are attachments with that.

MR. CONNER: We don't know what letter you are talking about.

JUDGE BRENNER: Mr. Bourquard, you mean you don't know right now off the top of your head approximately how many days of in-river construction this project will take?

WITNESS BOURQUARD: I did have that, but I don't remember it right at this moment. I think I testified in the deposition maybe, but I don't remember what it is right now. As I recall, it's going to take about three or four months of practically continuous work to do that.

JUDGE BRENNER: All right. Why don't you refer to your letter, then?

WITNESS BOYER: A lot of that depends upon the river conditions.

JUDGE BRENNER: That is not my question.

WITNESS BOYER: You are asking for clear days.

JUDGE BRENNER: I will get to the next part in a minute.

WITNESS BOURQUARD: I do not have that in my letter or here, the exact period of time that is required, and I would like to be able to go back and get some information from our office as to that time.

JUDGE BRENNER: Do you mean to tell me after the focus this question has had in the at least weeks,

if not months, leading up to this hearing in terms of the timing, you can't give me a range of how many days you need for in-river construction for this project?

WITNESS BOURQUARD: I mentioned about four months, but I'm not sure. There is a certain amount of time involved in setting up the equipment, which I don't remember exactly what it is, and getting out in the river. And then there is a certain amount of time to do the actual work in the river and the clean-up afterwards.

JUDGE BRENNER: I am just asking about everything in-river, whether that includes setup in river or work in river or clean-up in river -- just in-river.

WITNESS BOURQUARD: Well, my rough estimate now is four months, if we were allowed to continue working without interruption.

JUDGE BRENNER: 150 working days? You are assuming they work every day, Saturday and Sunday?

WITNESS BOURQUARD: Yes.

JUDGE BRENNER: That's 120, as I am corrected by Judge Morris, who is here to do technical things like that -- like multiplying 30 times 4.

(Laughter.)

WITNESS BOYER: He would have to check whether

that was seven days or five-day weeks.

JUDGE BRENNER: You don't know right now?

WITNESS BOURQUARD: Offhand, no, I do not.

JUDGE BRENNER: Well, it is going to range -- you don't know, then, if it is closer to 80 days or closer to 120 working days, correct?

WITNESS BOURQUARD: At the present time, no.

JUDGE BRENNER: Do you plan to work on Saturdays and Sundays in-river?

WITNESS BOURQUARD: That would generally be up to the contractor, but I would assume once he has equipment out there that he would keep working because it is pretty expensive equipment that he is working with.

JUDGE BRENNER: Is it up to the contractor or the person responsible for hiring the contractor and completing this project?

WITNESS BOURQUARD: Well, unless we place some restrictions on him that he cannot work at other times, he will be able to work 24 hours a day, if he wanted.

JUDGE BRENNER: Well, how about a positive incentive, if you will? Is the contract going to require?

WITNESS BOURQUARD: That he work 24 hours a day? No, sir.

JUDGE BRENNER: That is not my question? Weekend work.

WITNESS BOURQUARD: No, it will not require that he do weekend work.

JUDGE BRENNER: Do you mean to tell me that you are worried about completing in-river days on the time schedule and you are not going to require weekend work in the river, given the DRBC restriction?

WITNESS BOURQUARD: No, we would leave that up to the contractor.

JUDGE BRENNER: Do you mean the person hired to do the work?

WITNESS BOURQUARD: Yes, the firm that got the award.

WITNESS BOYER: The general practice on something like this is you give the contractors who are going to bid on the thing the description of the work that has to be done and any constraints, such as river conditions or what they have to do with the spoils that are taken out and so forth, and then they develop a schedule and cost for doing that work and they may give you two options.

They may give you one a five-day basis. They may give you one on a seven-day basis. They may give you a fixed price contract and then they will work it to

get done, as they see it most desirable from their standpoint, which may be working multiple days, continuously to get their equipment in and out.

