

NUCLEAR REGULATORY COMMISSION

ORIGINAL

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:

PHILADELPHIA ELECTRIC COMPANY

(Limerick Generating Station
Units 1 and 2)

:
:
:
:
:
:

DOCKET NO. 50-352 OL
50-353 OL

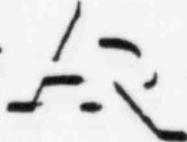
DATE: October 26, 1982

PAGES: 3742 - 4038

AT: Bethesda, Maryland

*Please return original & two (2)
extra copies (stapled) to
Anita Mc Namara 439 E/W*

TR & 1

ALDERSON  REPORTING

400 Virginia Ave., S.W. Washington, D. C. 20024

Telephone: (202) 554-2345

8210280173 821026
PDR ADOCK 05000352
T PDR

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

Fifth Floor Conference Room
4350 East West Highway
Bethesda, Maryland

Tuesday, October 26, 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

FOR THE BOARD:

LUCINDY MINTON, Esq.
Atomic Safety & Licensing Board

1 APPEARANCES:

2 On behalf of Applicant,
3 Philadelphia Electric Company:

4 TROY B. CONNER, JR., Esq.
5 Conner & Wetterhahn
6 1747 Pennsylvania Ave., N.W.
7 Washington, D.C. 20026

8 On behalf of the Regulatory Staff:

9 ANN. P. HODGDON, Esq.
10 JOSEPH RUTBERG, Esq.
11 Washington, D.C.

12 On behalf of Intervenor,
13 Del-Aware Unlimited, Inc.:

14 ROBERT SUGARMAN, Esq.
15 Sugarman & Denworth
16 North American Building
17 Suite 570
18 121 South Broad Street
19 Philadelphia, Pa. 19107
20
21
22
23
24
25

C O N T E N T S

	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>	<u>RECROSS</u>	<u>BOARD</u>	<u>CROSS ON BOARD</u>
1						
2	<u>WITNESSES:</u>					
3	Jonathan T. Phillippe (Resumed)					
4	By Mr. Sugarman		3745			
	By Judge Cole				3790	
5	By Judge Brenner				3810	
	By Judge Cole				3810	
6	By Judge Morris				3812	
	By Judge Brenner				3832	
7	By Mr. Conner			3848		
8	By Judge Brenner				3861	
	By Mr. Sugarman					3866
9	By Judge Cole				3883	
	By Judge Brenner				3885	
10	By Judge Cole				3886	
11	<u>(Afternoon Session..3892)</u>					
12	Rex G. Wescott and					
13	Michael T. Masnik (Resumed)					
	By Mr. Sugarman		3901			
14	E. H. Bourquard (Recalled)-----page 3910					
15	Rex G. Wescott and					
16	Michael T. Masnik (Resumed)					
17	By Mr. Sugarman		3917			
	By Mr. Rutberg			3989		
18	By Mr. Sugarman				3997	
	By Ms. Hodgdon		4000			
19	By Judge Cole				4004	
	By Judge Morris				4010	
20	By Judge Cole				4013	
	By Judge Morris				4013	
21	By Judge Brenner				4016	
22	By Mr. Conner					4031
	By Mr. Sugarman					4034
23						
24						
25						

C O N T E N T S (Cont'd)E X H I B I T S

<u>NUMBER</u>	<u>IDENTIFIED</u>	<u>RECEIVED</u>	<u>BOUND IN TRANSCRIPT</u>
Del-Aware 25	3748		3899
Del-Aware 26	3776		3899
Del-Aware 27	3953		
Board 2	3955		

Proposed Direct Testimony of Professor Peirce
Lewis and attached Personal Vitae.....page 4036

RECESSES:

Morning - 3811
Noon - 3891
Afternoon - 3949

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

2 JUDGE BRENNER: Good morning.

3 We are going to let you do the redirect first,
4 Mr. Sugarman, and then we will ask our questions, to the
5 extent they remain after your questions. So we will get
6 going right now and we will give you a five-minute
7 warning at 55 minutes. If you stop before we get to the
8 warning, that's fine.

9 Whereupon,

10 JONATHAN T. PHILLIPPE,
11 the witness on the stand at the time of recess, having
12 been previously duly sworn, resumed the stand and was
13 further examined and testified as follows:

14 REDIRECT EXAMINATION ON BEHALF OF INTERVENOR

15 BY MR. SUGARMAN:

16 Q Mr. Phillippe, in response to Mr. Conner's
17 questions you expressed your concern about cross
18 currents. Would you specify the cross currents to which
19 you were referring?

20 A (WITNESS PHILLIPPE) Yes, sir, I will. There
21 are two sets of cross currents that I would expect in
22 the area. One I discussed yesterday as originating from
23 the main channel and expanding out into the eddy as the
24 main flow tries to expand out into the broader river
25 sections, and those, because of the restraints of the

1 bars, I expected to be more pronounced diagonally in the
2 upper flow layers, given the constraints of that bar.

3 The second set of cross currents I would
4 expect to originate from the return flow of the eddy as
5 the eddy moves down and then back up toward the Tchicken
6 Creek and then is constrained to move back toward the
7 intake.

8 These flows I expect to be fairly pronounced
9 relative to the velocities in the eddy, whatever they
10 may be, throughout. However, they may be fairly
11 pronounced at the lower levels due to the constraints,
12 again, of the bar on the back side and the tendency for
13 flows to follow natural channels, such as that provided
14 by the thread of the Hickory Creek, which also points
15 back toward the intake structure.

16 So I expect some lesser velocity components
17 down lower back toward the intake structure on the back
18 side of the eddy as it comes back around.

19 Q When you say "down lower", do you mean down
20 lower in the water column?

21 A (WITNESS PHILLIPPE) Down lower in the water
22 column.

23 Q Do you have a copy of Policastro Exhibit 1?

24 A (WITNESS PHILLIPPE) I do.

25 Q Would you show the Board and parties what the

1 direction of the flow that you are referring to is on
2 Policastro 1?

3 A (WITNESS PHILLIPPE) My exhibit 2, which was
4 struck yesterday, was a depiction of Policastro 1 or
5 based on Policastro 1, and --

6 Q Could you take Policastro 1? Do you have a
7 copy of it?

8 A (WITNESS PHILLIPPE) Yes, I do.

9 Q Could you mark the approximate location of the
10 ridge line and the bar contours and indicate the
11 channel -- the Hickory Run channel -- to which you were
12 referring as derived from Policastro 1?

13 A (WITNESS PHILLIPPE) I have Policastro 1, but
14 I don't have it before me.

15 Q Could you get it before you?

16 A (WITNESS PHILLIPPE) I don't have it presently
17 in my possession. I'm sorry.

18 Q If you would mark in ink rather than do it on
19 Exhibit -- in other words, rather than do it on Exhibit
20 2, mark in ink on Policastro 1 first the ridge line, the
21 approximate location of the ridge line, and, secondly,
22 the approximate location of what you have referred to as
23 the Hickory Run Channel.

24 A (WITNESS PHILLIPPE) I will mark the ridge
25 line as a solid line and the dotted line from the

1 Hickory Run channel, or a dashed line.

2 (Pause.)

3 MR. SUGARMAN: I ask that this document be
4 marked for identification as Del-Aware Exhibit 24 and we
5 will make copies of it. As the Board can see, the
6 witness' exhibit 2 was --

7 JUDGE MORRIS: Excuse me, Mr. Sugarman. That
8 will be Del-Aware Exhibit 25.

9 MR. SUGARMAN: Thank you, sir. The witness'
10 exhibit 2 contained the same lines, only I am giving it
11 to you on Policastro 1 so as to avoid having to use a
12 document on which appears the withdrawn portion.

13 JUDGE BRENNER: All right. It will be marked
14 for identification as Del-Aware Exhibit 25. You won't
15 be able to make copies. I don't think the blue will
16 copy, but you could do it in black or pencil.

17 (The document referred to
18 was marked Del-Aware
19 Exhibit 25 for
20 identification.)

21 JUDGE BRENNER: Show it to the other parties
22 and let me suggest that we will get other copies made.
23 I think at this point in the record it is quite easy for
24 Mr. Phillippe to describe where he drew the lines in
25 relation to these, and I will return this to you and

1 show it to the other parties. In the meantime, Mr.
2 Phillippe, why don't you describe so someone reading the
3 record can figure out where you drew the lines if they
4 had the Policastro exhibit but not your further drawing
5 on it?

6 WITNESS PHILLIPPE: Yes. The lines follow the
7 ridge line of the bar. The shoreward portion of the
8 ridge line is approximately 400 feet north of the intake
9 and a little bit east or to the right of station 700, if
10 you drew that perpendicular to the intake center line.

11 JUDGE BRENNER: Let me try it a little
12 simpler. You started at the point of that peninsula.
13 This is the solid line which you have called the ridge
14 line or bar contours, and you have drawn the line from
15 the point of the peninsula to the approximate vicinity
16 of the intake and going in that direction the path you
17 followed was the depression portion -- the lowest
18 portion of what I would describe as approximately the
19 V-shaped contours. Is that right?

20 WITNESS PHILLIPPE: Yes, sir.

21 JUDGE BRENNER: And now the dotted line you
22 have described is the Hickory Creek channel. You have
23 started from in the vicinity of the mouth of Hickory
24 Creek just below that peninsula, starting approximately
25 with the notation "70" as on that 70 contour, perhaps a

1 bit to the right of that, and the contours at that
2 portion running from that creek mouth to the approximate
3 vicinity of the intake or what I would describe as
4 inverted Vs, and you have gone through the peaks of
5 those inverted Vs.

6 WITNESS PHILLIPPE: Yes, sir.

7 BY MR. SUGARMAN: (Resuming)

8 Q Now understanding Judge Brenner's terminology
9 there, the high points or the peaks of those inverted
10 Vs, would those represent the minimum elevation channel
11 through that channel?

12 A (WITNESS PHILLIPPE) Yes, sir. The general
13 rule for drawing contours is that the Vs point upstream
14 and the Us point downridge.

15 Q Now the ridge line, does that follow the high
16 points of the bar?

17 A (WITNESS PHILLIPPE) Yes, sir.

18 Q So that ridge line, as you have testified,
19 would act as a control and/or a deterrent to the flow
20 going upstream and the low lines, the tops of the Vs,
21 would act as a channel for it to come down in?

22 A (WITNESS PHILLIPPE) That is essentially
23 correct.

24 Q Would you then describe, and again with
25 reference to the cross current, would you then describe

1 the flow of water as it proceeds around the eddy
2 utilizing Del-Aware Exhibit 25?

3 A (WITNESS PHILLIPPE) I would generally
4 describe the flow around the eddy, and I did in my
5 testimony, or rebuttal testimony I guess we are calling
6 it. The flow in the main channel being shielded by the
7 bar comes down through the main channel, still being
8 directed by the residual portions of the bar, so that it
9 comes down mostly intact, although there is some
10 spreading out which gives rise to some cross currents.

11 The momentum that is contained in this volume
12 of water moving past serves to accelerate the edges of
13 the eddy and start the circulation going, I believe. At
14 some point, the flow in the main channel has spread out
15 sufficiently and whatever else is downstream causes the
16 eddy to turn and to go back upstream.

17 The eddy, of course, is deepest toward the
18 middle of the river -- the center portions of the
19 river. It becomes shallower toward the shore and part
20 of the energy that has been imparted to the eddy is
21 damped out or dissipated somewhat due to the shallowness
22 along the shore. However, there is a component of
23 current perhaps not quite as strong as I showed in
24 Exhibit 2 -- maybe a little bit more riverward than what
25 I showed in my stricken Exhibit 2.

1 However, that proceeds north until such a point as
2 it is constrained and must bend again, at which point it
3 turns and, I believe, follows a path somewhat uphill
4 from the lowest channel, just trying to make the bend,
5 and whatever the centrifugal forces might be in making
6 the turn, and then falling back down somewhere between
7 the ridge line and the channel bottom, give or take a
8 little bit one way or the other.

9 I might also note that in periods of high
10 local flows where you have a local thunderstorm that the
11 Hickory Creek and Tohicken Creek would funnel quite a
12 bit of water down directly to this point and there would
13 be somewhat of a component coming from -- velocity
14 component coming from flows coming down Hickory Creek
15 channel and also from Tohicken Creek, and if, for
16 instance, the bar was overtopped, flows coming down from
17 Tohicken Creek would tend somewhat to follow this
18 channel.

19 Q Now what would be the experience of the water
20 with respect to the intake as it passes by, as it heads
21 toward the intake coming down that Hickory Run channel?
22 Would it be associated or introduced to the intake?

23 A (WITNESS PHILLIPPE) Well, that is a hard
24 question to answer because we really don't have good
25 measurements of velocities around the intake in a

1 directional nature. How much of the velocities are
2 damped out by the main channel flows and how much come
3 from these counter-currents and how close these flows'
4 maximum velocities approach the intake is hard to say at
5 this point. I couldn't say.

6 However, I would say that whatever is being
7 carried around in this eddy current would tend to
8 circulate around and around in the eddy as long as the
9 eddy remains there.

10 Q What would you say? Can you give an opinion
11 as to the probability of it being exposed to the intake
12 as it circulates around the eddy?

13 A (WITNESS PHILLIPPE) Well, I could not give a
14 very firm opinion about that at this point. There are
15 turbulences one way or the other. If the net velocities
16 are toward the intake, then I would think that there
17 would be a pretty good chance of exposing whatever is in
18 that current to the intake and, again, I would say that
19 probably down at the lower levels.

20 Q And if that is true --

21 JUDGE BRENNER: Excuse me. What current are
22 we talking about in your last sentence -- Hickory
23 Creek?

24 WITNESS PHILLIPPE: The Hickory Creek current.

25 JUDGE BRENNER: Well, how fast is that

1 current?

2 WITNESS PHILLIPPE: I don't know because I
3 don't have any measurements. I do have the observations
4 of witnesses who have swum in the area and testified to
5 a current down at those levels in the general direction
6 of the intake, but I don't know how strong that current
7 is.

8 JUDGE BRENNER: Do you think that current
9 would have a major influence in the vicinity of the
10 intake?

11 WITNESS PHILLIPPE: Again, I don't know. The
12 intake -- the bottom of the intake is at least in part
13 sheltered somewhat by the extension of that bar.

14 BY MR. SUGARMAN: (Resuming)

15 Q Sheltered from?

16 A (WITNESS PHILLIPPE) Well, the channel
17 currents are focused toward the intake in one direction
18 and the eddy is focused from the other side of the bar.
19 Now whether the two cancel out or what happens, I don't
20 know, or whether one is more dominant than the other.

21 I would think that the currents from the main
22 channel would be somewhat more dominant, but then again
23 I am not sure of the full dynamics of the situation.

24 JUDGE BRENNER: Somewhat more dominant?

25 WITNESS PHILLIPPE: Well, the velocities

1 generally, under low flow conditions, are not very
2 high. They are in the range of half a foot per second
3 or so, or less.

4 JUDGE COLE: Mr. Phillippe, have you observed
5 Hickory Run?

6 WITNESS PHILLIPPE: I have been to the site,
7 but not for very long.

8 JUDGE COLE: Do you have any knowledge of the
9 drainage area that is contributory to Hickory Run at its
10 point of entrance into the Delaware?

11 WITNESS PHILLIPPE: No, sir, I don't.

12 JUDGE COLE: Thank you.

13 BY MR. SUGARMAN: (Resuming)

14 Q Well, you weren't talking about Hickory Run
15 flows, were you, in the Hickory Run channel?

16 A (WITNESS PHILLIPPE) No, only in terms of
17 localized storms.

18 Q Right. What flows were you talking about?

19 A (WITNESS PHILLIPPE) I was talking mostly
20 about eddy flows.

21 JUDGE COLE: Just created by the bathymetry in
22 the area?

23 WITNESS PHILLIPPE: Yes, sir.

24 JUDGE COLE: Thank you.

25 BY MR. SUGARMAN: (Resuming)

1 Q By utilizing the terminology "Hickory Run",
2 what were you intending to do?

3 A (WITNESS PHILLIPPE) Just to point the
4 location of the channel.

5 Q When you said, in response to Judge Brenner
6 just now, that the intake structure is somewhat
7 sheltered -- sheltered from what?

8 A (WITNESS PHILLIPPE) I perhaps did not phrase
9 my answer very well. The bar tends to divide flows from
10 the main channel from flows from the eddy -- backflows
11 from the eddy -- and in that way I meant sheltered. I
12 really meant divided, I guess.

13 Q And where are you saying the intake is located
14 with respect to the main channel on the one hand and the
15 bar on the other?

16 A (WITNESS PHILLIPPE) The intake is located on
17 the edge of the main channel.

18 Q And where is it located with respect to the
19 bar?

20 A (WITNESS PHILLIPPE) At the base of the bar.

21 Q Would the degree of influence on the intake --
22 that is, the location of the water that would come into
23 the intake -- would that be determined by the relative
24 flows and the relative elevations in the water column,
25 among other factors?

1 JUDGE BRENNER: Mr. Sugarman, I may have
2 misheard you, but I think in your question you said the
3 water that comes into the intake. If you said that, I
4 don't think you meant that.

5 MR. SUGARMAN: I did mean that.

6 BY MR. SUGARMAN: (Resuming)

7 Q I could rephrase it, but what I meant is would
8 the intake tend to draw water -- would the extent to
9 which the intake would draw water from the main channel
10 and the extent to which it would draw it from the eddy,
11 would that be determined by the relative flow and by the
12 elevation in the water surface column, among other
13 factors?

14 A (WITNESS PHILLIPPE) Among other factors.

15 Q Would you expect that at low flow it would be
16 more likely that the water would be -- that the intake
17 would draw water from the eddy?

18 A (WITNESS PHILLIPPE) To the extent that the
19 velocities drop in the main channel, I can't really
20 answer that question because I don't know enough about
21 the velocities in the area and I don't have measurements
22 to go on.

23 Q All right. Do you see any indication that
24 anybody -- from the data that exists that anybody can
25 confidently determine that it will not be eddy flow in

1 the intake predominantly at low flow conditions?

2 A (WITNESS PHILLIPPE) I think the key word in
3 your question is the word "confident," and from the data
4 that we have one could be confident of very little with
5 respect to what the flows are going to be into the
6 intake.

7 Q So then specifically with respect to the
8 extent to which the eddy flow will be taken into the
9 intake, can one predict, in your judgment -- does the
10 data exist whereby one could make a prediction that that
11 would not occur?

12 A (WITNESS PHILLIPPE) I don't think there's
13 enough data to make too many predictions. One can only
14 make observations of the general shape of the channel
15 and the general patterns that one sees.

16 Q Now, you were asked about the rating curve and
17 the confidence that you would have in a rating curve.
18 Do you believe it is possible to make a rating curve
19 that would give you sufficient confidence in light of
20 the conditions that exist at the site to make judgments
21 as to what the velocities of different portions of the
22 river will be -- different cross sections of the river
23 and different locations in the water column will be at
24 different flows?