The only restriction in the contract would be that they get it completed by some certain date, and then the bids are evaluated from a cost and schedule standpoint and at the bidding stage you would discuss, if they have not submitted proposals with their bids, what the cost of working on overtime schedule and getting things completed at an earlier date would be.

JUDGE BRENNER: Well, given all of your testimony about the schedule considerations, I don't understand and I am asking you so that you can enlighten me why you would have something that critical up to the contractor.

WITNESS BOYER: Because if we get all of the contractors' bids and find that from the time we can go in the river that with a reasonable estimation for non-working days due to flow conditions that we could get things done, you would choose the cheapest route, the cheapest course of action, or the least expensive is a better way to say it course of action to get the work accomplished by the date that you feel you need it for the completion of the startup of the project.

JUDGE BRENNER: But you don't know during the

first in-river season what conditions would be during the next in-river season.

WITNESS BOYER: That's right, and you would have to evaluate in the proposal and in the contractor's statement as regard to work based on his experience in rivers. He has the best knowledge of what problems might arise and how they would affect his mode of operation and some contractors may say well, if the flow is above so many cfs in the river, I'm going to have to stop. Others may say it can be two feet higher than that elevation and I will work up till that point.

So you've got some flexibility there in your evaluation of the bids, and you always have the option of considering, when you make the award, as to, you know, if we get stuck can we get this done in the time in one winter.

JUDGE BRENNER: We keep discussing this contract as if it was in the future. Has the contract been awarded yet?

WITNESS BOURQUARD: No. No, it has not been awarded yet. The bids are due in on November 3.

JUDGE BRENNER: Do you believe that work would be prepared to begin in the middle of December, given the present state of the contracting process?

WITNESS BOURQUARD: We would probably make an

award in the middle of December.

JUDGE BRENNER: How soon after an award is made do you think work could begin?

WITNESS BOURQUARD: Well, he would get a notice of intent to award prior to that, which would give him an opportunity to start up and then we would give him notice to award and an award and a notice to proceed at the same time.

JUDGE BRENNER: Well, given all of that, when do you think work could reasonably begin?

WITNESS BOURQUARD: In January.

JUDGE BRENNER: When in January?

WITNESS BOURQUARD: I would say about the latter part of January.

WITNESS BOYER: It's going to have to be moved up forward of that if we're going to get done this year, in my opinion, and we are going to push NRWA to get that done earlier. This is the first time that I have heard the end of January date. I have been working on a December date in my own mind.

WITNESS BOURQUARD: Well, he would start work -- I am sorry. He would start work before that, but it would be until sometime in January before the pipe could be delivered, so he would start in right away and be putting his equipment out in the river and he

would probably start his excavation in mid-January as soon as he got a good indication that he was getting delivery of pipe.

JUDGE BRENNER: What good would it do him to put equipment in the river if he then has to wait around for another half a month to a month?

WITNESS BOURQUARD: Well, he has to do some excavation before he can put the pipe in.

WITNESS BOYER: He has to do excavation, either ripping or blasting of whatever rock is available and we have made inquiries on the pipe. We believe we can get the pipe there earlier. We believe we can get the pipe there at the time the contractor would need it, and depending upon how he wants to work, if he wants to excavate to put the pipe in or if he wants to excavate competely and then come back and just suck out the mud and put the pipe in all at once, there are two different modes of operation which you would discuss with the contractor what he wanted to do.

JUDGE BRENNER: Wouldn't it be unusual to excavate if the pipe wasn't available to be put in?

WITNESS BOYER: I wouldn't say so.

JUDGE BRENNER: How do you know river conditions might not prevent you, after the excavation, from getting back in with the pipe for some amount of time such that you would have to redo the excavation?

WITNESS HARMON: It would only be silt and so forth that would be in there, maybe one or two of Mr. Sugarman's three-pound boulders.

JUDGE BRENNER: Okay. How many days would river conditions allow work in the river between November and March, the months that DRBC would --

WITNESS HARMON: We have no idea, Judge Brenner. We really don't know what is likely to happen. You can go back and make an historical review of what might be the average conditions, but they have no particular significance, because it may not be average and in all probability it isn't going to be average.

JUDGE BRENNER: Could you make such a historical review of average conditions and also worst conditions from your point of view, that is, years when you would have less working days?

WITNESS BOURQUARD: No, not in any detail. We are fixed by DRBC to install it in those months, so we have to install it in those months regardless of what the conditions are.

JUDGE BRENNER: Well, so, from all you can tell me today it might take you somewhere between 80 and 120 working days in the river, and you might be able to do it in one season, defined as November through March, in which there would be 150 days?

WITNESS BOURQUARD: It is possible, if we had good weather all of that time.

JUDGE BRENNER: Well, you haven't made any historical review to say?

WITNESS BOURQUARD: Well, we know the river has ice and high water during those months.

WITNESS BOYER: The probability of ice, extensive ice, is probably about 50 percent by February, just from my experience with rivers and the Susquehannah, and even the Delaware and Schuylkill.

JUDGE BRENNER: No analysis has been performed to support the proposition that you need two winter seasons to complete the in-river work; correct or incorrect?

WITNESS BOURQUARD: Not in any finite definite terms, no.

WITNESS BOYER: It is basically an engineering judgment, combined with a knowledge of the variation in river flows, waiting to get conversations with the contractor, to be able to firm up his situation and mode

of conduct of the installation.

JUDGE BRENNER: Mr. Boyer, do you think in-river work can start as early as December 15 h?

WITNESS BOYER: If we get the permits, I think there is no reason why we shouldn't be able to get a contractor out there by December 15th.

JUDGE BRENNER: Well, you said "if". Given the present state of the posture of the contracting process and everything else that you know that is pertinent?

WITNESS BOYER: And we are pushing for that, because I seriously believe that we need two winters to have any factor of safety at all in getting this completed by the time we need it for Limerick.

JUDGE BRENNER: I've shifted questions a little. I've shifted off one winter versus two winters, and I'm asking about the starting date this winter. And I guess "possible" is always a bad question at these hearings.

Do you think it is reasonably likely that the work can start as early as December 15 in-river?

WITNESS BOYER: I would say the contractor ought to be able to be on the site by December 15th, and he would be in the river immediately thereafter. He might have to construct some sort of barges.

WITNESS BOURQUARD: He would be assembling his equipment. He would probably start right away assembling his equipment, bringing it to the site, that he is going to use for his work in the river.

JUDGE BRENNER: But that wouldn't be in the river, would it?

WITNESS BOURQUARD: Well, the equipment would be in the river, yes.

WITNESS BOYER: Basically, if he has to work from the barge -- he may be able to do some from the dragline from shore. It depends upon how he sees it and what equipment he has available and experience in the past, to be able to perform this work.

JUDGE BRENNER: Back to you, Mr. Sugarman.

BY MR. SUGARMAN: (Resuming)

Q I take it that the contract calls for the construction of a temporary crossing of the Pennsylvania Canal for construction access?

A (WITNESS BOURQUARD) Yes.

Q Is that needed to transport the equipment that is going to be used to do the work in the river?

A (WITNESS BOURQUARD) Well, it will be used for the work, possibly it will be used for that, and it will also be used in connection with construction of the pipeline and the gate well between the canal and the

river.

Q Well, how is it proposed to -- what is the estimated time for construction of the access over the canal?

A (WITNESS BOURQUARD) Do you mean to install?

Q To install the access over the canal.

A (WITNESS BOURQUARD) That is nothing more than placing a fill in the canal. I would say they could probably do that in 30 days, and maybe less.

A (WITNESS BOYER) I would say much less.

Q According to the general construction procedures for installation of the intake conduit under the canal property:

"The first phase of construction activities will be installation of sediment and erosion control measures, and the staking of limits of wetlands for protection thereof. This will be followed by clearing of the station site and intake alignment other than wetlands and the salvaging of useful timber and shipping of trees, et cetera.

"Installation of the intake conduit under the canal will be accomplished in the dry. The water and any fish will be removed from the section of the canal between locks 13 and 14."