25 A (WITNESS PHILLIPPE) I think it is possible to

1 construct a rating curve for the site. However, the
2 rating curve is most directly affected by the hydrolics
3 of both the Lumberville Dam and the Delaware and Raritan
4 Canal, most prominently by the Lumberville Dam.

5 However, I believe Mr. Boyer indicated that
6 what he would do with the rating curve he had, taking it
7 down to zero flows at elevation approximately 65 or the
8 bottom of the weir was simply take his curve and extend
9 it straight down in a straight line.

10 I would suggest that if one were to extend the
11 line straight down from his data points around 10,000
12 cfs to zero, they could get a straight line and they
13 would see that the velocities or the elevations and
14 flows that he has around 3,000 cfs would be above that
15 line, and the reason they are above that line is because
16 of the hydrolics of the Lumberville Dam.

17 In other words, there is a double weir, in
18 effect, in operation at the Lumberville Dam, and that
19 causes a hump in the flows and velocities as observed.
20 Exactly how to describe that mathematically is a little
21 bit difficult at this point because there are other
22 effects, such as the Delaware and Raritan Canal
23 withdrawals, which relationships would have to be
24 studied.

25 But in general, in general one might extend

1 the rating curve down from about the 10,000 cfs mark
2 down to zero, and that would pretty well correspond to
3 what the rating curve would pick up at again above
4 10,000 cfs.

5 JUDGE COLE: Excuse me a minute, Mr.
6 Sugarman. Your question contained reference to
7 velocities at Point Pleasant, and I believe Mr.
8 Phillippe's response to that question concerning the
9 rating curve was concerned only with the quantities of
10 flow, not velocities. That is another question -- the
11 velocities.

12 BY MR. SUGARMAN: (Resuming)

13 Q Right, exactly.

14 A (WITNESS PHILLIPPE) If I could go ahead and
15 clarify it.

16 Q Please.

17 A (WITNESS PHILLIPPE) If we now have cross
18 sections in the river, then we have flow and area, and
19 we can derive an average velocity for cross sections
20 throughout that stretch of the river.

21 Q Has that been done, to your knowledge?

22 A (WITNESS PHILLIPPE) I have developed cross
23 sections based upon Policastro and from what I've gotten
24 from the Corps survey, and I do have ideas about what
25 the flows are and the flow distributions, at least

1 average flow distributions.

2 JUDGE COLE: Do you mean velocity
3 distributions also?

4 WITNESS PHILLIPPE: Yes -- velocity
5 distributions as well.

6 BY MR. SUGARMAN: (Resuming)

7 Q With that rating curve and with those velocity
8 distributions, could you predict, assuming that this
9 task were predicted, could you predict the velocities
10 that would obtain at the intake at various depths in the
11 water column?

12 A (WITNESS PHILLIPPE) Nothing substitutes for
13 actual measurements -- velocity measurements,
14 directional measurements -- in the various flow regimes
15 at that point. One could get some approximations,
16 however, from those rating curve values and
17 cross-sectional areas and so forth, at least average
18 values.

19 I might add that if one were to put the intake
20 down in a section of the river that had truly returned
21 to its normal cross section -- for instance, say, 300 or
22 400 feet down from its presently-proposed location --
23 one could be back to the place where the river flows
24 have spread back out and the velocity directions and so
25 forth would be expected to be more uniform.

1 Of course, one gives away some velocity
2 amplitude by the fact that the cross sections are spread
3 out. If one then were to go down a little bit further,
4 to about Section 22, the Corps Section 22, they would
5 have the best of all worlds as far as the channel being
6 fairly well established and the velocity directions
7 being established.

8 Also, some slight advantage -- that the higher
9 velocities would be closer to the Pennsylvania shore, so
10 there would be a shorter intake line out to the intake
11 structure, and those kinds of considerations also, with
12 whatever testimony there was about ice, the chance of
13 ice being a problem, would have dissipated by that
14 time. So there are other locations in that particular
15 Point Pleasant area that would be more conducive, I
16 think, to establishment of an intake structure, as is
17 being proposed.

18 Q Coming back to the proposed site, bearing in
19 mind -- well, is it also necessary in order to attempt
20 to apply a rating curve to the site at Point Pleasant
21 with the nature of the cross currents that you have
22 described, what is required to some base line or
23 reference point conditions to use to approximate off a
24 rating curve.

25 In other words, what actual velocity

1 measurements do you need to have in order to relate to
2 other points on the rating curve?

3 A (WITNESS PHILLIPPE) I don't follow the drift
4 of your question. I am sorry.

5 Q Let me try again. If you had a rating curve
6 that you were satisfied with as a basis for making
7 approximations, what would you have to have in terms of
8 velocity measurements at any given points on the rating
9 curve in order to relate those velocities or in order to
10 determine the expected velocities at other points on the
11 curve? What would you have to have for the reference
12 points in terms of measured velocities?

13 A (WITNESS PHILLIPPE) Each cross section has
14 its own unique characteristics. If we were to get into
15 a more uniform cross section, one could make some
16 approximations with some confidence concerning
17 velocities. For instance, at the edge of the channels
18 one has velocity that goes to zero, and it peaks out at,
19 in a more or less parabolic fashion to the maximum
20 velocity somewhere in midstream.

21 The same thing is true between surface
22 velocities and the bottom. One progresses from
23 velocities close to the surface which are the maximum,
24 down to zero at the bottom. In fact, in making velocity
25 and flow measurements, the method is to use velocity

1 meters in various subsections of the river, measuring
2 at, say, the two-tenths and the eight-tenths depths and
3 using that as average velocity through that section in
4 any gradient across the river.

5 Q Now in view of the nature of the currents at
6 the Point Pleasant proposed location, do you have -- and
7 based upon your testimony concerning the degree of
8 confidence in the velocities, that the velocity
9 measurements that were made, as to their location and
10 their direction -- do you believe that there is adequate
11 information upon which to determine the velocities and
12 directions of flow that would confront the intake at
13 different flows?

14 A (WITNESS PHILLIPPE) The most singular lack in
15 the data that is there, assuming that the stadia methods
16 were reasonably correct -- and I have reason to believe
17 that the particular set of measurements as far as
18 stationing is concerned, which is fairly close to what
19 would have been or what actually was there -- the most
20 singular lack, however, was the direction of the
21 velocities in that determination, and because of that
22 lack it would be very difficult to say exactly what was
23 going on at that intake.

24 Q Even at that flow?

25 A (WITNESS PHILLIPPE) Even at that flow.

1 Now the second things is that the flows would
2 appear to have been closer to 5,000 cfs. However, from
3 PECO's rating curve they estimated 4,500 cfs, so that is
4 a 500 cfs difference.

5 Q This is the July 1981 velocity measurements?

6 A (WITNESS PHILLIPPE) Yes, sir.

7 Q Go ahead.

8 A (WITNESS PHILLIPPE) At any rate, the most
9 singular lack in the velocity data is the direction --
10 JUDGE BRENNER: Could I jump in for a second?

11 For July 1981, using the rating curve, you think you
12 would get 4,000 cfs. Is that what you said?

13 WITNESS PHILLIPPE: What PECO -- Mr. Harmon
14 reported 4,500, and I said based upon what I saw in
15 flows at Trenton and what have you, I thought it was
16 closer to 5,000 cfs on that particular day. But it is
17 hard to say because I don't believe their rating curve
18 hits the situation in those low flow ranges.

19 JUDGE BRENNER: So you have what you think
20 might be a 500 cfs discrepancy by looking at the flows
21 at Trenton on that day?

22 WITNESS PHILLIPPE: Yes.

23 JUDGE BRENNER: But that would be inconsistent
24 with your other testimony on several things, including
25 travel time for you to look at the flows at Trenton that

1 day, wouldn't it?

2 WITNESS PHILLIPPE: Not that day, sir, but the
3 day thereafter. In other words, the flow at Point
4 Pleasant would have arrived at Trenton sometime the next
5 day or a portion of it would have arrived the next day
6 and a portion that day.

7 What we have are average flows for the day,
8 and if one had the flows actually observed on those
9 particular hours and knew what the travel time was to
10 Trenton, one could say well, the flow -- for instance,
11 the flow that was observed at 10:00 arrived at Trenton
12 at 10:00 that evening, if you will, or some such time of
13 travel.

14 JUDGE BRENNER: I thought you said you looked
15 that day. You actually looked at Trenton the next day.

16 WITNESS PHILLIPPE: I looked at several days
17 around there, yes, sir.

18 BY MR. SUGARMAN: (Resuming)

19 Q What you were saying, if I can clarify, in
20 response to Judge Brenner, what you were saying was you
21 expected the relevant flow at Trenton to have been 5,000
22 rather than 4,500?

23 A (WITNESS PHILLIPPE) The relevant flow at
24 Point Pleasant to have been 5,000.

25 Q Rather than 4,500?

1 A (WITNESS PHILLIPPE) Yes, sir.

2 Q And that was based upon consideration of what
3 data at Trenton?

4 A (WITNESS PHILLIPPE) The only data I had at
5 Trenton were the daily average data.

6 Q But I mean for what days?

7 A (WITNESS PHILLIPPE) The day that was reported
8 -- the 23rd and the 24th and the 25th. I looked at all
9 three days, I believe. A portion of the 23rd and a
10 portion of the 24th would have been representative of
11 the flows, at any rate.

12 Q And just so Judge Brenner can have the
13 underlying data, what was the flow at Trenton on the
14 23rd and what was the flow at Trenton on the 24th?

15 A (WITNESS PHILLIPPE) Just a minute.

16 (Pause.)

17 Q I think we have already marked that as
18 Del-Aware 12.

19 A (WITNESS PHILLIPPE) Yes, sir. The flow at
20 Trenton on the 23rd was 5,960 cfs. The flow the 24th
21 was 5,110 cfs.

22 Q So when you say the flow was closer to 5,000
23 cfs at Point Pleasant that day, you are adjusting the
24 Trenton data down to Point Pleasant?

25 A (WITNESS PHILLIPPE) Yes, sir.

1 JUDGE BRENNER: Could you add one more day?

2 WITNESS PHILLIPPE: Yes. The next day was
3 4,370 cfs, so we were in a falling river.

4 JUDGE BRENNER: That is pertinent, isn't it?

5 WITNESS PHILLIPPE: Yes, sir.

6 JUDGE BRENNER: In the sense that it might be
7 erroneous just to compare 5,100 to the 4,500.

8 WITNESS PHILLIPPE: Except that the time of
9 travels are on the order of 20 hours under those flow
10 conditions.

11 JUDGE BRENNER: Do you have an objection, Mr.
12 Conner?

13 MR. CONNER: No. I didn't hear. There was
14 some paper rattling and I want that number for the
15 23rd. I just couldn't hear it.

16 MR. SUGARMAN: 5,910.

17 WITNESS PHILLIPPE: 5,960. For the 23rd, the
18 flow at Trenton was 5,960.

19 MR. CONNER: Thank you.

20 BY MR. SUGARMAN: (Resuming)

21 Q Do you feel that the number at Trenton or the
22 number at Point Pleasant at the time that Mr. Harmon
23 made his measurements on the 23rd of July was
24 significantly higher than 4,500 cfs?

25 A (WITNESS PHILLIPPE) I would say it was on the

1 order of 500 cfs higher.

2 Q Now why is the direction of flows so critical
3 in trying to utilize that data to try to take velocities
4 for other dates?

5 A (WITNESS PHILLIPPE) Well, I believe that what
6 was attempted before was to say that we could make a
7 straight line relationship between the velocities at
8 4,500 cfs and the velocities at 3,000 cfs, and extend it
9 on down to lower flows. And one of the questions that
10 would arise is was the flow actually 4,500 or was it
11 higher, and the other question might be was the flow
12 actually at 3,000 or was it at some higher or some lower
13 flow.

14 Q Now turning to that other measurement of
15 November 7, 1980, what degree of confidence would you
16 have in those measurements as a basis for attempting to
17 determine the impact or the relationship of the flows in
18 the eddy and in the river to the intake?

19 A (WITNESS PHILLIPPE) Well, one of the things
20 that would be favorable from the Applicant's point of
21 view is the flows were probably less than 3,000 cfs.
22 What is unfavorable is the fact that no one knows
23 exactly where those measurements were made, given the
24 use of the rangefinder.

25 Q Would you have confidence in utilizing that

1 data to determine the direction and the velocity of the
2 flows that would come across the intake at other flows?

3 A (WITNESS PHILLIPPE) Again, the direction of
4 the velocity, as measured, was not given, so that I
5 don't know. Further, to get a good picture of the
6 velocity patterns and current patterns I would like to
7 see velocities upstream or downstream, with directions
8 given as well.

9 Q Have you seen Table 2 in Del-Aware Exhibit 9,
10 which is Mr. Harmon's letter to Mr. Pourquard of July
11 28, 1981?

12 A (WITNESS PHILLIPPE) I believe I have seen
13 it.

14 Q Are you familiar with the Table 2, which is
15 the transect 100 feet upstream, which was taken from
16 July 23 over onto July 24, 1981?

17 A (WITNESS PHILLIPPE) Yes, I have seen that
18 table.

19 Q Now on that table I direct your attention to
20 the fact that the velocity at 225 feet from shore at one
21 foot in the water is 1.8 feet per second, and the
22 velocity 250 feet from shore is registered as 1.35 feet
23 per second. In other words, the lower velocity as you
24 go out further in the river and the deeper in the water
25 column the velocities are higher. Can you account for

1 that?

2 A (WITNESS PHILLIPPE) Other than there might be
3 some turbulence involved there, I couldn't give you a
4 good reason. The other thing that I would note is that
5 one of the measurements was made on the 23rd and the
6 other one was made on the 24th, and as we have seen, the
7 corresponding flows at Trenton were lower the next day
8 as well.

9 So that those flows may have been closer to
10 4,500 at Point Pleasant.

11 Q So could you use the velocity flow, the
12 velocity measurements from the 23rd and 24th, from that
13 Table 2, 100 feet upstream, and, let's say, Table 3 at
14 100 feet downstream, which were all taken on July 24th,
15 could you utilize that data to help evaluate the
16 situation, or would it not be possible to utilize that
17 data?

18 A (WITNESS PHILLIPPE) That might help. I
19 haven't done that.

20 Q Does that data indicate the direction of the
21 flow of the velocity?

22 A (WITNESS PHILLIPPE) Possibly. One would have
23 to make some assumptions about directions, but given
24 those assumptions were reasonable, one might be able to
25 extrapolate.

1 Q Taking into account the reservations or
2 problems you have expressed with the velocity data and
3 the problems you have expressed and your opinion
4 concerning the ability to construct a straight line
5 curve, a rating curve, do you believe that it is
6 possible to confidently predict the direction and
7 velocity of the flows in the intake based upon the
8 present analysis and the present data at various flows?

9 A (WITNESS PHILLIPPE) I have stated the
10 deficiencies I see in the data, and I wouldn't want to
11 make that analysis and put my stamp on it.

12 Q Do you believe that any reasonable engineer,
13 hydrolic engineer, could do so?

14 A (WITNESS PHILLIPPE) I don't think any
15 engineer could do so and put his stamp on it and sign
16 it.

17 Q Now you indicated along the same lines in
18 response to Mr. Conner that you had arithmetically
19 plotted the January 22, 1982 data and that you would
20 have no confidence limit on that data as arithmetically
21 plotted.

22 Was it your intention in plotting that data to
23 construct a rating curve of your own, or were you simply
24 plotting the data that the Applicant had provided?

25 A (WITNESS PHILLIPPE) I simply plotted the data

1 that the Applicant had provided to give me some
2 indication of how the numbers clustered and so forth and
3 the measurements clustered.

4 Q And Mr. Conner expressed a concern that you
5 had concentrated the data points in, I think, a half an
6 inch square.

7 A (WITNESS PHILLIPPE) Yes, sir.

8 Q And you testified that you have also done them
9 on a larger scale.

10 A (WITNESS PHILLIPPE) Yes, sir.

11 Q Now if you plot them on the larger scale, does
12 that change your opinion that there is no confidence
13 limit?

14 A (WITNESS PHILLIPPE) Well, I have plotted them
15 to a larger scale.

16 Q Had you done so previous to your testimony
17 also?

18 A (WITNESS PHILLIPPE) I had done so previously.

19 Q And does it change your opinion?

20 A (WITNESS PHILLIPPE) No, sir. In fact, I
21 plotted all his data points, and given the assumption
22 that the data points were correct and correctly
23 determined -- which I have some difficulties with --
24 given that, if I took his data points I would find they
25 fell into two distinct sets of clusters. In fact, I

1 have plotted these without reference to any trend lines
2 or what have you, and I would be willing to provide them
3 to the panel.

4 However, if I do put lines through them, I
5 come up with essentially two parallel lines -- one
6 through the points above elevation 71.5 and one through
7 the points below 71.5 -- and those two lines are almost
8 parallel, but displaced by 600 or 700 cfs.

9 Q And that reflects the weir?

10 A (WITNESS PHILLIPPE) That reflects the effects
11 of the hydrolics of the weir.

12 Q In other words, what you are saying is that
13 there are two rating curves -- one at flows where the
14 weir has an impact and the other at flows where the weir
15 does not?

16 A (WITNESS PHILLIPPE) That's correct. There is
17 one rating curve where the weir has an impact, and there
18 is another rating curve when the weir is rounded out by
19 the volume of the flows.

20 JUDGE BRENNER: Mr. Sugarman, can I interrupt
21 with one thing?

22 MR. SUGARMAN: Sure.

23 JUDGE BRENNER: Did you say you had problems
24 doing something like that because of the lack of
25 knowledge of, I forget the exact term, but the crest of

1 the weir?

2 WITNESS PHILLIPPE: Yes, sir. I have had a
3 great deal of difficulty in doing it, but the trend is
4 consistent and I have tried several weir formulas with
5 numbers that I had to generate from what I remembered
6 from what I had seen in the field, and they seemed to be
7 consistent. But I'm not ready to -- I certainly
8 wouldn't put my stamp on them at this point.

9 But the trend is clear, that there is an
10 effect from the weir and it appears twice -- one from
11 the lower weir and then once when the wing dam abutments
12 themselves are crested.

13 MR. SUGARMAN: I will offer Mr. Phillippe's
14 plotting, and this is a purely arithmetical plotting of
15 the points -- the 16 or 17 points that relate to
16 Trenton.

17 WITNESS PHILLIPPE: Seventeen points or 18
18 points.

19 MR. SUGARMAN: As indicating the data for
20 which one can and from which he has been trying to
21 construct -- it is actually more than one rating
22 curve -- the curves for the site using the Trenton data,
23 and I will ask that that be marked as Del-Aware 26.

24 WITNESS PHILLIPPE: Mr. Sugarman, in further --

25 JUDGE BRENNER: Wait a minute. Don't lose

1 your thought.

2 (Board conferring.)