And it goes on for another half a page. Then

it says:

"The next step will be the installation of a temporary canal crossing across the canal, shown on Exhibit 1, using materials excavated from the site. There will be two drainage culverts in this crossing to permit normal canal flow through the embankment."

And then it says -- then it goes on to talk about the construction of the intake facilities under the canal and says that they should take about 90 calendar days, and that includes the soil removal, that includes the blasting down to the necessary depth, and that includes the reconstruction of the canal itself.

JUDGE BRENNER: Mr. Sugarman, I'm sorry. Where were you reading? I thought you were reading from that September 9th letter?

MR. SUGARMAN: No, sir. This is a document I just got today or yesterday. This is the general construction procedures in the bid document package.

JUDGE BRENNER: But you see, it helps when you orient us with the document.

MR. SUGARMAN: I'm sorry, sir.

JUDGE BRENNER: I don't know if you're going to need to identify it.

MR. SUGARMAN: Well, maybe.

JUDGE BRENNER: Here again, you're reading

quite fast. If you're going to identify it, it is better for the reporter to have it in front of him. It is better for us to have it.

MR. SUGARMAN: Yes, sir. This is the document that I have been asking for for three weeks.

JUDGE BRENNER: I understand.

BY MR. SUGARMAN: (Resuming)

Q And my question is, how long is it going to take to carry out all of those activities to get the temporary canal crossing across the canal?

A (WITNESS BOURQUARD) How long is it going to take for all of these activities?

Q After the contractor gets on site, to carry out those construction procedures that are required in order to construct the access across the canal.

(Panel of witnesses conferring.)

JUDGE MORRIS: Mr. Sugarman, I think you were talking both about the transmission pipe and the temporary road access. Would you split those up?

MR. SUGARMAN: Yes, sir. The temporary road access calls for -- I was really going on to the pipe to suggest the 90 days as the estimated time period for construction under the canal.

But to come back to the temporary canal crossing, it includes two drainage culverts and it calls

for an overflow weir upstream of lock 49 to be constructed. It calls for the removal of fish and water between locks 13 and 14. And it includes the installation of pumping facilities and an underground discharge line for the temporary pumping facilities, and then the construction of this temporary canal crossing.

BY MR. SUGARMAN: (Resuming)

Q My question is, doesn't all of that have to be done before the contractor can get any of his heavy equipment down to the river?

MR. CONNER: May we have the reference to where you're reading from?

MR. SUGARMAN: Yes. Page 01060-33.

JUDGE BRENNER: Of what? I know you said bid documents.

MR. SUGARMAN: This is the Addendum No. 1, dated September 14, 1982, to the bid documents for the Point Pleasant pumping station, contract 60A, et cetera.

MR. CONNER: What was the page number again?

MR. SUGARMAN: 1060-33. And then the construction -- that is where the license requires the use of these procedures. And then 01060-39 is Exhibit B, which sets forth the general construction procedures.

BY MR. SUGARMAN: (Resuming)

Q My question remains, doesn't this crossing have to be constructed before the contractor can get his heavy equipment down to the site, down to the river?

A (WITNESS BOURQUARD) Yes.

A (WITNESS BOYER) Not necessarily.

JUDGE BRENNER: Wait a minute. I heard a yes and a no.

WITNESS BOYER: Not if I had the contract. If I had a time schedule to meet and I was able to, I would lift the stuff across the canal.

JUDGE BRENNER: Mr. Bourquard, what is your answer?

WITNESS BOURQUARD: The idea of putting the access road across the canal is to get his equipment down there.

(Panel of witnesses conferring.)

WITNESS BOURQUARD: The bigger equipment would have to use the access road. The lighter equipment could utilize the other way, that is, across the canal bridge.

BY MR. SUGARMAN: (Resuming)

Q Do you mean the existing canal bridge?

A (WITNESS BOURQUARD) Yes.

Q What is the turning radius for vehicles coming

across that existing canal bridge?

A (WITNESS BOURQUARD) Well, pretty large trucks go across there, so I don't really know what it is offhand. But the Department itself brings fair-sized trucks along there and they do work on the canal.

Q And they use that bridge?

A (WITNESS BOURQUARD) Yes.

Q And have you evaluated that bridge and the proposed equipment to see whether it can in fact use that bridge?

A (WITNESS BOURQUARD) No, we did not do that. The DER did, and as I recall they set a limit of what we could take across.

Q Now, is it a requirement of the contract that the contractor perform a pre-blasting survey and a blasting plan, and get approval from the Department of Environmental Resources of their blasting plan before blasting can begin in the river?

A (WITNESS BOURQUARD) You have to get approval of a blasting plan before he can do blasting in the river. Now, what you are speaking of there is approval of blasting under the canal.

Q Yes. I understand that blasting is also -- approval is also required for blasting under the canal. But isn't blasting -- isn't approval also required and

isn't a plan also required for blasting in the river?

A (WITNESS BOURQUARD) Yes.

Q And in your estimate of when he could get started and when he could work in the river, what assumption did you make about how long it would take him to get blasting approval?

A (WITNESS BOURQUARD) Well, it shouldn't take over a week or so to get blasting approval in the river, or for any of the blasting plans.

A (WITNESS BOYER) The initial steps for that have already been initiated.

Q What are those?

A (WITNESS BOYER) Well, the preparation of what documents would be needed to be reviewed by the agencies. And when we reviewed this a few weeks ago, we felt that the time was available to do that, to still meet this December 15th start date.

JUDGE BRENNER: Mr. Sugarman, why don't you come to a logical stopping point for the day.

MR. SUGARMAN: If I could take just a couple minutes, another couple of minutes on this subject.

BY MR. SUGARMAN: (Resuming)

Q Isn't a permit from the Pennsylvania Fish Commission also required before blasting in the river?

A (WITNESS BOURQUARD) Yes.

Q Has that been applied for?

A (WITNESS BOURQUARD) No.

Q Has the Pennsylvania Fish Commission stated that it is opposed to the project?

A (WITNESS BOURQUARD) I think they have.

Q What assurance do you have that you will get a permit from the Pennsylvania Fish Commission in a hurry?

A (WITNESS BOURQUARD) I don't know any reason that they would hold it up, because they were supposed to review it in light of the damage to the fish that would take place when blasting. I don't know what their basis would be for holding it up because they didn't like the project.

Q Have you applied for zoning and building permits from the Township of Plumstead?

A (WITNESS BOURQUARD) No.

Q Are you familiar with the fact that the Township of Plumstead has informed the NWRA that they will require a zoning change in the township before they will permit the project to proceed?

A (WITNESS BOURQUARD) I think I have seen a letter like that, and as I recall our attorney has researched that and found it wasn't necessary.

Q Has any action been taken to verify that it is

not necessary?

A (WITNESS BOURQUARD) Not by me. Possibly by our attorney.

Q Can you describe, if the blasting approval will take ten days, how much blasting you estimate is going to be necessary, submarine blasting in the contract?

A (WITNESS BOURQUARD) How much? Do you mean in cubic yards?

Q Yes.

A (WITNESS BOURQUARD) I don't know that offhand.

Q Is it less than 2,000?

A (WITNESS BOURQUARD) I don't know. I would guess it may be in that area.

Q Is it less than 200?

A (WITNESS BOURQUARD) I don't know, I said.

Q You don't know.

Could you describe --

JUDGE BRENNER: Mr. Bourquard, maybe you misheard him. He threw two different figures at you. The first was 2,000 and you said you don't know, but you think it would be in that area. And then he said, would it be less than 200, and you said you don't know. Is that what you meant to say?

WITNESS BOURQUARD: Well, basically, I don't know, Judge Brenner. I think it's probably around maybe 2,000, but I'm just guessing at that.

BY MR. SUGARMAN: (Resuming)

Q Without going into great length, can you describe to the Board what the activities are that would consume 80 to 120 days in the river?