3 JUDGE BRENNER: All right. We will mark it
4 for identification. Have you got copies for the
5 reporter?

6 MR. SUGARMAN: Yes, sir.

7 (The document referred to
8 was marked Del-Aware
9 Exhibit Number 26 for
10 identification.)

11 BY MR. SUGARMAN: (Resuming)

12 Q Del-Aware 26 is simply a plotting of the
13 points on Applicant's -- on the Exhibit 7 to Mr.
14 Bourquard's letter of January 22, 1982, to Mr. Denmark.
15 Is that correct?

16 A (WITNESS PHILLIPPE) That is correct.

17 Q And it's your testimony that shows you that
18 there are two separate lines if you were to try to
19 construct a rating curve or curves through those
20 points. Is that correct?

21 A (WITNESS PHILLIPPE) Yes, sir. In fact, if
22 you took a line through the upper set of points, if you
23 will, directly through point 7, and more or less
24 splitting points 4 and 12, and extended it down to zero,
25 to 65 feet, you would find that that line intersects at

1 about zero, at 65 feet.

2 Unfortunately, I would have had to put another
3 piece of paper on here, but it can be done. You can see
4 that. And that indicates to me that what I previously
5 said, if the weir wasn't there, then one could have one
6 rating curve for the whole site. But since the weir is
7 there, the weir affects the hydrolics at that particular
8 site, particularly under the low flow conditions.

9 Q So the data point, the curve that you would
10 derive, would not explain the lower points?

11 A (WITNESS PHILLIPPE) That is correct. Those
12 lower points are not explained by the curve that has
13 been drawn previously. I might say that these points
14 also, under the low flow conditions, I am not sure what
15 the effect of the Delaware and Raritan Canal are because
16 we don't have those numbers abstracted for the data
17 points that were provided by Mr. Bourquard.

18 Q Now in terms of attempting to conver the
19 Trenton -- oh, by the way. When you plotted these
20 points, are these the points that utilized the channel
21 storage method that the Applicant used, or did you use a
22 different method?

23 A (WITNESS PHILLIPPE) Yes, sir. These used the
24 channel storage method.

25 Q In other words, these are directly off of

1 Exhibit 7?

2 A (WITNESS PHILLIPPE) They are directly off
3 Exhibit 7.

4 Q Now do you feel that the channel storage --
5 you were asked to read pages from or paragraphs from
6 USGS publication "Techniques of Water Resources
7 Investigations".

8 A (WITNESS PHILLIPPE) Yes, sir.

9 Q And they indicated that the channel storage
10 adjustment method is usually preferred. Is that
11 applicable to this case?

12 A (WITNESS PHILLIPPE) In general, the channel
13 storage method is preferred, except in this case there
14 is intervening hydrolics considerations very close to
15 the site to which the measurements were to be
16 transferred, and I think that these intervening hydrolic
17 considerations override the use of the channel storage
18 method or even time of travel, for that matter. I don't
19 think either method is all that good.

20 However, they are both relatively consistent
21 with each other.

22 Q So you would not feel that it would be
23 appropriate to use Trenton data as a dominant influence
24 in the situation at all, then?

25 A (WITNESS PHILLIPPE) That is correct. I think

1 that under the low flow situation one has to relate the
2 hydrolics to the hydrolic control at Lumberville and, I
3 guess, through the Delaware and Raritan Canal.

4 Q By the way, in looking at this "Techniques of
5 Water Resources Investigations", do you find any
6 comments on the use of boats as the basis for making --
7 for measuring the velocity?

8 A (WITNESS PHILLIPPE) I believe the reference
9 indicated that if one were using a boat they should have
10 a tag line for horizontal positioning.

11 Q And is the boats method to be used only where
12 no cableways or suitable bridges are available and where
13 the stream is too deep to wade?

14 A (WITNESS PHILLIPPE) That is almost a direct
15 quote from the publication.

16 JUDGE BRENNER: Mr. Phillippe, was that a
17 figure of speech? Do you know that it says that?

18 WITNESS PHILLIPPE: Yes, sir. I read it last
19 night, but I don't remember the exact wording.

20 BY MR. SUGARMAN: (Resuming)

21 Q Would you read the first sentence under the
22 title "Current Meter Measurements from Boats" on page
23 44?

24 A (WITNESS PHILLIPPE) "Discharge measurements
25 are made from boats where no cableways or suitable

1 bridges are available and where the stream is too deep
2 to wade."

3 Q Now in the case of -- in case of using that
4 measurement, in the next paragraph what does it indicate
5 is the appropriate procedure for using boats to measure
6 velocities?

7 A (WITNESS PHILLIPPE) "String a tag line at the
8 measuring section by unreeling the line as the boat
9 moves across the stream."

10 Q Is there any indication, and did you hear Mr.
11 Harmon's testimony, as to whether a tag line was used to
12 ensure proper positioning of the boat in either of his
13 measurements?

14 A (WITNESS PHILLIPPE) My understanding was that
15 he used stadia in one set of measurements and he used an
16 optical rangefinder in another set of measurements.

17 Q Was any tag line used?

18 A (WITNESS PHILLIPPE) To the best of my
19 knowledge and belief, no.

20 Q Now you were asked about whether the five
21 percent difference between the data that was plotted by
22 the Applicant for some of those October dates --

23 JUDGE BRENNER: Wait a minute, Mr. Sugarman.
24 Mr. Conner, I realize we are in close quarters here, but
25 I'm having a little difficulty hearing.

1 MR. CONNER: I'm sorry.

2 JUDGE BRENNER: You can keep talking. Just
3 lower it slightly and, in fact, if you want we will give
4 you a break to talk to your counsel also after Mr.
5 Sugarman is done.

6 Go ahead.

7 BY MR. SUGARMAN: (Resuming)

8 Q Mr. Conner asked you about the apparent
9 incompatibility of some of their October data where they
10 had higher flows and lower elevations than another piece
11 of data where they had lower flows and higher elevations
12 at Trenton, and he asked you what the error factor was
13 at Trenton and you said up to .5 percent, I believe it
14 was.

15 A (WITNESS PHILLIPPE) Five percent.

16 Q And he asked you whether that could account
17 for the discrepancy. I will ask you this: Is it
18 equally possible that the five percent error at Trenton
19 might have been the other way and that there might be
20 some other intervening factors that might have caused
21 that and that the intervening factors might have made a
22 difference greater than five percent?

23 A (WITNESS PHILLIPPE) That is correct. Five
24 percent is plus or minus five percent, typically, and
25 usually the USGS flow measurements at gauge are, the

1 better gauges, are plus or minus five percent as, I
2 guess, if you would, one standard deviation confidence
3 about the mean.

4 There are very few sites where they give an
5 excellent rating of plus or minus two percent. However,
6 in this particular case there is a lot of intervening
7 hydrolics between Point Pleasant and Trenton,
8 particularly the hydrolics of the Lumberville Dam.

9 Q Now, finally, with respect to the anticipated
10 future low flows, you were asked about the specific
11 month of January 1981 and you were asked whether the
12 DRBC has been better able to maintain the 3,000 cfs
13 since the new reservoirs have come on.

14 Is the addition of new reservoirs the only
15 factor affecting the ability of the DRBC to maintain low
16 flows in the Delaware River?

17 A (WITNESS PHILLIPPE) That is a very basically
18 complicated question.

19 Q What other factors might bear on that?

20 A (WITNESS PHILLIPPE) One has to manage those
21 reservoirs, for one thing. There has to be storage in
22 the reservoirs. There has to have been a period of
23 storage. If we had three or four drought years, it is
24 quite possible those reservoirs wouldn't be full and
25 couldn't maintain flow for additional years.

1 In other words, there has to be water in the
2 reservoir to release water from the reservoir.

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 Q To your knowledge, did you hear Mr. McCoy's
2 estimate of what the DRBC projects with respect to future
3 increases in depletive uses of the basin?

4 A (WITNESS PHILLIPPE) I don't believe I was
5 present when he made that statement, but certainly, more
6 and more demands are placed on the river, and until we
7 learn how to conserve our water, we are going to have
8 problems with demands for water from the river.

9 One of the things we don't like is consumptive
10 uses. If we could use the water in a non-consumptive
11 fashion, in a riparian user's fashion, if we will. In
12 the East we have a riparian water law, and the idea is
13 that a user takes water out of the stream, uses it and
14 puts it back in, so that downstream users have the
15 benefit of that water. So consumptive water users mean
16 that in the riparian fashion, someone extracts water
17 from the river and never puts it back in, depriving the
18 downstream users of the use of that water.

19 Q So that -- does the Delaware River Basin
20 Commission's ability to maintain future flows depend on
21 other factors besides the increase in storage, if any?

22 A (WITNESS PHILLIPPE) Yes, it does depend upon
23 some of those other factors.

24 Q When I say storage I mean storage capabilities.

25 A (WITNESS PHILLIPPE) Storage capability. It

1 depends upon consumptive uses and it depends upon the
2 weather patterns.

3 Q Now specifically, in recent history -- I ask
4 you if you have with you the USGS Trenton flow data for
5 August, September and October 1980, and I will ask you
6 whether there were -- first of all, what was the average
7 flow, the average of the mean flows for the month of
8 September 1980 at Trenton?

9 A (WITNESS PHILLIPPE) All right. The average of
10 the means for Trenton in September from the provisional
11 data -- and I believe that has since been superseded,
12 and that this data is published, but what I have as
13 average of the means is 2974 cfs.

14 Q And what was the mean flow on September 30,
15 1980?

16 A (WITNESS PHILLIPPE) The mean flow on September
17 30 was 2690.

18 Q And on -- well, were there a number of days in
19 September 1980 where the flow was below 3000 cfs?

20 A (WITNESS PHILLIPPE) Yes, sir. On the sheet
21 that I have, all those days are asterisked, and they
22 constitute better than half the month.

23 Q And that indicates that that is an undesirable
24 condition?

25 A (WITNESS PHILLIPPE) Yes, sir. They have

1 flagged that as being an undesirable condition.

2 Q Now, in August 1980 were there a significant
3 number of days on which the flow was below 3000 cfs?

4 The mean flow at Trenton?

5 A (WITNESS PHILLIPPE) Yes, sir. About a third
6 of the month was below 3000 cfs at Trenton.

7 Q And on August 23rd, what was the flow?

8 A (WITNESS PHILLIPPE) On the provisional data,
9 the flow on August 23rd was 2580, and the day before,
10 2550.

11 Q And in October 1980 were there a significant
12 number of days on which the flow was less than 3000 cfs?

13 A (WITNESS PHILLIPPE) Yes, sir. Nine days out
14 of that month.

15 Q So what does that indicate with respect to the
16 Delaware River Basin Commission's ability to maintain
17 3000 cfs at Trenton with the new storage that has come
18 on since 1964?

19 A (WITNESS PHILLIPPE) If they are able to
20 maintain it, they have not been able to do it on a
21 day-to-day basis.

22 JUDGE BRENNER: Mr. Sugarman, I'm sorry, I
23 thought you had finished your answer.

24 WITNESS PHILLIPPE: I might also add that
25 there were very significant releases from the reservoirs

1 on those days.

2 BY MR. SUGARMAN (Resuming):

3 Q In other words, that they were trying to --

4 A (WITNESS PHILLIPPE) They were trying to
5 maintain it, yes, sir.

6 JUDGE BRENNER: You are within five minutes.

7 JUDGE MORRIS: Were any of those days less
8 than 2500?

9 WITNESS PHILLIPPE: The lowest day in the
10 month of October appears to be 2630; in September the
11 lowest day was 2660, and in August, the lowest day was
12 2550. And then again, you want to factor in the fact
13 that that is plus or minus 5 percent on those days, and
14 that is based upon the provisional data, and I don't
15 have the published data, so that is subject to some
16 revision.

17 BY MR. SUGARMAN (Resuming):

18 Q And in August 1981, were they, again, below
19 3000 cfs on some number of days?

20 A (WITNESS PHILLIPPE) Yes, sir. They were just
21 under 3000 cfs.

22 Q And was 1981 a high water year, or a good
23 water year?

24 A (WITNESS PHILLIPPE) I would think that
25 basically, 1981 was one of the wetter years.

1 Q And going back to January 1981, that was when
2 the flow of 1900 was measured; is that correct?

3 A (WITNESS PHILLIPPE) Yes. My provisional data
4 goes down to 2050, but it has been published elsewhere
5 as 1900.

6 JUDGE BRENNER: At other than Mr. McCoy's
7 table?

8 WITNESS PHILLIPPE: Yes, sir.

9 JUDGE BRENNER: When you said published
10 elsewhere, did you mean his table?

11 WITNESS PHILLIPPE: Yes, sir.

12 JUDGE BRENNER: Your look at the official
13 records didn't show a 1900?

14 WITNESS PHILLIPPE: The provisional records I
15 have show 2050, so I don't know if his numbers would
16 supersede these numbers or not. However, in January of
17 1981, there were almost half the days were below 2500
18 cfs.

19 BY MR. SUGARMAN (Resuming):

20 Q And in July -- well, strike that.

21 I think we've gone through enough. Based upon
22 your experience with rivers and river basins, Mr.
23 Phillippe, would you feel confident in planning a system
24 that would depend for a significant amount of its impact
25 on the flows never dropping below the 2500 cfs measured

1 at Trenton in the Delaware River Basin, or 2500 cfs at
2 Point Pleasant?

3 A (WITNESS PHILLIPPE) Well, I would say that
4 depending upon flows not going less than 2500 cfs would
5 be very marginal.

6 Q Now in addition to that, you testified
7 yesterday that you feel that low flow conditions occur
8 at flows less than 6000 cfs at Point Pleasant. And by
9 that phrase, now having heard your testimony and your
10 cross examination and your redirect, can you summarize
11 why it is that flows at less than 6000 cfs are low flow
12 conditions, in terms of impacts on the intake and at the
13 intake?

14 A (WITNESS PHILLIPPE) At apparently flows under
15 6000 cfs, the one flow that I had that is in the range
16 of 6000 cfs occurred during the time Mr. Golub made his
17 survey where he showed the eddy starting to be washing
18 out or pushed downriver by flows just apparently
19 over-topping portions of the bar. So some flows
20 somewhere less than that, maybe 5500, maybe 5000 on down
21 to whatever the minimum flows we might expect at Point
22 Pleasant, will be creating an eddy.

23 In other words, these are the flows in which
24 the eddy exists. At flows above 6000 cfs, particularly
25 flows 8000 or 10,000 cfs, the eddy, I'm reasonably sure,

1 is washed out and the river behaves more like a normal
2 river, cross-sections. But under the 6000 cfs, then the
3 eddy starts to form.

4 JUDGE BRENNER: Mr. Sugarman, you are over the
5 time.

6 MR. SUGARMAN: Thank you. That's all I have.

7 BOARD EXAMINATION

8 BY JUDGE COLE:

9 Q I will try to be brief, Mr. Phillippe. You
10 talk a lot about the intake. What are your principal
11 concerns as a professional engineer? What are your
12 principal concerns with the current design of the
13 intake? I know yesterday you mentioned the ability to
14 withstand the damage from ice. Is that your principal
15 concern or are there others?

16 A (WITNESS PHILLIPPE) Well, there are a number
17 of concerns that relate to the intake. There are
18 concerns whether the intake is a good idea to begin
19 with, which I won't address. There are concerns about
20 where relative -- if there is an intake, where would the
21 best place to have the intake proper be within the Point
22 Pleasant area, which I believe I did address, and I
23 think that Section 22 or somewhere in that vicinity
24 would be the best place to have an intake, for the other
25 considerations that I would be concerned with.

1 As an engineer, I would be concerned with
2 operation of the intake with ice and debris, and those
3 kinds of things that would tend to up my operational
4 costs. For the owner of the intake that would be a
5 concern. For biological considerations, I would want to
6 -- from the testimony of the biologists, I would want to
7 situate the intake such that I had confidence concerning
8 what the streamlines of flow past the intake were. And
9 that the streamlines and the intake were so aligned that
10 the bypass velocities truly were bypass velocities, and
11 that the intake structure itself would do what it is
12 purported to do.

13 I think that pretty well summarizes my
14 concerns.

15 Q All right, sir. With respect to bypass
16 velocity and the orientation of the screen with respect
17 to the currents, do you have any knowledge of the
18 consequences with respect to any ichthyoplankton or
19 other biological life forms in the stream, any
20 implications of not having it directly oriented with the
21 current? Do you have any knowledge of that, sir? I
22 mean, what if it was perpendicular to the current; do
23 you have any knowledge of what the difference would be
24 with respect to biological impact?

25 A (WITNESS PHILLIPPE) If the intakes were

1 perpendicular to the flow, then again, streamlines would
2 tend to form around them. There would be a zone of
3 impact upfront and there would be some eddy behind. If
4 it were aligned longitudinal to the flow and if it were
5 the proper longitudinal line to the flow, one might
6 expect streamlines to develop that would assist whatever
7 biotic organisms there were to flow by. If at some
8 place inbetween them, the tendency might be to break
9 through that streamlining capability. If, in fact,
10 there are streamlines anymore and there are not eddies
11 behind it to break through those streamlines and perhaps
12 be caught under the streamlines and bounce along the
13 intake, grading itself.

14 In other words, an organism might get in there
15 and become trapped in that boundary layer, and then be
16 subjected to higher biological damage. I don't know,
17 I'm not a biologist and I can only go by the biologists'
18 testimony with respect to how the organism behaves. But
19 certainly, if one had a particle that got in there and
20 got trapped it would bounce along.

21 Q All right, sir. Mr. Phillippe, you are
22 familiar with the location of the intake with respect to
23 the cross section of the river and the design at the
24 intake with respect to distance from the bottom, and at
25 least the distance from the top at a known flow

1 elevation. Is that correct, sir? Is it safe to say you
2 know that?

3 A (WITNESS PHILLIPPE) Yes, sir, I know the
4 general shape of what is proposed; that the bottom
5 should be about three foot off the bottom and the top
6 should be approximately four feet down, give or take
7 some.

8 Q All right, sir. I believe you stated that one
9 of your concerns was damage due to ice, moving ice,
10 during the wintertime. Is that correct?

11 A (WITNESS PHILLIPPE) Yes, sir.

12 Q Do you have any knowledge of the behavior of
13 ice on the Delaware River, and water elevations during
14 such times as ice flows and ice thicknesses such as
15 might impact on structures beneath the surface?

16 A (WITNESS PHILLIPPE) A little bit in a very
17 general sort of way. I know, for instance, that there
18 have been ice dams formed on the Delaware River that
19 have backed up flows and affected flow ratings at
20 Trenton, particularly in January of 1981 there were
21 such, and I'm sure in other years there have been.

22 One of the things that occurs is that ice
23 would tend to break up in the channel. If we had
24 protracted low flow events, which we typically have in
25 December, January and February before the spring thaws,

1 later in February, March and April we have a situation
2 where there is less water in the river, and with colder
3 temperatures the ice would tend to freeze thicker and
4 then be subjected to rising flows from whatever
5 rainfall. And brief thaws might occur during that
6 period because there is a warming and cooling up and
7 down the river. In other words, it would be cold enough
8 to freeze several feet thick and then warm up and thaw
9 and cause some runoff which would then tend to break the
10 ice up.

11 The pattern might be, particularly at this
12 intake location since it is just downstream from a
13 riffle, for that ice to break up and slide down in under
14 the ice a little bit further downstream than the deeper
15 water and start to form an ice dam at that point. The
16 tendency then would be for the main channel, as the
17 flows rise, to try to push that ice aside, and the
18 location of this intake, then, on the side of the
19 channel then would subject it to ice damage.

20 Observers of ice on the river, Mr. McNutt
21 being one, have observed large blocks of ice upended on
22 the river with the observation that they appear to be
23 dragging bottom. And that is not at all unbelievable,
24 given the size of fairly thick ice, that it could upend
25 and drag bottom. And those things could happen.

1 Q Up in the riffle area, do you have any
2 knowledge of the bathymetry in the area of the riffle?

3 A (WITNESS PHILLIPPE) The only knowledge I have
4 is the one cross-section from the Corps survey at river
5 mile or Section 22.56. And I do know that that is
6 shallower and narrower than downstream cross-sections.

7 Q All right, sir. Do you have any knowledge of
8 what the thickness of the ice might be in a riffle area,
9 in a relatively shallow water area? How thick the ice
10 might be up there, as compared to deeper water? Would
11 it be thinner or thicker?

12 A (WITNESS PHILLIPPE) I would expect it to be
13 thinner because there's more energy trying to break up
14 the ice before it frees.

15 Q Is it this ice that you say might tend to
16 slide under the ice?

17 A (WITNESS PHILLIPPE) That or other ice that is
18 broken up from upstream and washed down.

19 Q So then it becomes a structural problem with
20 respect to how far that will push under before there is
21 enough under there with an upward thrust to break the
22 ice layer? Do you foresee that problem, sir?

23 A (WITNESS PHILLIPPE) I see that as sort of a
24 structural type problem. I would be concerned -- I am a
25 utility billpayer myself and a taxpayer.

1 Q Aren't we all?

2 A (WITNESS PHILLIPPE) And I would be very
3 concerned about the O&M that goes into repairing damages
4 of this sort, particularly if I could find a better
5 location in the particular area where I would expect
6 that ice to have long since been broken up before it got
7 to my intake structure.

8 Q On page 2 of your testimony of September 20,
9 1982, question number two, in response to a question you
10 indicate that -- you state that you analyzed flow
11 records at Trenton for the period 1963 to 1979.

12 A (WITNESS PHILLIPPE) Yes, sir.

13 Q Could you tell me how you happened to pick
14 that particular range of 17 years, sir?

15 A (WITNESS PHILLIPPE) Well, there were a couple
16 of things I was trying to do at the same time. I wanted
17 10 years of record at least. I can't do a log Pearson
18 distribution without at least 10 years of record. And
19 I'm using canned USGS procedures, by the way, to do that.

20 I also was trying at the same time to look at
21 the gauge at Riegelsville. My earlier letter looked at
22 Riegelsville. At that time, there was a gauge at
23 Riegelsville which was the best gauge upstream from the
24 Point Pleasant site, and there was a gauge at Trenton
25 which was the best downstream gauge, and Point Pleasant

1 was approximately halfway inbetween, so I wanted at that
2 time to look at what was happening at Riegelsville, and
3 what was happening at Trenton.

4 The applicant, of course, has done a drainage
5 area comparison, and I think that is a very good thing.
6 I did not do that at that time, so I was trying to look
7 at those two gauges, and I was trying to look at them
8 with similar periods. And by picking the period 63 to
9 79, there was a period of about 10 years that overlapped
10 between Riegelsville and also overlapped at Trenton. So
11 that is why I picked that particular period of time.

12 Q All right, sir. Was 63 a particularly dry
13 year?

14 A (WITNESS PHILLIPPE) It turns out that 63 --
15 well, just a minute.

16 Q I know there were a couple of years following
17 that that were quite dry.

18 A (WITNESS PHILLIPPE) I'm not sure that 63 was
19 particularly dry. The drought of 66, of course, was the
20 most intense drought of record. However, one in 1915
21 was almost as intense.

22 Q All right, sir. Could you generally
23 characterize the sixties as generally years of low flow?

24 A (WITNESS PHILLIPPE) Yes, sir. The sixties
25 tended to be dry. We had our problems in Washington,

1 D.C. on the Potomac in 66, and yes, in the northeast the
2 sixties were dry and the seventies were wet.

3 Q All right, sir. If you are going to take data
4 and analyze it for low flows, wouldn't a relatively
5 large period of low flows dominate that data?

6 A (WITNESS PHILLIPPE) At the same time, the
7 flows in the seventies were among the highest flows of
8 record, so that one compensated for the other.

9 Q All right, sir. On page 3, you present the
10 results of your log Pearson Title III analysis of the 17
11 years of record. Do you not, sir?

12 A (WITNESS PHILLIPPE) No, sir. The 17 years of
13 record were presented in my letter to Del-Aware on May
14 10th.

15 Q I misspoke. I'm looking at the flow record
16 1913 to 1979, so this is your 66 years of record
17 assessment?

18 A (WITNESS PHILLIPPE) Yes, sir. That was what
19 was available to me.

20 Q All right, sir. Did you prepare a similar
21 chart for the 17 years of record for direct comparison
22 with this historical record? Or the extended historical
23 record?

24 A (WITNESS PHILLIPPE) Yes, sir. In my letter to
25 Del-Aware of May 10th there was a similar comparison.

1 Q I don't have that letter, sir. I don't think
2 so. I haven't seen it.

3 A (WITNESS PHILLIPPE) I don't believe it was
4 admitted because basically, the letter was written to
5 Del-Aware outlining several issues at that brief time
6 that I had identified as being, I thought, issues with
7 respect to the intake at Point Pleasant.

8 I have been educated throughout the summer as
9 to what the issues are, but I do have a table here and I
10 would be glad to supply it to you.

11 Q Generally, how did they compare, sir? You've
12 made statements concerning the comparison. How does the
13 short-term record compare to the longer term in the one,
14 three and seven-day low flow records, for example?

15 A (WITNESS PHILLIPPE) The shorter period of
16 record actually gave higher values in every instance.
17 Let me just cite for instances. The one-day low flow on
18 the 17-year record was 2635.

19 Q For what time period, sir?

20 A (WITNESS PHILLIPPE) For the 17 years from 63
21 through 79.

22 Q Well, I'm looking here at a two-year return
23 period, a five-year and a ten-year period period.

24 A (WITNESS PHILLIPPE) Yes, sir. For the
25 two-year return period, 2635 as opposed to the longer

1 period of record, 2184.

2 Q All right, sir.

3 A (WITNESS PHILLIPPE) And I can give you some of
4 the values.

5 Q I think that's fine. That gives me a feel for
6 the comparison.

7 A (WITNESS PHILLIPPE) Yes, sir.

8 Q Now, in question six and seven on page 4,
9 particularly question 7 where they ask you to provide
10 similar monthly estimates of low flows of less than 2500
11 cfs to 2000 cfs, you respond using the same partitioning
12 screen for historic published daily flows at the Trenton
13 daily gauge. The following estimates are provided --
14 and then on the next page you provide the estimates for
15 flows of 2550 and 2000 cfs.

16 A (WITNESS PHILLIPPE) Less than 2000 cfs.

17 Q Less than 2550 and less than 2000 cfs?

18 A (WITNESS PHILLIPPE) Yes, sir.

19 Q Is that also based upon the 17 years? My
20 confusion there was you state historic published daily
21 flow records. Is that based upon the 67 years?

22 A (WITNESS PHILLIPPE) Yes, the 67 years of
23 record.

24 Q But in question six this is based on the 17
25 years, or based upon -- ?

1 A (WITNESS PHILLIPPE) No. Question six is also
2 based upon the entire period of record between 1913 and
3 1979. You see, sir, I have been criticized that I have
4 been biased against the project by picking these dry
5 years in the sixties, and it turned out that instead of
6 being biased against the project I had been biased
7 toward the project, and my integrity had been impuned.
8 So I used the entire period of record.

9 Q All right, sir. I understand that, sir, but
10 in comparing those I have no direct comparison other
11 than the one figure you gave me that demonstrates that
12 there is a lot of difference, because here you've got
13 the percent of flow is less than 3050, less than 2550
14 and less than 2000, all based upon the 67 years of
15 data. And what you have for the 17 -- well, I don't see
16 any data for the 17 years to compare with other than the
17 one figure you gave me.

18 A (WITNESS PHILLIPPE) Yes, sir. In my letter of
19 May 10th I also provided a comparison by month.

20 MR. SUGARMAN: If I may interrupt, I have no
21 objection to providing all of those tables.

22 WITNESS PHILLIPPE: And it turned out that I
23 had one of the people on my staff prepare the
24 partitioning of the data, so that is why I was very
25 sensitive on the second set to have it clearly

1 partitioned. We partitioned to the nearest 500, so he
2 went up to 3450 rather than keeping close to the 3000 on
3 the previous table and the chart. And I discovered that
4 after it came out and I went through the programming of
5 how he came up with it.

6 But if you will, I've prepared a chart as
7 Exhibit 3 in my letter of May 10th to Del-Aware, showing
8 flows less than 3000 cfs, which in turn turned out to be
9 less than 3500. So I want to make that clear.

10 But in June, I showed approximately 15 percent
11 of the flows less than 3500, if you will, at Trenton.
12 In July, the flows were just a shade under 30 percent.
13 In August, the flows were a little over 30 percent, less
14 than 3500. In September with the 17 years of record,
15 the flows were close to 37 percent, and in October the
16 flows were closer to 30 percent again, less than 3500
17 cfs.

18 BY JUDGE COLE (Resuming):

19 Q So what you're telling me, sir, is that in
20 each of the instances where you compared the 17 years of
21 record with the longer-term record, that the shorter
22 period of record indicated larger flows than would be
23 indicated by the historical data, going to all of the
24 historical data?

25 A (WITNESS PHILLIPPE) Yes, sir.

1 Q All right, thank you. On page 2 of your
2 supplemental statement, sir, I guess I missed it
3 yesterday when you were asked questions about using 6000
4 cfs as a low flow. What was your basis for identifying
5 that 6000 cfs and below as among low flows?

6 A (WITNESS PHILLIPPE) Well, my basis really was
7 looking at the date that Mr. Golub did his survey where
8 he showed the eddy starting to wash out on his chart.
9 And I went back to the flow records and found them to be
10 in the range of 6000 cfs at Trenton. So that is why I
11 said that at flows under 6000 cfs, give or take a little
12 bit, I expect basically that eddy to develop.

13 Q All right, sir, thank you. On page 4 of that
14 supplemental testimony, the section that was discussed
15 before you actually started testifying, the last
16 sentence in the paragraph that ends a little less than
17 halfway down the page, "It should also be noted the
18 rising river stages probably are the assisting mechanism
19 for adding aquatic biota to the eddy."

20 A (WITNESS PHILLIPPE) Yes, sir.

21 Q "And falling levels encourage out-migration."

22 A (WITNESS PHILLIPPE) Yes, sir.

23 Q Is that statement based upon the fact that
24 since water moves into the area and does, in fact,
25 contain, for whatever reason, aquatic biota, that is a

1 de facto movement in the area of aquatic biota? And as
2 the water level drops water moves out and whatever is in
3 it will move out with it?

4 A (WITNESS PHILLIPPE) That is essentially what I
5 was saying.

6 Q All right, sir, thank you. Now on page 6 of
7 your supplemental testimony with respect to the travel
8 time to Trenton --

9 A (WITNESS PHILLIPPE) Yes, sir.

10 Q Do you have any knowledge of how these time of
11 travel studies were conducted?

12 A (WITNESS PHILLIPPE) Yes. They used, I
13 believe, Rhodamine D dye. It was a dye study.

14 Q Is it an instantaneous slug of dye, and do
15 they measure the mean or modal time of appearance of the
16 dye at some distance downstream, and then use that as
17 the time? Or what do they do, sir?

18 A (WITNESS PHILLIPPE) Yes, sir, they measure
19 both the time it takes the leading edge, which should
20 follow the main channel. Plus, they measure the time to
21 peak and the time to peak should represent closer the
22 time that the whole body of water moves from one place
23 to the other. Assuming they put a big enough slug of
24 Rhodamine dye in, that they could detect that in the
25 monitoring equipment downstream.

1 Also, the time that the leading edge appears
2 is useful to the field crews in tipping them off that
3 they had better watch their instruments closely to catch
4 the peak concentration. There are some discussions as
5 to whether the peak is the exact point or whether one
6 should go through and draw up the whole hydrograph, if
7 you will, of the dye and find the centroid and measure
8 from centroid to centroid. But the time to peak is a
9 fairly good indication of overall times of travel.

10 Q All right, sir, so the time that they report
11 is, in fact, the peak?

12 A (WITNESS PHILLIPPE) They reported both in the
13 time of travel studies, and I have both curves.

14 Q But what is your time here when you say at
15 3500 to 3000 cfs range, it was observed to be
16 approximately 22 hours.

17 A (WITNESS PHILLIPPE) That was the time to peak.

18 Q All right, sir, thank you. At the bottom of
19 that page you referred to time of travel of
20 approximately 12 hours between Nockamickson and
21 Trenton. Where is Nockamickson, sir?

22 A (WITNESS PHILLIPPE) Nockamickson is on the
23 Tohicken Creek. It is upstream on the Tohicken Creek.

24 Q You've referred to the hydraulic control point
25 for Point Pleasant as being -- or the hydraulic

1 evelation at Point Pleasant at least being heavily
2 impacted by the weir dam at Lumberville.

3 A (WITNESS PHILLIPPE) Yes, sir.

4 Q And you have attempted the beginnings of a
5 preparation of a rating curve?

6 A (WITNESS PHILLIPPE) Yes, sir. I have
7 developed somewhat of a rating curve based upon my
8 observations, but my observations are not tempered with
9 actual measurements of cross-sections of the dams and
10 that kind of thing. And I have some questions as to
11 whether the weir acts as a weir. There is a long outlet
12 from it, or whether it acts as a chute in part, and
13 there are some complications there and I only have about
14 two or three datapoints to reference.

15 However, if I try to develop a rating curve, I
16 have gotten a good first cut at some coefficients that
17 seem to fit. And it certainly does describe the hump in
18 the data that I see at 3000 cfs level.

19 Q At approximately the 3000 cfs level, part of
20 the contention in this case is the impact of withdrawal
21 at Point Pleasant, and one of the impacts is a drawdown
22 of the water elevation in that area. With your
23 knowledge of hydraulic control points and of flow over
24 weirs and impacts of the differences in elevation with
25 various flows over weirs, and being able to reflect that

1 back upstream, have you made any calculations to assess
2 the impact of a withdrawal of about 150 cfs at Point
3 Pleasant? The impact on water surface elevation at
4 Point Pleasant when the flow is about 3000 cfs?

5 A (WITNESS PHILLIPPE) At Point Pleasant,
6 basically what we are drawing is water from a large pool
7 and a large volume backed up by the Lumberville Dam. So
8 consequently, I would expect to see very little change
9 in water surface elevation at Point Pleasant. I haven't
10 made calculations but I wouldn't expect to see much
11 change in surface elevations at Point Pleasant.

12 If you will, it is sort of like when you have
13 a bathtub that's full and you pull the stopper and a lot
14 of water is going out but you don't see the effects
15 until you get down to the bottom. You know, the bottom
16 layers of water going out, and then it rushes to the
17 sink.

18 Q Would you think there would be much difference
19 if we considered 2500 cfs as the flow passing the
20 Lumberville Dam? In other words, taking out 150 cfs at
21 Point Pleasant?

22 A (WITNESS PHILLIPPE) Again, we would be taking
23 it out of a large volume behind the dam, so I would not
24 expect to see a great water reduction. However, if we
25 were taking it out for a prolonged period --

1 Q I'm sorry, sir, I must have misstated the
2 question. I'm talking about a continuous withdrawal
3 assuming a uniform flow downstream; uniform flow going
4 over the weir at Lumberville, and then I take out 150
5 cfs, and at sometime later when equilibrium is
6 established what will be the difference in elevation
7 before and after I take out the 2500 cfs?

8 A (WITNESS PHILLIPPE) The 150 cfs at 2500 I
9 would expect not to see much change in elevation given
10 that the inflow matches the outflow downstream. I would
11 expect that elevation at Point Pleasant to remain within
12 very narrow limits.

13 Q How would you calculate that, sir? How would
14 you calculate that?

15 A (WITNESS PHILLIPPE) I don't know, I haven't
16 given it any thought, and I would prefer not to respond
17 at this point.

18 Q Would one way to do it be to determine what
19 the difference would be in flow over the weir at these
20 two different flows, and then reflect those elevations
21 back? Would that be the way you would do it
22 hydraulically?

23 A (WITNESS PHILLIPPE) Yes, sir. As far as what
24 the elevation would be at 2500 and what it would be at
25 3000, yes, sir. And I would expect that elevation to be

1 pretty close to what the elevation would be at Point
2 Pleasant. I get the drift of your question now.

3 Q Do you have any idea of the magnitude of the
4 change considering that? Are we talking about a tenth
5 of an inch, or are we talking about a foot and a half?

6 (Pause.)

7 You could get it from the rating curve if it
8 was drawn accurately, could you not, sir?

9 A (WITNESS PHILLIPPE) Yes, sir. I would think
10 that the order of elevation difference between 2500 cfs
11 and 3000 cfs would be in the range of about three-tenths
12 of a foot.

13 Q All right, sir. As the flow decreases, what
14 happens to the relative impact elevation-wise at Point
15 Pleasant, considering your rating curve, of course.

16 A (WITNESS PHILLIPPE) As the flow decreases, the
17 elevation at Point Pleasant goes down. It is lower.

18 Q And it goes lower at an increasing rate or
19 decreasing rate as flows decrease.

20 (Pause.)

21 Let me change that question, sir. If I have
22 3500 cfs and I'm going to take out 150 cfs, I get a
23 certain magnitude of change. Let's just say an inch and
24 a half or an inch. Let's say an inch. Now I'm down to
25 2000 cfs and I'm going to take out 150 cfs. What change

1 would that create at Point Pleasant? Would it be
2 considerably more than an inch or about an inch or less
3 than an inch?

4 A (WITNESS PHILLIPPE) Let me rephrase it, if I
5 could, since I have a scale here I can refer to.

6 Q All right, sir.

7 A (WITNESS PHILLIPPE) If I went from 3000 cfs to
8 2500 cfs, I would see a change on the order of
9 three-tenths of a foot. If I went from 2000 cfs to 1500
10 cfs, I would see a change on the order of half a foot.