A (WITNESS BOURQUARD) Primarily it would be putting the equipment together, the barges, the cranes that would be needed, and whatever kind of motorboat equipment he would need to move these around, some type of boat. And that would have to be assembled first.

Q How long would that take?

A (WITNESS BOURQUARD) I think probably, if you start off right away, probably a month.

Q That would take a month, okay. That's 30 days.

A (WITNESS BOURQUARD) Yes. Now, I told you I did not have the schedule in front of me, and if I tried to guess at these things then I'm sure I would come up with something that won't be correct.

Q You say there is a schedule? Are you saying there is a schedule for construction in the river?

A (WITNESS BOURQUARD) Yes. We have an estimate of how long it will take to do it in the river, yes. I

don't have it with me, no.

Q Did you produce it in response to our interrogatory or our supplemental interrogatory or the supplement to the interrogatory required by the Board?

A (WITNESS BOURQUARD) I don't think we had it then, if I did.

Q Well, did you have it when you decided that you needed two winters in the river?

A (WITNESS BOURQUARD) I think we have always known we needed two winters in the river.

Q Well then, why in the PECO memo of December 16, 1981, did you not allow for two winters in the river?

A (WITNESS BOURQUARD) There is.

Q There is one and a half.

A (WITNESS BOYER) Well, that's two winters.

Q Well, let's just deal with the 30 days of preparation time. Out of the 80 to 120 days that you estimated for Judge Brenner, 30 days are required for assembly of equipment; is that right?

A (WITNESS BOURQUARD) Yes. That is an estimate.

Q That can be done before November 1st, can't it?

A (WITNESS BOURQUARD) Not very well, not if the

contractor hasn't got --

Q I don't mean November 1st of this year. I mean that activity is not constrained by the DRBC limitations, is it?

A (WITNESS BOURQUARD) No, not until they start actuating.

Q So you could use the period from October 1 to November 1, 1983, to assemble the equipment, and then you would have from November 1, you would have five months, 150 days, to do the remaining 50 to 90 days of work, by your estimate.

A (WITNESS BOURQUARD) Now, I told you that my estimate was strictly an estimate.

Q Well, did you provide the testimony or help to provide the testimony that was your direct testimony on this subject?

A (WITNESS BOURQUARD) I would assume so.

JUDGE BRENNER: Yes or no, not "I would assume so". This testimony on page 27 to 28.

(Pause.)

BY MR. SUGARMAN: (Resuming)

Q Did that question get answered, sir?

JUDGE BRENNER: He's looking.

Mr. Bourquard, I want to stay on the record while you're looking at that. I want to talk to the

other Board members. So we will each pause, and then kind of when we each maintain eye contact again, I will let you give the answer. But give us a moment also.

(Board conferring.)

JUDGE BRENNER: All right. Mr. Bourquard?

WITNESS BOURQUARD: Yes, I am in agreement with this testimony.

JUDGE BRENNER: The question was, did you prepare it in the first instance or assist in the preparation or provide the information with which it was prepared?

WITNESS BOURQUARD: I assisted in providing the information.

JUDGE BRENNER: All right. We would like some information tomorrow, if possible, hopefully, later this week if not possible tomorrow. As we understand it, a contractor would have to do certain work, and I don't want my loose description to become a definition locked in concrete, but generally in the nature of setup work, that would not actually affect anything. That is, it would not be construction in the river or building a building or building a road. It would be getting equipment into place.

WITNESS BOYER: Not excavating.

JUDGE BRENNER: That's right, not any

excavation or construction. You're not going to move any trees or any ground. You, meaning the contractor, is just going to get things ready.

WITNESS BOYER: Sir, the grading, the removal of trees for access and some of the underbrush, is going to be one of the first things the contractor is going to do.

JUDGE BRENNER: I will get to that in a moment. That would be a second category.