11 Q All right, sir, thank you.

12 BY JUDGE BRENNER:

13 Q What was your first change before you had that
14 half a foot change?

15 A (WITNESS PHILLIPPE) Three-tenths, from
16 approximately 3000 to 2500, and about half a foot from
17 2000 to 1500.

18 BY JUDGE COLE (Resuming):

19 Q That is for withdrawals of 500 cfs, just for
20 the purposes of demonstration?

21 A (WITNESS PHILLIPPE) Yes, sir.

22 JUDGE COLE: That's all I have, thank you.

23 JUDGE BRENNER: The Board has more questions
24 but we're going to take a break now and then come back
25 with our questions. So we will break until 10:35.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

(A short recess was taken.)

1 JUDGE BRENNER: We are back on the record.
2 Judge Morris has some questions at this point.

3 BY JUDGE MORRIS:

4 Q I have to start with a little confession. I
5 think I may be the only physicist in the room, and to me
6 velocity is a vector, which means that it has a
7 magnitude and a direction in three dimensions. So the
8 use we have been making of it is perfectly intelligible
9 I think in most cases, but it may be a little fuzzy at
10 times. So I think we need to be a little careful about
11 how we use the term.

12 With that introduction, Mr. Phillippe, I
13 wanted to ask whether you had checked the numbers which
14 the applicant has used for the speed of the water going
15 into the intake as a function of pump operation.

16 A (WITNESS PHILLIPPE) Do you mean with respect
17 to certain radii away from the intake?

18 Q That, too, yes.

19 A (WITNESS PHILLIPPE) I have not specifically
20 checked that. I did check the through-slot velocities
21 which, with a perfectly clean screen, all things being
22 equal, given the numbers that he represented, should be
23 on the order of about 35-hundredths of a foot per
24 second. That is not to say what happens when you clog
25 the screens; that it would get much higher than that.

1 But I did not try to go various radii away from the
2 screens.

3 Q If you were to have a well-financed program
4 for measuring velocities of the currents in the river at
5 Point Pleasant, what program would you recommend?

6 A (WITNESS PHILLIPPE) The flow ranges that I
7 would be interested in would be up to 6000 cfs or 5500,
8 as Mr. Boyer indicated. He thought the eddy formed at
9 under 5500 in his Norristown testimony. So up to that
10 flow range. I would like to see various transects
11 established upstream and downstream of the proposed
12 intake; sufficiently upstream to see what the currents
13 and velocities would be.

14 Actually, I'm concerned, as you indicated,
15 with the velocity vector; how that relates on these
16 various transect points upstream and downstream, and I
17 would think that I would want to go several hundred feet
18 upstream with maybe 100-foot transects with maybe
19 100-foot stationing, and making somewhat of a finer grid
20 immediately in the vicinity of what I expected my intake
21 to be. In other words, having that finely-tuned
22 measurement.

23 What I would want to do is to conduct such a
24 survey at various increments within that flow range up
25 to 6000 cfs. I would like to see the high range, the

1 6000 cfs. I would very much want to see good detail in
2 the 2500 to 3000 cfs range. And if I were so fortunate
3 as to get a flow event of less than 2500, I would want
4 to be able to jump on that opportunity.

5 However, if I could ascertain that I knew what
6 my flows were, part of the effort I think would be to
7 establish what the hydraulics are so that I knew exactly
8 what the flows were coming through the Point Pleasant
9 area. I would want to coordinate those flows and river
10 elevations with the velocity measurements that I made.

11 Q If you were confined to a fairly short time
12 period, say a year, and were not so fortunate as to get
13 flows substantially below 2500, would the program that
14 you suggest allow you to extrapolate with some
15 confidence?

16 A (WITNESS PHILLIPPE) If I had enough transsects
17 around so that I could have a clear trend with the
18 various flow ranges, I could establish that there was a
19 clear trend, I had confidence with respect to my
20 positioning and I had confidence with respect to the
21 direction of the velocity measurements, I think, yes, we
22 could make a reasonable extrapolation down to the lower
23 flow ranges.

24 Q Well continuing in this low flow region, what
25 do you think the effect of the elevation at the

1 Lumberville Dam would have on the distribution of
2 currents at the Point Pleasant area? Would that change
3 significantly, say, from 2500 to 3000 cfs, the pattern
4 of currents?

5 A (WITNESS PHILLIPPE) I think one of the things
6 that the Lumberville Dam does for us, it creates a pool
7 of water in which the momentum of flows entering the
8 Lumberville pool is dissipated in. And if I had a
9 lesser volume of water I would expect -- and a high flow
10 that would enter -- I would expect a very substantial
11 current.

12 You see, one of the things we're saying is
13 that we have a steady state and what we have is the
14 groundwater flow situation under low flow conditions, on
15 which is superimposed runoff event from thunderstorms
16 and what have you. So that we can have a relatively
17 high volume of flow entering the Lumberville pool with a
18 relatively low volume of water to absorb that.

19 And as we have seen -- I guess, Judge Cole's
20 probing questions demonstrated that in the 3000 feet per
21 second, or cubic feet per second range anyway, that
22 there is a smaller increase in surface elevation with an
23 equal amount of flow than there is at the lower volumes,
24 which is what we might expect as we drop down, given the
25 general configuration of the river. The volume drops

1 faster than -- just the geometry of it causes that to
2 change faster.

3 Q Do you have any information on flows in the
4 Tohicken or the other creek?

5 A (WITNESS PHILLIPPE) The Hickory Creek?

6 Q The Hickory Creek at times when, say, the
7 Delaware is 3000 cfs and there is a rainstorm or
8 something of that kind?

9 A (WITNESS PHILLIPPE) No, sir, I don't. But
10 that could be a rainstorm on the Lehigh or somewhere
11 else upstream as well that causes a rapid rise in that
12 water surface over and above a flow. So I'm not
13 limiting it to flows that would increase in the
14 Tohicken. It might be other drainages that enter above
15 the Point Pleasant site that give a rapid rise to the
16 hydrograph at Point Pleasant.

17 Q I was more interested in possible changes in
18 the direction of currents in the river from the streams
19 entering from the side.

20 A (WITNESS PHILLIPPE) Yes, sir. I don't have
21 any information on the flows in Tohicken Creek. I do
22 know that Tohicken Creek is regulated by the
23 Nockamickson Reservoir, and when the reservoir releases
24 are made, if they are made for low flow augmentation,
25 there would be a considerable perhaps predictable

1 release from it. But I don't know what those releases
2 are and what the history of them is.

3 Q I think you mentioned that you thought that
4 the intake structure was on the side of the channel, or
5 the edge of the channel.

6 Q Yes, sir.

7 Q And I think just reading the cold record, one
8 wouldn't know how far up the slope that would be, and I
9 was wondering if you meant that you thought of the
10 channel as sort of a U-shape with a fairly flat bottom.
11 If it would be near the bottom or well up on the side.

12 A (WITNESS PHILLIPPE) Yes, sir. One of the
13 things I did from the Policastro exhibit was I made
14 cross-sections across the stream upstream and downstream
15 from the intake structure. And I have plotted a figure
16 which is a super-position of the various cross-sections
17 500 feet up, and I had to extrapolate a little bit to
18 get 500 by taking those contour lines in the direction
19 they were going. I made one for 500 feet up, 400, 300,
20 200 and 100 feet and at the intake site itself. And
21 this figure shows the regression of the bar down to the
22 intake.

23 And if one were to look at this figure with a
24 line showing where the intake is, you would see that
25 looking upstream perpendicular to the intake, this is

1 the valley that one would see. And you would see that
2 the intake is, in fact, on the edge of that channel.

3 Q Well, where is it for a transect that goes
4 right through the center of the intake structure?

5 A (WITNESS PHILLIPPE) Right through the intake
6 structure it becomes -- then the channel starts to
7 straighten out and becomes like a channel on
8 downstream. And so it is closer to the middle of that
9 particular channel. But the flow patterns that have
10 been demonstrated by the measurements that were made by
11 Mr. Harmon indicate that this is, in fact, the way the
12 channel operates.

13 If you will, you will notice the peak
14 velocities occur out much further from the intake
15 structure, and I think clearly demonstrates the fact
16 that the flows are concentrated in this channel that is
17 shaded from the eddy, or the bar shades the eddy and
18 concentrates the flow into this channel. And the intake
19 is on the edge of this, as if it were a real channel or
20 a quasi-channel.

21 Q If we take the axis of the array at the
22 location of the array, --

23 A (WITNESS PHILLIPPE) Yes, sir.

24 Q Is it roughly -- well, what fraction of the
25 way up is it from the bottom to the surface?

1 A (WITNESS PHILLIPPE) Well, the center of the
2 array is approximately --

3 Q From the bottom of the channel to the
4 surface. Do you understand what I'm trying to do? Let
5 me put it in numbers. Supposing that the deepest part
6 of the channel at that location at the extension of the
7 intake mains is minus 12 feet from the surface, and the
8 location of the axis, the main axis of the array, is
9 displaced from that so that the bottom is no longer
10 minus 12 at that point but something higher.

11 A (WITNESS PHILLIPPE) Yes, sir, like minus 10.

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 Q So it is maybe 2 feet out of 12?

2 A (WITNESS PHILLIPPE) Yes, sir.

3 Q This is at the extension of the transmission
4 mains?

5 A (WITNESS PHILLIPPE) Actually, sir, on the
6 transect that the array, the intake line is. The
7 bottom, the minimum point is almost at the base of the
8 array. In other words, it's only slightly deeper for
9 the route. However, immediately upstream and somewhat
10 diagonal to the intake there is a 2-foot hole, if you
11 will, deeper; so the front edge of the array is just
12 downstream from a deeper hole.

13 I would be willing to make this figure
14 available if you would like.

15 Q Well, fortunately I can see it from here.

16 If we were to look at the eddy at flows where
17 it exists below say 5000 CFS, and if I can idealize it
18 for a moment and say it flows in a circle, and it flows
19 clockwise, and at 3:00 the flow is, let's say, parallel
20 to the main flow of the river, and at 6:00 it would be
21 flowing perpendicular to that, and then at 9:00 it would
22 be flowing upriver, what would be the velocity say at
23 about 9:00? And I recognize that it starts at zero at
24 the shore and goes up to a maximum and then must come
25 back to zero at the center.

1 A (WITNESS PHILLIPPE) Yes, sir. The velocity,
2 if I have the correct measurement from Mr. Harmon,
3 appears to be on the order of 25 hundredths of a foot
4 per second or a quarter of a foot per second.

5 Q Now, would that speed continue going up to
6 12:00?

7 A (WITNESS PHILLIPPE) I would expect that speed
8 to continue going up to about 12:00.

9 Q And then as it comes down, 1:00, 2:00 and
10 3:00, would it still be .25?

11 A (WITNESS PHILLIPPE) At that point there is
12 going to be a transition between the eddy itself and the
13 edge of the main channel, so that there will be a
14 transition between the eddy velocity and the main
15 channel velocity. And if we are at steady state, then
16 that transition should be a fairly uniform transition
17 from whatever that eddy velocity is up to the channel
18 velocity. If, however, we are in a situation of rising
19 flows upstream with more momentum and what have you,
20 then we will probably have a turbulent area between the
21 eddy and the main channel. In fact, observers have
22 noted vortices in the water where the eddy and the main
23 channel merge.

24 Q So the transition would take place from a
25 speed of roughly a quarter of a foot per second to

1 whatever the velocity of the main channel was?

2 A (WITNESS PHILLIPPE) Yes. If I rely upon Mr.
3 Harmon's measurements.

4 Q Well, even without the measurements, this
5 would be --

6 A (WITNESS PHILLIPPE) It would be a reasonable
7 assumption.

8 Q So that per unit cross-sectional area, the
9 volume of water in the main current flowing per unit
10 time is much greater than that in the eddy current?

11 A (WITNESS PHILLIPPE) That is correct.

12 Q So assuming that the majority of the intake
13 structure at least was in the main current, this would
14 affect the amount of water from the eddy that ever was
15 taken into the intake structure, wouldn't it?

16 A (WITNESS PHILLIPPE) Yes, sir. I think that
17 is a reasonable assumption.

18 Q Mr. Phillippe, what is your opinion of the use
19 that can be made of a rating curve, a river rating curve?

20 A (WITNESS PHILLIPPE) The use will vary by the
21 user. The USGS uses their rating curves to translate
22 stage to discharge. In fact, that is the way the
23 discharge numbers are gotten, say at Trenton. They take
24 a rating curve and translate that elevation on the stage
25 to a corresponding discharge, and that is usually the

1 use of a rating curve, to translate stage to discharge.

2 Q What is your understanding of what the
3 applicant will use the curve for?

4 A (WITNESS PHILLIPPE) I don't know. The point
5 of contention that I was examining to relate stage and
6 discharge at Point Pleasant, I don't know if he intends
7 to use it as his part of the Merrill Creek release or
8 planning or what have you. But I do know that he used
9 his curve to relate a discharge to an elevation at Point
10 Pleasant.

11 I'm not sure I gave a good answer, or I may
12 not have understood the gist of your question.

13 Q I think that is just the answer I was looking
14 for. But for that use of relating the discharge to
15 stage, if you used the same method each time so that you
16 are looking not so much for absolute accuracy but for
17 relative accuracy, how well do you need to know the
18 absolute accuracy?

19 A (WITNESS PHILLIPPE) Well, for most cases you
20 wouldn't need to know the absolute accuracy. In this
21 particular case there was a question about whether the
22 flows were 3000 or 4500 and whether one could make an
23 extrapolation, and the basis of the extrapolation was
24 that the flows were 3000 and 4500, and a lot of
25 arguments revolved around whether the flows were 3000

1 and 4500.

2 (Discussion off the record.)

3 WITNESS PHILLIPPE: At any rate, a lot of
4 testimony has centered around the use of these values at
5 3000 and 4500, and one could simply make an
6 extrapolation of what was observed. And I think it is
7 clear that the basis of those numbers is questionable.

8 Now, if one had determined that in fact we
9 have 4500 CFS, and in fact we have 3000 CFS, and in fact
10 the velocity measurements that were made were correct,
11 and in fact that they were, as you indicate, velocity
12 measurements, that they had the directional components
13 shown, then one might have a basis for making an
14 extrapolation.

15 But I think that -- I personally think that it
16 kind of unravels in this particular instance.

17 BY JUDGE MORRIS: (Resuming)

18 Q Even though you did it the same way every time
19 you used the curve?

20 A (WITNESS PHILLIPPE) Even though I did it the
21 same way due to the fact, at least in part, that that
22 particular rating curve is very sensitive in that
23 particular flow range, and it is --

24 Q In that particular what?

25 A (WITNESS PHILLIPPE) In that particular flow

1 range. It is sort of like saying if I were to use a
2 surveying instrument -- for instance, a chain, a tape --
3 and the tape is, I think is 100-foot long and in fact it
4 is 90 feet long, and if I laid out a piece of property
5 with that chain or tape that I thought was 100 feet long
6 and it was in fact 90 feet long, and I put my stamp as a
7 surveyor on that, I think that the landowner would have
8 every right to sue me for shortchanging him because he
9 thought he had a hundred feet, and if someone else came
10 out with another tape of a hundred feet long, he would
11 find this turkey that surveyed this property doesn't
12 know what he's doing; he used a tape that was apparently
13 90 feet long, and it was consistently wrong.

14 Q Well, let me turn that little analogy around.
15 You have been to punt, pass and kick contests?

16 A (WITNESS PHILLIPPE) I've seen it on TV, yes,
17 sir.

18 Q And they use a tape, and they measure to see
19 who kicked it the farthest, and who passed the farthest,
20 and isn't that a legitimate measurement?

21 A (WITNESS PHILLIPPE) Yes, sir. In that
22 particular application of it, yes, sir.

23 Q So it does depend upon the application.

24 A (WITNESS PHILLIPPE) Yes, sir. It depends
25 upon the application.

1 Q You've reviewed, I believe, Mr. Harmon's
2 measurements in the vicinity of the intake, say between
3 200 and 300 feet?

4 A (WITNESS PHILLIPPE) Yes, sir.

5 Q In your opinion what would be the accuracy of
6 the measurement of the maximum speed of the currents
7 that he performed?

8 A (WITNESS PHILLIPPE) I don't know the
9 particulars of the instrument that he used. I think
10 that those instruments such as you mentioned have got a
11 fairly reasonable accuracy.

12 MR. SUGARMAN: May I ask, sir, if you are
13 using that term "velocity" there to include the vector?

14 JUDGE MORRIS: I did not say velocity. I said
15 speed, the speed of the current.

16 WITNESS PHILLIPPE: Yes, sir. I think the
17 maximum speed that he recorded is pretty close to what
18 the maximum speed is. I think it is a fairly -- plus or
19 minus five percent, if you will.

20 BY JUDGE MORRIS: (Resuming)

21 Q Well, I would be happy -- it is certainly less
22 than a tenth of a foot per second, you are saying?

23 A (WITNESS PHILLIPPE) Yes, sir. Except at the
24 low velocities in turbulent areas where the meter may
25 have been affected. Once the meter was used in a

1 sustained flow, it would appear that, yes, plus or minus
2 a tenth of a foot or so per second.

3 Q And I believe you said this morning that you
4 felt that the horizontal measurements of distance using
5 the stadia rod were fairly good?

6 A (WITNESS PHILLIPPE) Yes, sir.

7 Q That means within a foot or two or something
8 like that?

9 A (WITNESS PHILLIPPE) I said within a foot or
10 two, giving the stable platform for your level rod. I
11 noted in my testimony that there are errors that are
12 introduced. The observer is onshore trying to read two
13 crosshairs at one time at some distance. The crosshairs
14 tend to obliterate the gradations on the rod, so there
15 are other factors that are involved.

16 If the level rod is onshore, on stable ground,
17 then, yes, plus or minus a foot. If it is out within
18 300 feet of shore and it is even bouncing around, it may
19 be plus or minus five feet. I don't know. Somewhere in
20 that order.

21 Q But the large discrepancy seems to be the
22 distances measured with the viewfinding of the optical
23 device, and a correction curve was made for that. And I
24 think you were here when we were talking about that
25 curve.

1 A (WITNESS PHILLIPPE) Yes, sir.

2 Q Given the corrections, what would you think
3 the error would be in the corrected values of distance
4 between say 200 and 300 feet?

5 A (WITNESS PHILLIPPE) Sir, I wouldn't hazard a
6 guess as to the accuracy of those measurements, even
7 given the correction, given the fact that optical
8 rangefinders are notoriously unreliable pieces of
9 equipment. I have one.

10 Q I'm not sure that we got a really definitive
11 answer to my question on the effect of different
12 elevations at the Lumberville Dam and the pattern of
13 flows in the river at Point Pleasant in the region of
14 say 2500 to 3500 CFS.

15 A (WITNESS PHILLIPPE) I don't know exactly how
16 you would like me to address that.

17 Q Well, if you had an array of velocity
18 detectors --

19 A (WITNESS PHILLIPPE) Yes, sir.

20 Q -- At the Point Pleasant intake site.

21 A (WITNESS PHILLIPPE) Yes, sir.

22 Q And you took measurements for a condition
23 where the flow at the Trenton gauge say was 3500 CFS
24 under equilibrium conditions, and then you took the same
25 set of measurements under equilibrium conditions at 2500

1 CFS at Trenton, would you see changes in direction that
2 are significant?

3 A (WITNESS PHILLIPPE) In the various
4 cross-sections?

5 Q No. Right at Point Pleasant.

6 A (WITNESS PHILLIPPE) It depends where in the
7 river I'm taking those measurements. If I'm taking the
8 measurements in an established channel for which the
9 upstream stream lines and so forth have stabilized and
10 have become uniform, I would expect to see those curves
11 increase or decrease at a fairly uniform rate or a
12 predictable rate, one that you could extrapolate in the
13 particular instance that we have at the intake site. We
14 have not seen those stream lines stabilized, and they
15 are affected by rising and falling flows and current
16 patterns, I believe, because of the shading of the
17 stream that the bar provides and various flow patterns.

18 Also, I would have some difficulty
19 extrapolating what I see at Trenton with what I see at
20 Point Pleasant even under steady state, so-called steady
21 state conditions, although it would be somewhat
22 reasonable to assume that there is some correlation and
23 there is drainage area type of correlations and so
24 forth. But there is a lot of things that happen between
25 Point Pleasant and Trenton. I don't know what might

1 happen with a localized storm that affects the Trenton
2 area and doesn't affect the Point Pleasant area.

3 I have had had considerable experience with
4 localized storms. I tried to assist the state of Ohio
5 in conducting a survey of the Great Miami River, and I
6 did the statistics on the river and showed that clearly
7 there was a chance that they could get flows in the
8 river in any given summer that were less than 1000 CFS.

9 It so happened -- and I looked at the past ten
10 years of record -- it so happened that particular summer
11 that there were two rainstorms that occurred in Dayton,
12 Ohio that were of a 100-year magnitude, and they were
13 back to back, and the rest of the country around it was
14 bone dry. It was a dry summer anywhere else in the
15 country except in Dayton, Ohio. It was a quirk that
16 that happened.

17 And so there are a lot of things that happen
18 in between one point and another point. And the point
19 that I tried to make with rating curves at Lumberville
20 is that there is a clear set of hydraulic controls at
21 Lumberville, and to try to base a rating curve on what
22 happens at Trenton and Lumberville up to Point Pleasant
23 when there is clear hydraulics in between that have a
24 detectable effect in the Point Pleasant pool.

25 Q I guess I didn't bound my question very well.

1 A (WITNESS PHILLIPPE) Excuse me.

2 Q I understand what you are telling me, but that
3 really wasn't what I was interested in. Let me ask a
4 slightly different question.

5 A (WITNESS PHILLIPPE) All right.

6 Q Supposing we postulate the condition where
7 there is flow over the wings of the dam.

8 A (WITNESS PHILLIPPE) Yes, sir.

9 Q Not very much but say to a depth of an inch.

10 A (WITNESS PHILLIPPE) Yes, sir.

11 Q And then we look at the direction of the
12 currents at the site of the intake.

13 A (WITNESS PHILLIPPE) Yes, sir.

14 Q Then we lower the flow such that the water no
15 longer overtops the wings.

16 A (WITNESS PHILLIPPE) Yes, sir.

17 Q What would be the effect on the direction
18 patterns of the currents at Point Pleasant, if any?

19 A (WITNESS PHILLIPPE) All right. Given that
20 limitation and the steady state condition that would
21 affect, I would suspect that the directions would not
22 change much. And I see where you are driving.

23 Q I'm sorry. I didn't phrase that well.

24 JUDGE MORRIS: Thank you. That's all I have.

25 JUDGE BRENNER: It might be more efficient if

1 somebody could provide yesterday's transcript to Mr.
2 Phillippe.

3 (Document handed to witness.)

4 BY JUDGE BRENNER:

5 Q I'm going to ask you about several things that
6 Mr. Wescott said he did as a check on the direct work of
7 the applicant which we have been discussing for some
8 weeks now.

9 At transcript page 3599 -- and I will give you
10 an opportunity to look at -- you might want to look back
11 at 3598 to get the context, but the heart of what I want
12 to ask you about is on lines 2 through 20 of 3599.

13 A (WITNESS PHILLIPPE) Okay.

14 Q Just let me know when you've finished.

15 (Pause.)

16 A (WITNESS PHILLIPPE) Yes, sir. I've read it.

17 Q I don't remember if you were here when he
18 testified.

19 A (WITNESS PHILLIPPE) No, sir.

20 Q As I understand what Mr. Wescott says he did,
21 he took the applicant's velocity measurements done at
22 3000 CFS, or in any event, on that November 7th, 1980
23 day, and used the velocity measurements to calculate the
24 flow, and then compared his flow calculations with
25 another method by which he ascertained flow. And, in

1 fact, he asked the applicant to do the same thing, and
2 that question he references, which I believe you've also
3 had for some time.

4 A (WITNESS PHILLIPPE) Yes, sir.

5 Q What do you think of what he did as a method
6 and also his conclusion that, ergo, velocity
7 measurements are pretty good?

8 A (WITNESS PHILLIPPE) I would say that he did a
9 pretty good thing. In fact, that is the way of
10 establishing flow across a transect is to have velocity
11 measurements and subsets of that transect, divide up the
12 areas, and integrate them across the river. And he was
13 only able to do that with the 3000, "the 3000 CFS plus
14 or minus flows," because they were the only ones that
15 extended all the way across the river.

16 Q Right. But if I'm real interested in knowing
17 whether the velocity measurements as a measurement of
18 speed were done reasonably accurately by Mr. Harmon and
19 also are done in approximately the locations Mr. Harmon
20 says he did them, would this be a good check of that
21 proposition?

22 A (WITNESS PHILLIPPE) Yes, sir, it would be.
23 It would be a pretty good check.

24 Q At 3600 -- and, incidentally --

25 A (WITNESS PHILLIPPE) The only problem I would

1 have is --

2 Q Tell me about any problems.

3 A (WITNESS PHILLIPPE) I could obtain the same
4 velocities or flows through the river given a slight
5 dislocation of where those maximum velocities occur one
6 way or the other out into the river, back into the
7 river, and still be within those same percentages, given
8 the fact that the bulk of the velocity that was measured
9 by Mr. Harmon was measured out in the main channel.

10 So if I were a little bit further out in the
11 channel or a little bit less in, I would obtain the same
12 discharge essentially, give or take a little bit.

13 Q How far off do you think the linear -- what I
14 guess we have been calling the horizontal dislocation --
15 would be and still come within this range?

16 A (WITNESS PHILLIPPE) I think you could go 5 or
17 10 feet easily and come within the range, maybe even
18 further than that.

19 Q I'm talking about distances of 200 to 250.

20 A (WITNESS PHILLIPPE) Yes, sir. That is really
21 the point: where is the velocity with respect to the
22 intake. And you could go either way, and I could still
23 have a reasonable check on the integration of the
24 currents across the river.

25 Q It could go 5 or 10 feet either way?

1 A (WITNESS PHILLIPPE) Easily.

2 Q Twenty-five feet either way?

3 A (WITNESS PHILLIPPE) Possibly. Because, if
4 you will, essentially half the river had very low flow
5 in it, and the bulk of the measurements were out from
6 the edge of the -- somewhere between Station 817 and 862
7 and on across the river. The maximum flows and the
8 maximum velocities measured were out in the main
9 channel, so that we could even have compensating
10 errors. We could even have compensating errors in the
11 instrument readings, say showing higher flows than
12 actually occurred further out in the river and have a
13 dislocation with distances in closer to the intake.

14 I think the method is good, and I would agree
15 that the flows are in the vicinity of 3000 CFS. I don't
16 have too much problem with that. It might be 2850; it
17 might be 3070. I don't have any problem with that at
18 all, and I think my answer is consistent.

19 Q Looking at the readings on Table 1 of
20 Applicant's Exhibit 2 for identification -- and I think
21 we've seen this table in other places also, and that's
22 the November 7th 1980 measurements by Mr. Harmon at the
23 four depths -- were different horizontal differences
24 expressed in the stationing nomenclature?

25 Do you have that?

1 A (WITNESS PHILLIPPE) Yes, sir.

2 Q Given that table and also what you've
3 described as where -- and these are my words -- where
4 the bulk of the flows would be -- and I interpret that
5 as therefore having a great influence on the result of
6 Mr. Wescott's check.

7 Looking at the speed measurements at station 8
8 plus 60, if we assume that that is off by as much as 25
9 feet, given the result of the check by Mr. Wescott, do
10 you think it more likely that an error of that magnitude
11 of 25 feet in where Mr. Harmon thought he was would more
12 likely be an error that he was further out -- that is, 8
13 plus 85 -- or more likely be an error that he was closer
14 to shore -- that is, 8 plus 35 -- closer to the
15 Pennsylvania shore, given the channel configuration that
16 you talked about also?

17 A (WITNESS PHILLIPPE) I would think that it
18 probably is an error; that he was further out than he
19 was in, because if we plot the "3000 CFS measurements
20 over top the 4500 CFS measurements," we find on the 4500
21 CFS measurements his maximum velocities are considerably
22 further out. And the first peak on the 4500 -- there
23 are two peaks showing possibly some cross-currents
24 there, but the innermost peak is still further out in
25 the river on that set of measurements.

1 Q That is what I thought, but I don't know much.

2 A (WITNESS PHILLIPPE) I plotted it. I plotted
3 it on an overlay of the intakes and superimposed them.

4 Q Just to fill out the picture, if I ask you to
5 assume that the horizontal error was of the smaller type
6 that you talked about -- that is, five feet, perhaps ten
7 feet -- then it is possible the error is the other way,
8 and that is he was actually closer to the Pennsylvania
9 shore than the 8 plus 60 recorded location?

10 A (WITNESS PHILLIPPE) Possibly.

11 Q But is it more likely even for an error of
12 that smaller magnitude that the error is the other way,
13 that is, he was further out than he thought?

14 A (WITNESS PHILLIPPE) Well, given his
15 positioning methods, it is very difficult to tell where
16 exactly he was.

17 Q Yes, I know that. That is why I'm talking
18 about applying Mr. Wescott's check in your discussion as
19 to the possible range of distance even given that check.

20 A (WITNESS PHILLIPPE) He could have been
21 further out in the river.

22 Q Just so I understand your other answer, that
23 if it's a large error such as 25 feet, it is unlikely he
24 was closer to the Pennsylvania shore?

25 A (WITNESS PHILLIPPE) Yes, sir. That is

1 exactly correct.

2 Q I started to say, and I'm not sure if I
3 completed the thought, that I would feel better if you
4 looked at these portions of the transcript, having heard
5 it once; but given your expertise and knowledge of
6 everything in the proceeding, I don't feel so bad that
7 I'm not going to proceed. But if you see something that
8 you really are not sure of what you're reading, you just
9 let me know, and we will pass it. And, in other words,
10 don't guess, or if there are other things you think you
11 need to know, you can state that.

12 A (WITNESS PHILLIPPE) Thank you, sir.

13 Q Take a look at page 3600, and I will give you
14 a coming attraction by telling you that I think 3600 is
15 fairly self-contained, perhaps going over the lines to
16 line 6 of 3601, and if you read that you will see a
17 discussion of Manning's calculation or Manning's method
18 to get the Manning's n value by Mr. Wescott. Happily,
19 he doesn't give us the full formula, because I don't
20 know if I would have understood it.

21 A (WITNESS PHILLIPPE) Yes. The Manning's
22 formula is Q is equal to area times 1.49 divided by
23 Manning's n. That is the letter "n." The hydraulic
24 radius is radius to the two-thirds power of the slope to
25 the one-half power.

1 MS. HODGDON: Judge Brenner, may I interrupt?
2 Mr. Wescott tells me that he misspoke when he said
3 cross-section there at line 15; that it should read
4 intake.

5 JUDGE BRENNER: Okay. Thank you.

6 BY JUDGE BRENNER: (Resuming)

7 Q Why don't you just pen that in on your copy,
8 Mr. Phillippe, and you will do the owner a favor.
9 That's line 15, the first two words instead of
10 "cross-section" substitute the word "intake." And then
11 take a look at this transcript page, and I will ask you
12 what you think of it basically.

13 MR. SUGARMAN: I wonder if I might take a look
14 at the applicant's second copy of the transcript or
15 somebody else's?

16 JUDGE BRENNER: Sure.

17 (Board handing document to counsel.)

18 JUDGE BRENNER: While Mr. Phillippe is reading
19 and thinking about it, in case Mr. Sugarman or other
20 counsel want to read ahead, my next and I think last
21 subject is going to deal with pages 3609 and 10.

22 (Pause.)

23 WITNESS PHILLIPPE: Yes, sir, I've finished.

24 BY JUDGE BRENNER: (Resuming)

25 Q Well, what do you think?

1 A (WITNESS PHILLIPPE) Well, if I take his
2 cross-section there I come up with an average velocity,
3 assuming it is plotted correctly, of about 67 hundredths
4 of a foot per second using his methods.

5 Q As compared to his 46 hundredths?

6 A (WITNESS PHILLIPPE) No. His 0.46 is a
7 Manning's n value. Now, that depends at least in part
8 on knowing what the bottom slope is, and the bottom
9 slope is very, very flat right at the intake. And I
10 don't know what he used for slope, so I can't come up
11 with his number right away. I think he knows his
12 hydraulics pretty well, though.

13 Q Well, let me ask you -- let me divide up the
14 question then. Do you think this, too, is a reasonable
15 check to make going through Manning's calculation?

16 A (WITNESS PHILLIPPE) Yes, sir. In fact, I've
17 made similar checks.

18 Q Now, assuming he went through the same math
19 you did and ended up with the .067, do you agree with
20 his --

21 A (WITNESS PHILLIPPE) .67.

22 Q I'm sorry. .67. Do you agree with his
23 conclusion that that matches the situation at the intake
24 given the bottom there and Mannings n value?

25 A (WITNESS PHILLIPPE) Well, the Manning's n

1 value that he derives would have to then be compared
2 with what is a reasonable Manning's n value for that
3 type of river section. And I haven't seen the bottom of
4 the river, and I'm afraid Mr. Wescott hasn't either. So
5 --

6 Q So we should ask him a little more?

7 A (WITNESS PHILLIPPE) Yes, sir.

8 Q We're glad to have other people do our work
9 for us here.

10 A (WITNESS PHILLIPPE) I would certainly be glad
11 to compare notes, though.

12 Q Well, what would we look for in this answer in
13 terms of good check -- a numerical similarity? He is
14 going to describe the bottom as he knows it when we ask
15 him, and he is going to say therefore I applied a
16 certain number to it, is that it?

17 A (WITNESS PHILLIPPE) Yes, sir. He may do
18 that. I did a similar thing. I concentrated all of the
19 flow. In fact, I took a line that I thought delineated
20 the edge of the bar and translated that all the way
21 down, essentially station 7 plus 90, and I divided the
22 cross-sectional areas to that left of the bar looking
23 upstream and that right of the bar, so I had
24 cross-sectional areas at that flow depth.

25 I came up then funneling all of the flow

1 through the cross-sectional area to the right looking
2 upstream at the intake and came up with an average
3 velocity which very closely checks out to the average
4 velocity for what's under that curve. It doesn't come
5 out exactly, but it's very close to it. That is one of
6 the reasons that says that his measurements at least
7 demonstrate that the general configuration of the flow
8 patterns there at the intake --

9 Q His November measurements?

10 A (WITNESS PHILLIPPE) His November measurements
11 and his July measurements are the same thing. I did the
12 same thing with them.

13 The problem occurs at exactly what are the
14 velocity measurements at the intake. Are they really
15 further out in the river or are they closer in? And I
16 can get essentially the same thing, because you see that
17 little wedge that is inside of 790 is a very, very small
18 fraction of the velocities across the river and the
19 flows across the river. The bulk of the flows to the
20 left that are in the eddy area are recirculating flows.
21 It is a quiet eddy. And this is why I have problems
22 with this particular location. If we were downstream a
23 little bit further, then we would be out of the eddy,
24 and we would have clear velocity patterns.

25 Q All right. Take a look at 3609 to 3610, and

1 Mr. Wescott there describes the calculational method he
2 employed to yield the speed at 2500 CFS. In the
3 transcript it says "velocity," and Judge Morris has me
4 trained already.

5 (Pause.)

6 A (WITNESS PHILLIPPE) Yes, sir.

7 Q Do you understand what he did?

8 A (WITNESS PHILLIPPE) Yes, sir.

9 Q What do you think of that as a calculational
10 method to get the average cross-sectional velocity of
11 .57 feet per second, and then multiplying that times the
12 1.4 ratio, getting the .8 feet per second at 2500 CFS.
13 And he says that is the minimum velocity at the screens
14 to fill out the picture.

15 A (WITNESS PHILLIPPE) Yes, sir. I think that
16 is the best he could do with the data that was available
17 to him, and I have done similar things.

18 Q It is very close to the result that the
19 applicant had by its method of extrapolating from 4500
20 to 3000, is it not, if you recall?

21 A (WITNESS PHILLIPPE) Yes, sir.

22 Q Do you think that method -- I'm sorry.

23 A (WITNESS PHILLIPPE) As Judge Morris
24 indicated, we all used the same sets of data and
25 extrapolated essentially the same way. We could go one

1 way or the other, but it's from the same base, if you
2 will. And I really think it is a reasonable value if
3 the velocities actually occur there at the intake and
4 not further out in the river; and that I don't think is
5 clear at this point, that it doesn't occur further out
6 in the river.

7 So the .67, however, is certainly or whatever
8 he came up with is certainly not more than the one foot
9 per second that the applicant was postulating earlier.

10 Q Well, I could go into quite a dialogue, and
11 I'm sure that we would quickly reach agreement as to
12 what flow the applicant was postulating one foot per
13 second, so I won't bore you with it because I don't
14 think we disagree on that.

15 I don't think the applicant ever postulated
16 one foot per second at the screens at 2500 CFS, and I
17 will leave it at that, and the record will say what it
18 says.

19 A (WITNESS PHILLIPPE) Yes, sir, that is
20 correct.

21 Q You say it is the same set of data, implying
22 that the agreement result doesn't surprise you. I'm
23 always suspicious of that, too, especially when I get
24 confused by numbers, which I sometimes do. I think this
25 is actually different data, because one of the points in

1 dispute with what the applicant did was whether it was
2 fair to correlate 4500 and 3000 given the possibly
3 different flow regimes and so on. And Mr. Wescott by
4 his method cut out, if you will, in the vernacular, that
5 problem with going from 4500 to 3000, and nevertheless
6 eliminating that came up with a similar result.

7 So I'm surprised to hear you say, and maybe I
8 misunderstood you, that it is essentially the same data
9 so it doesn't surprise you that the result is the same.
10 And that is why I kind of myself viewed it as a check.
11 So I ask your opinion of that long-winded statement of
12 mine.