This first category of work, if we end up prohibiting any work that we think would prejudice our decision on operational impacts before it is issued -- we would be willing to not prohibit the setup type work, which would be at the Applicant's or whoever's, NWRA's, own risk. If they want to spend money getting ready for something they might not be able to do, that is their business as far as we are concerned.

So we would want an identification of that work, in writing if possible, so that if we wanted to prohibit work until we issued our decision, we would not want that to be included in the prohibition. That would be one category of work, that you would not touch any trees or touch any ground. All right.

The second category would be work that might touch trees and ground, construction preparation work,

but work that in your opinion would have no nexus whatsoever, even arguable nexus, to any potential operational mitigations which we might order within the scope of the contentions that we are hearing.

WITNESS BOURQUARD: I don't understand that.

JUDGE BRENNER: For example, you may feel that an access road, although it would be construction impacts and it would disturb ground, would have nothing to do with any of the impacts within the contentions that we are looking at, that is alleged operational impacts.

On the other hand, starting to actually build in the river, which would be prejudicial to the selection of a location of the intake -- or, not prejudicial so much as it would incur impacts in the river which might later prove to have been unnecessarily incurred -- would be something that wouldn't fall within this middle category.

I am purposely not being precise for a few reasons. First of all, we haven't thought out the language, but we wanted to give it to you today so you would have the maximum opportunity to think about it. And in addition, we want to give you flexibility to make the proposal to us on the record, so that the other parties can comment on it.

We could have waited for the findings stage, but we think all parties agree we should get these things as up-front as possible while we are here and continually talk to each other about it, as opposed to just building paperwork trails. I agree with Mr. Boyer's observation earlier as to the efficiency of getting things done when we are together, as opposed to arguing it out on paper solely later.

Now, the access road was one example. We may disagree that it fits in that category. Just preliminarily, it could fit in that category, and you may have some others.

WITNESS BOURQUARD: Excuse me. May I ask a question?

JUDGE BRENNER: Yes.

WITNESS BOURQUARD: Your second category, construction preparation, is that construction preparation related to river work or --

JUDGE BRENNER: Related to the supplementary cooling water system, to all of the work involved.

WITNESS BOURQUARD: At the Point Pleasant facility?

JUDGE BRENNER: And the Bradshaw Reservoir.

MR. CONNER: Mr. Chairman, do you want any distinction made between NWRA work and Limerick work?

JUDGE BRENNER: No, not that I know of. But you could make a distinction if you then wanted to make a point based upon that distinction. It is up to you. I don't have any distinction in mind.

Don't come and tell me NWRA is building the intake, if that is what you have in mind, so therefore we shouldn't worry about that while we are deliberating the issues, because we have been down that road before.

MR. CONNER: But we have already told you that NWRA has put an affidavit in that it will proceed irrespective of Limerick. So I think you are making a rush to judgment here that may be discriminating against NWRA.

JUDGE BRENNER: Well, you can fight that later, either yourself or through NWRA. I'm merely asking you to suggest these categories.

We are going to plut in a notice requirement before any work is done beyond these categories. Exactly how long that notice requirement will be, I don't know, and whether it will require an affidavit, as distinguished from just somebody's just best guess.

MR. CONNER: Superseding the one that is in the construction permit?

JUDGE BRENNER: You mean the one that we imposed in our prehearing conference?

MR. CONNER: No, no. The 45-day notice that, as I remember it, is in the construction permit.

JUDGE BRENNER: We imposed a 45-day notice.

MR. CONNER: All right.

JUDGE BRENNER: Yes, as far as -- yes, that's right, preceding that. I expect it will be a time frame of in the neighborhood of 15 to 20 days, so rather than getting your longer-range estimate we would get a precise estimate with an affidavit that the affiant can start construction in-river, or however we're going to phrase it -- and we're going to think about that -- on this day.

We don't want to induce you to put a notice in just to protect yourself. We want to get this down to the day information, and we feel we can do that with a tighter time frame and that is why we are at the point where we would supersede it.

This decision is very unlikely to be out by December 15th, I can tell you that, and that is part of what we have in mind. And we can make our own inferences and decisions and judgments on what we've heard so far as to the schedule in this testimony and what else we might hear tomorrow on it.