13 A (WITNESS PHILLIPPE) Yes, sir. It could serve
14 as a check that the data is not totally inconsistent,
15 but then again, I don't expect the data to be totally
16 inconsistent. If we go back to the rating curve the
17 applicant presented, it represents an attempt to provide
18 some consistency to the data, which when we dug into it
19 further we found to be somewhat inconsistent.

20 So that it is a fairly broad river at this
21 point. There is a lot to be absorbed in that
22 cross-sections in variations of flows and what have you,
23 so we could still be off and still have a reasonably
24 consistent check with the data base that we have to work
25 with.

1 Q Now, the only thing -- just following up on
2 that, the only thing Mr. Wescott used the rating curve
3 for here is to take the average cross-sectional
4 velocity, of course, and not our particular point.

5 A (WITNESS PHILLIPPE) Yes, sir. And he could
6 have done that with the elevations as I did. I used the
7 elevation and struck a line across the river and figured
8 out what the cross-sectional area was. And I personally
9 don't question the applicant's elevations that he
10 gives. I think they are probably very accurate. It is
11 the flows that match those elevations that I have
12 difficulty with, and I think Mr. Wescott has had the
13 same kind of difficulty.

14 Q All right. But one problem was the elevations
15 don't change much, and they didn't change consistently
16 in the flow region of 2500 CFS on that rating curve,
17 correct?

18 A (WITNESS PHILLIPPE) That is correct.

19 Q If my problem was not correlating flows with
20 elevations but rather calculating an average
21 cross-sectional velocity, then it actually becomes less
22 of a problem to have the elevations very close to each
23 other at those flows, correct?

24 A (WITNESS PHILLIPPE) Yes, sir. It is quite
25 easy to calculate an average cross-sectional velocity.

1 What we're more concerned with is what the distribution
2 of those velocities is across that cross-section; and I
3 think that is what really is at issue: what is the
4 velocity at the intake, and what is the -- not only what
5 is the magnitude of the velocity, but what is the
6 direction of the velocity. And I think Mr. Wescott is
7 also, from the pages I'm reading here, indicating that
8 there is a directional component that he thinks could be
9 into the screens as I think the geometry suggests.

10 JUDGE BRENNER: All right. I think I have
11 gone as far as I can go, or in fairness to you, should
12 go with your comments. And I appreciate your assistance
13 on these.

14 If you have got a particularly pithy point,
15 I'm sure through the mind and mouth of Mr. Sugarman when
16 he has Mr. Wescott up on this we can hear some more.

17 (Board conferring.)

18 JUDGE BRENNER: All right. We have no more
19 questions of Mr. Phillippe.

20 What are the time frames in our succeeding
21 rounds going to be with Mr. Phillippe?

22 MR. CONNER: I couldn't hear you.

23 JUDGE BRENNER: How much time will you need if
24 you have any more questions?

25 MR. CONNER: We have some questions. I would

1 guess 20 minutes, plus or minus 5. That's an error band.

2 (Laughter.)

3 JUDGE BRENNER: Lawyers usually use -- and
4 I've said this before -- plus or minus 100 percent error
5 band.

6 (Laughter.)

7 JUDGE BRENNER: Staff?

8 MS. HODGDON: We don't have much, if anything,
9 based on what has gone on up to this time, because we
10 can get it from Mr. Wescott, I think.

11 JUDGE BRENNER: Do you have much based on so
12 far, Mr. Sugarman? I understand you may have things
13 based upon questions to come.

14 MR. SUGARMAN: So far I have about five
15 minutes.

16 JUDGE BRENNER: Okay. Let's do it.

17 Mr. Conner.

18 RE CROSS EXAMINATION

19 BY MR. CONNER:

20 Q Let's try to do this in order, Mr. Phillippe.

21 You first talked about the crosscurrents that
22 you envisioned in the river by making the marks on
23 Applicant's Exhibit 4. Do you recall that? On
24 Policastro 1?

25 A (WITNESS PHILLIPPE) Yes, sir.

1 Q It wasn't clear -- oh, by the way, do you know
2 where the Hickory Creek flows or what it flows into? Do
3 you know in fact that the Hickory Creek flows into the
4 Delaware, into the canal there?

5 A (WITNESS PHILLIPPE) I know that it would have
6 to cross the canal.

7 Q Do you know it flows into it?

8 A (WITNESS PHILLIPPE) It may flow into it.

9 Q And that what you see coming out here is the
10 overflow from the canal?

11 A (WITNESS PHILLIPPE) Yes. Or the historical
12 channel, yes, sir.

13 Q Now, is it your testimony that this channel
14 comes right out to the intake?

15 A (WITNESS PHILLIPPE) I'm just taking what Mr.
16 Majors' survey shows, yes, sir.

17 Now, Mr. Majors' survey may be totally in
18 error, but unfortunately, that seems to be the best we
19 have to work with that shows the bottom configurations.

20 Q Now, directing your attention to the main
21 channel as you said it came in there, wouldn't it tend
22 to push anything coming out of the eddy back in toward
23 the Pennsylvania shore?

24 A (WITNESS PHILLIPPE) Would you repeat that
25 question again?

1 Q I say wouldn't the force of the main current
2 in the river bench as you referred to it push the eddy
3 flow back toward the Pennsylvania shore?

4 A (WITNESS PHILLIPPE) Yes, sir. There is a
5 tendency as the bar is overtopped for the flows to be
6 moving in the Pennsylvania direction.

7 Q What angle do you perceive the main stream of
8 the Delaware would have at the intake structure?

9 A (WITNESS PHILLIPPE) The main stream, bottom
10 channel, which of course has been excavated under high
11 flow conditions, follows an angle to the intake
12 structure of 10 to 15 degrees or so, and I'm just
13 estimating with a triangle.

14 Q And wouldn't the -- to determine the flow past
15 the intake structure from the main channel, wouldn't you
16 derive that by taking the cosine of the angle of the
17 parallel flow downstream?

18 A (WITNESS PHILLIPPE) That is what Mr. Wescott
19 did.

20 Q And how much flow approximately at 15 degrees
21 angle would that have as a bypass?

22 A (WITNESS PHILLIPPE) What velocity component?

23 Q Yes.

24 A (WITNESS PHILLIPPE) I believe Mr. Wescott
25 calculated one.

1 Q It would be in the vicinity of about 95
2 percent of the river flow, wouldn't it?

3 A (WITNESS PHILLIPPE) Well, if all of the flow
4 were concentrated straight down the channel without any
5 expansion into the eddy area, yes, sir.

6 JUDGE BRENNER: Are we still talking about 15
7 degrees?

8 WITNESS PHILLIPPE: Yes, sir.

9 JUDGE BRENNER: I'm not sure Mr. Wescott
10 actually did the calculation for 15 degrees as
11 distinguished from another number, but you can give your
12 answers directly anyway.

13 BY MR. CONNER: (Resuming)

14 Q Would you accept the fact that if it were 15
15 degrees it would be 96.6 percent?

16 A (WITNESS PHILLIPPE) Yes, sir.

17 Q And at 25 degrees it would be 90.6 percent?

18 A (WITNESS PHILLIPPE) Yes, sir.

19 Q You referred to centrifugal force at the top
20 of the eddy.

21 A (WITNESS PHILLIPPE) Yes, sir. I always have
22 a problem with centripetal and centrifugal. What I mean
23 is going around the tangent.

24 Q Well, irrespective of what it is, how much
25 force did you calculate in your answer?

1 A (WITNESS PHILLIPPE) I haven't calculated
2 anything yet. I don't have enough numbers up there to
3 calculate anything.

4 Q Did you make any assumptions as to what the
5 velocity was?

6 A (WITNESS PHILLIPPE) No, sir.

7 Q Now, directing your attention to -- well, your
8 calculations here, which is Del-Aware 26 -- why didn't
9 you draw any parallel lines on there that you referred
10 to?

11 A (WITNESS PHILLIPPE) I believe that is
12 Del-Aware 25.

13 JUDGE BRENNER: Twenty-five is the additions
14 to the Policastro, and 26 is the plotting of calculated
15 flows at Point Pleasant. I'm showing you 26, Mr.
16 Phillippe.

17 WITNESS PHILLIPPE: I didn't plot any lines on
18 the exhibit simply to allow the points as they are on
19 the exhibit to speak for themselves. I have on my copy
20 of the exhibit drawn a few lines.

21 (Counsel for applicant conferring.)

22 BY MR. CONNER: (Resuming)

23 Q Can you state where on these curves or these
24 data points, where do you believe that the weir would
25 take over control of the curve?

1 A (WITNESS PHILLIPPE) The weir has control from
2 the 65-foot elevation -- excuse me -- the weir in
3 combination with the Delaware and Raritan Canal, and I
4 don't know exactly what that effect is under various
5 elevations. I haven't made those calculations. But the
6 weir and the Delaware and Raritan Canal together would
7 take control of somewhere up to elevation --
8 approximately elevation 72 at which point the
9 broad-crested wing dam would have been overtopped about
10 a foot and a half roughly.

11 Q You're saying it takes a foot and a half
12 overtopping to have smooth flow?

13 A (WITNESS PHILLIPPE) Well, it's not smooth
14 flow even at that because there is a dropoff on the
15 downstream side of that wing dam, so it is a weir flow
16 type situation. But it is so broad at that point that
17 the frictional effects of going over the wing dam have
18 more or less been overcome, and we are starting to see
19 the wing dam appear more like a river bottom even though
20 it is acting as a weir. So exactly what the physics and
21 the mechanics are, there is a transition to what would
22 be normal river channel type flows.

23 Now, I'm not sure what the upper limit of that
24 is. I know that in plotting the data up on the larger
25 sheet in an arithmetic way that above 15 or 20,000 CFS

1 then we start getting into a straight line relationship.

2 Q How did you construct your bottom line then?

3 Did it start at 6500?

4 A (WITNESS PHILLIPPE) My bottom line?

5 Q Or your lower curve that you were talking
6 about, the two parallel curves. What was the starting
7 point for the lower curve?

8 A (WITNESS PHILLIPPE) I said that if you
9 extended this down to 6500 --

10 (Pause.)

11 If you extended this down to 6500, you would
12 intercept something close to zero. In fact, in this
13 case if I extend it down I intercept a difference of
14 about 100 CFS. And maybe that is what is going through
15 the Delaware and Raritan Canal. I don't know.

16 Q What is the beginning point of the line you
17 are extending down to zero?

18 A (WITNESS PHILLIPPE) I drew -- just quickly I
19 drew a line through .7, assuming that .7 is correct, and
20 I don't know that it is, but assuming that it is in the
21 ballpark of being correct, and splitting .4 and 12, you
22 will see that if you draw a line through that, the data
23 points tend to cluster around that line.

24 Now, one could adjust that line a little bit
25 one way or the other.

1 Q Then you are going up to the other datapoints?

2 A (WITNESS PHILLIPPE) Yes, sir.

3 Q How about the lower curve, the lower part of
4 the curve?

5 A (WITNESS PHILLIPPE) The lower curve, if you
6 strike a line through your datapoint number one, which
7 is your premier datapoint, and down through point number
8 two, you will find that that line is also parallel to
9 the other line, and that the data clusters around that
10 line.

11 Now, I'm not saying that there is a straight
12 line relationship between those two sets of datapoints.

13 Q And these lines cannot meet? Is that what you
14 are saying?

15 A (WITNESS PHILLIPPE) They wouldn't meet if it
16 were a linear relationship, but weir equations are a
17 non-linear relationship. It is based upon the elevation
18 above some bottom of the weir raised to the one-half
19 power, which is non-linear.

20 Q Is it appropriate then to draw a straight line?

21 A (WITNESS PHILLIPPE) Only within this narrow
22 range that we have, simply to relate these two sets of
23 datapoints and to demonstrate that the two sets, the
24 numbers within them are related to each other. But no,
25 sir, I would not use those straight lines for my rating

1 curve.

2 (Counsel for applicant conferring.)

3 Q Doesn't a rating curve have to be one line? I
4 mean, one curve, on your chart to use it? Make it
5 usable?

6 A (WITNESS PHILLIPPE) You make one continuous
7 line, but it may be made up of several components to get
8 that line.

9 Q But doesn't it have to have a smooth
10 transition?

11 A (WITNESS PHILLIPPE) Yes, sir.

12 Q Are you saying that these datapoints make it
13 impossible to have a smooth transition?

14 A (WITNESS PHILLIPPE) No, sir. It is not
15 impossible. The rating curve for the weir itself will
16 be different from the rating curve for the wings. The
17 physics of the weir are different from the physics of
18 the wing.

19 Q In response to another question, I think by
20 Mr. Sugarman, you were talking about taking -- going
21 downstream somewhat where the cross-section had returned
22 to a normal cross-section. Do you remember that?

23 A (WITNESS PHILLIPPE) Yes, sir.

24 Q If you put the intake down there, wouldn't
25 that reduce the velocity of the flow?

1 A (WITNESS PHILLIPPE) Yes, sir, if you put the
2 intake down 300 feet from where it presently is, the
3 velocities would drop across the cross-section as a
4 whole. Now, that is assuming that the velocity -- that
5 the overall velocities are dropping. The 200 to 300
6 feet down is slight broader across the river than at the
7 present intake location. So I'm not too happy about
8 that location with respect to velocity. In fact, I
9 think when I was making my statement I did say that you
10 would trade off having well-aligned stream lines for a
11 lower velocity, and I went on to say that if you were to
12 take Section 22, then you would gain a more constricted
13 cross-sectional area and higher velocities and still
14 gain the streamline advantages. And that that would be
15 -- if I were to pick a spot to put the intake proper I
16 would have picked Section 22 in this section of the pool.

17 Q You were asked questions about the validity of
18 the 4500 estimate, and I think you said you thought it
19 would be more nearly 5000.

20 A (WITNESS PHILLIPPE) Yes, sir.

21 Q You gave the daily flows for the day at
22 Trenton, as measured at Trenton for the 23rd, 24th and
23 25th of July. Do you recall that?

24 A (WITNESS PHILLIPPE) Yes, sir.

25 Q And the drop in those flows ranges about 30

1 percent per day?

2 A (WITNESS PHILLIPPE) Yes, sir. They are fairly
3 substantial.

4 Q And isn't that a very steep drop?

5 A (WITNESS PHILLIPPE) Yes, sir. But not unusual
6 for the river.

7 Q But wouldn't it be better to use a rating
8 curve to get the average conditions for a time like that?

9 A (WITNESS PHILLIPPE) If the rating curve made
10 any sense, it would, yes, sir.

11 Q Directing your attention, sir, to your answer
12 referring -- Mr. Sugarman asked you about 1981. Do you
13 recall that? I think you said that it was a wet year.

14 A (WITNESS PHILLIPPE) I said I thought it was
15 wetter than some.

16 Q But you did say it was a wet year?

17 A (WITNESS PHILLIPPE) I thought so, yes, sir.

18 Q For the record, would you look at this water
19 resources data, New Jersey water year 1981, for the
20 Delaware River Basin by the United States Geological
21 Survey? And if I may direct your attention to page 2,
22 read it all if you wish but would you read particularly
23 the first paragraph of the summary.

24 A (WITNESS PHILLIPPE) It says, "Stream flow was
25 much below normal during water year 1981, ranging from

1 65 to 70 percent of the average throughout New Jersey.
2 This was directly relate to the below-average
3 precipitation. Drought conditions prevailed during the
4 early part of the years and emergency measures were in
5 effect to help dwindling water supplies. Not until the
6 latter part of the water year did conditions show signs
7 of improvement." So it was drier than usual.

8 JUDGE COLE: Does it have the time of the
9 water year? When the water year begins and ends?

10 WITNESS PHILLIPPE: In this part of the
11 country, the water year begins with October and ends in
12 September.

13 JUDGE COLE: So water year 1981 would start
14 October 1980 and end in September 1981?

15 WITNESS PHILLIPPE: That is correct, sir.
16 (Counsel for applicant conferring.)

17 BY MR. CONNER (Resuming)

18 Q Mr. Phillippe, I may not have understood
19 this. You were talking about conditions of the channel
20 and the cross-sections and so forth, and did I
21 understand you to say that you believe the river bottom
22 at Point Pleasant is continually changing?

23 A (WITNESS PHILLIPPE) No, sir, I didn't say the
24 river bottom at Point Pleasant is continually changing.
25 All I said was that the river bottom section to section

1 showed a change.

2 Q The river bottom what?

3 A (WITNESS PHILLIPPE) From section to section.
4 If I take a section 500 feet up and come down to the
5 intake, I show a change in that cross-section. A very
6 definite change.

7 MR. CONNER: No further questions.

8 JUDGE BRENNER: Staff?

9 MS. HODGDON: May I have a moment, please?

10 JUDGE BRENNER: Surely.

11 (Counsel for NRC staff conferring.)

12 MS. HODGDON: We have no further questions.

13 JUDGE BRENNER: Give us one moment.

14 (Board conferring.)

15 I have one or two points that I should have
16 followed up on when I was earlier asking questions, and
17 in a way, it is a follow-up on the questions that Judge
18 Morris asked you, Mr. Phillippe, about how you would
19 measure speed and velocity at the site if you had a year
20 and some reasonable amount of money, and also, a
21 follow-up to what we have ascertained the possible
22 margins of error may be, depending upon whose testimony
23 we give weight to later, but at least it is possible.

24 BOARD EXAMINATION -- Further

25 BY JUDGE BRENNER:

1 Q And if you want to find the location to put
2 this intake at Point Pleasant, assuming the same river
3 mile location but the distance in the river to put the
4 intake so that you reasonably assure a velocity of one
5 foot per second at 3000 cfs, do you need to do all of
6 those measurements you are talking about on the
7 transsects?

8 Or, can you look at the November 7th
9 measurements by Mr. Harmon combined with the checks that
10 were made on it by Mr. Wescott, and your own views of
11 the errors in the flows, and including your view that
12 the flow, if anything, was lower that day, and ascertain
13 the reasonable location without having to go through a
14 measurement program of the type you talked about? And
15 emphasizing that the only goal I've given you so far is
16 a one-foot per second at 3000 cfs.

17 A (WITNESS PHILLIPPE) Yes, sir. If I wanted to
18 be assured of that flow, I could go out to station about
19 9 plus 25 or 9 plus 30 or 9 plus 40, somewhere in that
20 area. I would also be concerned about the alignment of
21 my intake so that I align them to the direction at the
22 velocity. But given that, I would be assured of having
23 at least one foot per second past the intakes.

24 Q Why do you have to go --

25 MR. SUGARMAN: I' sorry. I was going to

1 interrupt and ask him what flow that statement would
2 obtain.