And none of this should indicate going one way or the other on that testimony. It is just because we

don't know what we will think about that that we want to have available these other distinctions should we choose to use them, and it is just a matter of prudent planning on our part.

I don't want to think about the problems you may have with us if we find that there is a reason for prohibiting construction, a very big if at this point, and you tell us you're not building it, NWRA is building it. We will cross that bridge if and when we have to.

WITNESS BOYER: But just the two categories you want itemized?

JUDGE BRENNER: Yes. Now, since we've had more of a dialogue than I anticipated, if you feel there are other things that would be pertinent, we won't prohibit you from including it. I think it would be most efficient in writing. I recognize the logistics are not that great, but it might be best to do it that way if that can be done some time in the next day or two.

Because I'm worried about -- if we had more time on the record I wouldn't worry about it. But we want to save record time as much as we can.

MR. CONNER: We will have it typed and brought out in the morning.

WITNESS BOYER: It may not be the morning.

JUDGE BRENNER: We didn't require it in the morning. As soon as practicable, and we would rather have it done right than first thing, and I'm sure everybody else would also. And if you find you need another day, just let us know and you will get it. It just would be more efficient while the subject is on our minds, but we recognize you have a lot of other burdens this week also. But it should be done this week.

MR. SUGARMAN: Is this supposed to be from the Applicant or from all parties?

JUDGE BRENNER: From the Applicant, I think, in the first instance. They are the ones in control of that information. You can comment on it. That is one reason for getting it on the record.

If they put something in the category that they think does not affect operational impacts and you say, yes it does, certainly we will appreciate your informing us as to why you think it does. And you will get copies of it the same time we do and we will give you some time to read it before we discuss it again.

But it is not testimony for cross-examination by them.

MR. SUGARMAN: I understand.

JUDGE BRENNER: Whenever I'm vague orally at the end the end of the day, I always hide the

justification that I'm being purposefully vague to give you flexibility. That happens to be true to some extent today. If we had more time we would write it out more precisely, but we don't.

MR. SUGARMAN: Need I state that I have a couple of more questions on cross-examination?

JUDGE BRENNER: I knew you weren't finished with your cross plan. I assumed you weren't. We will be back at 8:30 tomorrow morning.

Mr. Conner?

MR. CONNER: There is one thing on the record that I want to put on today, because it came up earlier today when you stated that we have not been requested to file testimony on timing. I would refer you to the Board's order dated September 9.

JUDGE BRENNER: I'm very familiar with that order, and you can show me tomorrow morning where it says that required testimony to be filed. I don't think you will find it.

MR. CONNER: Well, I can see how it could be misread, now that you have so ruled.

JUDGE BRENNER: We asked you to supplement your interrogatory.

MR. CONNER: Well, for the record: "The Applicant is directed to supply a more responsive answer

at the time of its filing of written testimony on September 20, 1982."

I now understand you to mean not in the testimony, but separate from.

JUDGE BRENNER: I'm sorry as to the ambiguity, and we in fact meant what you just said we meant. I think there are some other sentences in the order that put it in context.

MR. SUGARMAN: May I just say, the Applicant did file a response in addition to putting that in the testimony.

JUDGE BRENNER: I know. That is why I thought they understood what we meant.

Well, I think it is a good thing you did, as it turns out, Mr. Conner, from your point of view, to the extent you want to rely on that view.

All right, we will be back at 8:30.

(Whereupon, at 5:20 p.m., the hearing in the above-entitled matter was recessed, to reconvene at 8:30 a.m. on Wednesday, October 20, 1982.)

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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of: Philadelphia Electric Company (Limerick Generating Station Units 1 and 2)

Date of Proceeding: October 19, 1982

Docket Number: 50-352 OL & 50-353 OL

Place of Proceeding: Bethesda, Maryland

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

Ray Heer

Official Reporter (Typed)

Ray Heer

Official Reporter (Signature)