3 JUDGE BRENNER: I'm asking him about 3000 cfs,
4 so let's make sure that's what he had in mind.

5 WITNESS PHILLIPPE: Yes, sir, I would be
6 assured of that.

7 BY JUDGE BRENNER (Resuming):

8 Q Why do you have to go out that far? I thought
9 you told me that Mr. Harmon's error at 8 plus 60 is
10 unlikely to be more than a 25-foot error. And also,
11 that if anything, the flow was really less than 3000 on
12 that day when he measured it, and he has got a velocity
13 measurement at depths down to seven feet of over one
14 foot per second. The seven-foot depth is 1.1, and that
15 is at station 8 plus 60. So I'm wondering why you don't
16 say at the most, move it to 8 plus 85.

17 MR. SUGARMAN: Sir, I think if I may, I would
18 like to object to that because I think you have
19 inadvertently mischaracterized your prior question.

20 JUDGE BRENNER: Well, I've asked a different
21 one. Let him answer the different one now.

22 WITNESS PHILLIPPE: The reason that I would
23 suggest putting it further out is that at this point,
24 with the measurements I have, I do not know what the
25 direction of those velocities is. Now, if I put it out

1 slightly further and can assure myself that I've rotated
2 it to align with the streamlines at that point, then
3 that should be sufficient as far as the distance out and
4 the alignment.

5 Now, if I have --

6 BY JUDGE BRENNER (Resuming):

7 Q When you say that should be sufficient, would
8 that be the 8 plus 85 that I gave you in my question?

9 A (WITNESS PHILLIPPE) Give or take, yes, sir.

10 Now, the other question I would have is if, in
11 fact, I do have ice problems, then I would want to get
12 it further out into the main channel so that I would
13 have a chance of that ice breaking up and throwing out
14 of the main channel and not into the intake. So that is
15 why I would go further.

16 Q Okay. You're free to add what you did, and
17 I'm glad you did.

18 A (WITNESS PHILLIPPE) That is the reasons those
19 thoughts were going through my mind, when I said put it
20 out here in the sustained and substantial flow, rather
21 than marginally.

22 Q I only gave you as the goal the bypass
23 velocity at 3000 cfs.

24 A (WITNESS PHILLIPPE) Yes, I understand.

25 Q At that location at which you could reasonably

1 assure one foot per second bypass velocity at 3000 cfs,
2 would that same location also reasonably assure a bypass
3 velocity of about .8 foot per second at 3000 cfs if that
4 was also a goal?

5 A (WITNESS PHILLIPPE) At 2500?

6 Q Yes. If I didn't say it, 2500. That is what
7 I meant to say.

8 A (WITNESS PHILLIPPE) I think so. There is, if
9 you will, characterized through the data certain overall
10 consistency with some very specific inconsistencies. So
11 if I could get further out into that channel where I
12 feel reasonably sure that I have obtained my velocities,
13 I think that is all the further I need to go to get the
14 one foot per second.

15 And then the other considerations I have put
16 in to locate the intake, -- and I might say I was asked
17 what I would put my stamp on, and at this location if I
18 were the design engineer and independent of who was
19 paying me, I certainly wouldn't put my stamp on what I
20 see here.

21 Now, if I am coerced by reason of employment
22 to put my stamp on it and it is my livelihood, I may put
23 my stamp on it and hope I get by with it.

24 Q Well, when you say that, are you worried about
25 some of the economic considerations that you talked

1 about of damage to the intake in this flow regime and
2 ice and so on?

3 A (WITNESS PHILLIPPE) Yes, sir.

4 Q Trying to isolate that -- I'm not trying to
5 prevent you from testifying about it but you've said it
6 already and I will let you say it again. But I do want
7 to isolate it, that for your different reasons.

8 A (WITNESS PHILLIPPE) Yes, sir.

9 Q If my goal -- and these are all just ifs for
10 the sake of the questions -- if my goal, or one's goal
11 were to get a bypass velocity of one foot per second at
12 2500 cfs, keeping the same considerations we talked
13 about when we got out for the sake of these questions
14 only to 8 plus 85, where would you go for -- I will
15 repeat -- one foot per second at 2500?

16 A (WITNESS PHILLIPPE) For one foot per second at
17 2500, assuming these other calculations are reasonable
18 -- and I'm looking at about a tenth of a drop from the
19 one foot per second -- that would put me out to a little
20 bit past station 900, disregarding the ice.

21 Q For ice you want to get to 9 plus 30 or 40?

22 A (WITNESS PHILLIPPE) Yes, sir.

23 JUDGE BRENNER: Okay. Mr. Sugarman?

24 EXAMINATION ON BOARD EXAMINATION

25 BY MR. SUGARMAN:

1 Q I would like to clarify, Mr. Phillippe, and I
2 might have misunderstood Judge Brenner's earlier
3 questions, but I thought he asked you how far could Mr.
4 Harmon have been off and his number still be useful, and
5 I thought you answered that in his asking you 25 feet
6 and you said it is possible you could still use his
7 numbers. Is that how you understood his questions?

8 A (WITNESS PHILLIPPE) The way I understood it --
9 JUDGE BRENNER: That's not the way I
10 understood my question, either.

11 MR. SUGARMAN: I apologize, sir. I
12 misunderstood them, so I want to make sure the witness
13 didn't misunderstand them.

14 JUDGE BRENNER: You can ask him whatever you
15 want, but in case it helps, I don't know what you mean
16 by useful, for what. I only asked how far did he think
17 he would be off, and you introduced an additional factor
18 that I don't fully understand. But you are free to
19 pursue it.

20 MR. SUGARMAN: Well, I'm probably wrong,
21 then. If you and Mr. Phillippe both understood the
22 questions a different way then I'm sure I'm wrong. But
23 I will ask him anyway just to make it clear.

24 WITNESS PHILLIPPE: What I said -- if he was
25 off on the side of a high flow, which would it be, and I

1 said probably 25 feet further into the river rather than
2 25 feet further toward the shore.

3 BY MR. SUGARMAN (Resuming):

4 Q Did you mean to say, in response to Judge
5 Brenner's questions, that Mr. Harmon's error would
6 probably not have exceeded 25 feet in either direction
7 or in any direction, did you understand that you were
8 going to be so understood?

9 A (WITNESS PHILLIPPE) I'm not sure of the
10 magnitude of the error, how far off it is one way or the
11 other. But if I have recorded, say, one in two-tenths
12 feet per second, I may have recorded that as being
13 closer into shore than it actually was. Now, whether
14 it's 25 feet further out or whether it's 30 feet further
15 out, or whether it's -- I don't know, but I would think
16 that it would be in the range of 25 feet perhaps. I
17 really haven't done an analysis as to how far one way or
18 the other we would be going.

19 JUDGE BRENNER: Mr. Sugarman, I hate to
20 interject like this because I wouldn't let another party
21 do it to you if you were asking about their questions,
22 but I want to remind you at least of the context we were
23 using Mr. Wescott's check when I asked Mr. Phillippe
24 those questions, and it was given that check, how far
25 off did he think the distance would be. And I certainly

1 did understand Mr. Phillippe to be testifying that given
2 that check, the outside bounds of the range that he
3 thought Mr. Harmon would be off on that day was 25
4 feet. So if you want to pursue that, go ahead, but that
5 was the context.

6 I understand Mr. Phillippe didn't do an
7 independent check, but I had asked him, and he did do
8 some looking at things similar to what Mr. Wescott did
9 to the extent he told us, and that is what we were
10 discussing in my questions and answers with Mr.
11 Phillippe.

12 MR. SUGARMAN: Well, I just want to give him a
13 chance to clarify it, because I didn't understand your
14 questions that way, sir. And I'm perfectly capable of
15 misunderstanding, but he may have misunderstood the same
16 way I did.

17 BY MR. SUGARMAN (Resuming):

18 Q When you --

19 JUDGE BRENNER: I don't think so, because he
20 was nodding along with me just now, but that could be an
21 important finding.

22 MR. SUGARMAN: Exactly.

23 BY MR. SUGARMAN (Resuming):

24 Q When you put in the additional element of
25 assuming Mr. Wescott's correction, then I think it does

1 conform more to my recollection, so I stand corrected on
2 that part. Were you, in answer to Judge Brenner,
3 postulating that Mr. Harmon's measurements were not off
4 more than 25 feet, given the validity of Mr. Wescott's
5 cross-check?

6 A (WITNESS PHILLIPPE) I can't say that I have
7 done a sensitivity analysis to find out how far those
8 measurements could have been off one way or the other.
9 I have not done a sensitivity analysis.

10 Q Go ahead.

11 A (WITNESS PHILLIPPE) I think those flow
12 measurements are marginal; whether it's 25 feet or
13 whether it's 50 feet, I don't know.

14 Q Did you mean to tell Judge Brenner that Mr.
15 Harmon's measurements were not more than 25 feet off?

16 A (WITNESS PHILLIPPE) As I understood Judge
17 Brenner's question, he asked me whether he could have
18 been 25 feet closer to shore than he showed, rather than
19 25 feet toward the river, so it is qualitative.

20 Q He asked you that, too. But before asking you
21 that, before asking you which direction he could have
22 been off, he asked you a question about 25 feet off,
23 about being 25 feet off. And my understanding of his
24 question was that he was asking you if Mr. Harmon was no
25 more than 25 feet off, would his measurement still be

1 useful in determining the location of the velocities on
2 Mr. Westcott's check. And I thought your answer to that
3 question was yes.

4 But did you understand him to be asking you to
5 verify how far Mr. Harmon's measurements might have been
6 off? Not the direction; I'm asking you about the
7 distance.

8 A (WITNESS PHILLIPPE) Actually, I'm going to
9 answer the question that what Mr. Westcott did was to
10 integrate a series of velocity measurements across the
11 river, and I said that it didn't matter whether that was
12 25 feet or 10 feet; that it didn't matter, I still would
13 have gotten the total volume of flow or the flow through
14 the river whether it was 25 or 50 feet off. And that
15 that check, although it is a useful check, does not
16 prove whether that measurement was at the intake or 25
17 feet out or 50 feet out, or however far out. I don't
18 know. But I do know something about the configuration
19 of the channel.

20 Q And would you relate the relevance of the
21 configuration of the channel to the velocity
22 measurements?

23 A (WITNESS PHILLIPPE) Yes. I would expect the
24 maximum velocity measurements to be somewhere close to
25 the middle of the channel.

1 Q Somewhat closer to where?

2 A (WITNESS PHILLIPPE) To the middle of the
3 channel.

4 Q Now, the middle of the channel -- Judge Morris
5 asked you about the middle of the channel in terms of
6 whether you would assume that the majority of the intake
7 was in the main current, and I want to ask you -- he
8 asked you a series of questions relating to the location
9 of the deep water and the edge of the deep water.

10 A (WITNESS PHILLIPPE) Yes, sir.

11 Q Do you have an opinion as to whether the main
12 current is at the location -- or where it is in
13 relationship to the deepest water at the cross-section
14 of the intake in view of the bathymetry of that area at
15 that cross-section?

16 A (WITNESS PHILLIPPE) If I look at the
17 bathymetry which I have plotted up with superimposed
18 cross-sections I find that the thread of the river, the
19 thalweg -- and this is the thread of the river -- that
20 that thread of the river or the thalweg is at about
21 Station 9 plus 20 to 9 plus 30; more channelward from --
22 if I drew that stationing parallel to the stationing of
23 the intake or perpendicular to the intake line -- that
24 that thalweg is at about station 925, or 9 plus 30. And
25 given the cross-currents that are at upstream, I would

1 expect to find the main velocities at that point are a
2 little bit more toward the New Jersey shore.

3 Q Now, how far in each direction across the
4 river would you extend those main velocities?

5 A (WITNESS PHILLIPPE) Well, they certain die out
6 by the time you get to the eddy.

7 Q How about in relationship to the intake
8 location?

9 A (WITNESS PHILLIPPE) They are dying out there,
10 too.

11 Q Now, you indicated further in response to
12 Judge Morris that the velocities in the main channel,
13 and then you mentioned the numbers 8 plus 17, that
14 somewhere between 8 plus 17 and 8 plus 62 in that same
15 sentence, where is -- and you were talking about the
16 edge of the main channel. Is it your testimony that the
17 area between 8 plus 17 and 8 plus 62 is in the main
18 channel?

19 A (WITNESS PHILLIPPE) Yes, sir. I think that
20 the intake is in the main channel but on the edge of it.

21 Q Now, when you say in the main channel and on
22 the edge of it, and you use the term "main channel",
23 does main channel mean the area of the highest velocity
24 in this case?

25 A (WITNESS PHILLIPPE) Yes, sir.

1 Q And so, is the intake in the area where the
2 flow is of the highest velocity across the river?

3 A (WITNESS PHILLIPPE) No, sir, it is not in the
4 area of the highest velocity. It is in an area of
5 increasing velocity.

6 Q As the flow reduces or drops, does the point
7 of highest velocity move across the river either way?

8 A (WITNESS PHILLIPPE) As the -- if I use the
9 July measurements, I find two peaks of velocities that
10 move across the river. The combined peak, if you will,
11 the difference between them, stays in about the same
12 position as the 3000 cfs peak position.

13 That indicates to me that -- and, if you will,
14 those biggest differences are on the surface layers, and
15 as we get down to the bottom layer we have a more smooth
16 curve with a single peak in the main channel, or the
17 central portion of the main channel. That indicates to
18 me that there are some cross-current components at the
19 4500 cfs level.

20 Q And what is the impact of the cross-current on
21 the peak flow?

22 A (WITNESS PHILLIPPE) The peak flows are still
23 riverward from the intake structure, but the concern I
24 have would be with cross-currents that cut across the
25 intake structure and perhaps would create eddies behind

1 it and disrupt whatever streamlines the structures of
2 those two provide.

3 Q As a result of the toe of that bar that you
4 have talked about and the cross-currents at various
5 flows, including the 4500 that you just described, is it
6 appropriate to utilize any single depth velocity to
7 describe the direction and speed of the velocity at all
8 depths of the water column in the flow range below 6000
9 cfs?

10 A (WITNESS PHILLIPPE) Well, we find the velocity
11 contours, if you will, cross each other at different
12 points. Most of them -- strike that. They cross each
13 other; sort of like an overhanging cliff, if you will,
14 contour line that crosses the contour lines underneath.
15 And so that there are various current patterns at
16 different levels or velocity profiles at different
17 levels.

18 Q So when you answered Mr. Conner that the main
19 current would push the eddy back toward the Pennsylvania
20 shore, at what flows and at what depths in the water
21 column were you talking?

22 A (WITNESS PHILLIPPE) Well, I think at any depth
23 there is a tendency for the water to try to rise around
24 the bar, so that at any depth there will be some kind of
25 a component that would tend to push it back toward the

1 Pennsylvania shore. There will also be a component of
2 the eddy tending to push towards the intake structure.
3 The river currents would, I think, tend to dominate, but
4 I don't know exactly what distribution of the various
5 currents is down low.

6 In any event, there would be a turbulence
7 involved, and whatever debris or what have you is in
8 that water column would be affected in a turbulent
9 fashion. If it is mobile aquatic organisms, I guess
10 they would become disoriented. If it is particles of
11 inert material, they would go wherever they're tossed.
12 And it has no knowledge for desire to move otherwise.

13 Q Now, when you answered Judge Brenner with
14 respect to the validity of Mr. Westcott's approach to
15 verifying the distribution of velocities across the
16 river, you answered him that you don't know the
17 character of the bottom of the river. What does the
18 character of the bottom of the river have to do with the
19 attempt to distribute velocities across the river and
20 the attempt to distribute flows across the river, and
21 what impact does that have on the distribution of flows
22 in the area of the intake?

23 A (WITNESS PHILLIPPE) All right. Usually when
24 one tries to distribute the flow across a river, such as
25 the USGS when they try to make a flow measurement at a

1 given point, the attempt is to find a cross-section that
2 has some kind of uniformity or describability to it for
3 which there are positive currents through that
4 particular point.

5 We try -- the USGS personnel try to find
6 cross-sections where the flow distribution and the
7 velocity patterns are more or less uniform, and in that
8 way we can integrate it. What Mr. Westcott did is he
9 traversed an almost slack zone in the eddy and found the
10 bulk of his flows occurring in the main channel. And
11 that is exactly what I did; I found the bulk of the
12 flows occurring in the main channel, and calculating
13 back the other way.

14 So that what we have done is to show that the
15 bulk of the flows that are in the main channel and the
16 velocities that we get are representative of the
17 velocities of the main channel. And what the
18 distribution of those particular is across the main
19 channel is only alluded to by the measurements Mr.
20 Harmon made.

21 Q And is anything in Mr. Westcott's approach
22 able to distribute those velocities in the area that we
23 are talking about?

24 A (WITNESS PHILLIPPE) Only if you assume that
25 the measurements Mr. Harmon made are correct and

1 correctly located, and assuming that they are more or
2 less directionally significant perpendicular to the
3 cross-section we are taking.

4 Q And is there any reason to assume any of those
5 things?

6 A (WITNESS PHILLIPPE) The general character of
7 the measurements I think is probably good, and the
8 maximum velocities are good, but the directional
9 considerations were omitted.

10 Q How about the location that the measurements
11 were taken?

12 A (WITNESS PHILLIPPE) And the locations leave a
13 little bit to be desired.

14 Q When you say leave a little bit to be desired,
15 do you mean they are okay to use? The horizontal
16 stationing I'm talking about.

17 A (WITNESS PHILLIPPE) I would think that the
18 "4500 cfs stationing" is probably closer to reality.

19 Q I was talking about what Mr. Westcott used,
20 which was the November 1980 stationing.

21 A (WITNESS PHILLIPPE) That stationing I would
22 have a great deal of difficulty using, in knowing how it
23 was obtained.

24 Q Now, Mr. Westcott used Manning's n value in
25 relating his -- in attempting to cross check the

1 velocities. Do you have a Manning's n value for that
2 section?

3 A (WITNESS PHILLIPPE) No, I don't.

4 Q Do you know any way that one could get one for
5 that section? I mean, with the data that is presently
6 available in written form?

7 A (WITNESS PHILLIPPE) No. I think what Mr.
8 Westcott did was back-calculated and obtained an n
9 value. He said that this n value seems to him to be
10 reasonable, and I would concur that the n value seems to
11 be reasonable. Where I have a little difficult is I
12 don't know what slope he used, so without talking to him
13 I couldn't reproduce the n value.

14 It seems to be reasonable for that kind of a
15 river bottom. As I have heard reported from divers that
16 have been down there, there are some boulders and
17 obstructions down there on the bottom. Now, the n value
18 may very well vary going across the river. It may be
19 lower, say, in areas that are heavily silted up and
20 you've got fine gravel, and it may be higher where there
21 are big obstructions and boulders and so forth. So even
22 the n value will vary as you go across the river.

23 Q And is it appropriate to use one n value for
24 an entire cross section? That is to say, to pick the
25 rocky one, if the entire channel isn't rocky?

1 A (WITNESS PHILLIPPE) Usually what is done is to
2 give an average n value for the entire river,
3 particularly if we are -- not for the entire river,
4 either. For instance, if we are doing flood
5 determinations using, say, the model HEC-2 -- that is a
6 U.S. Army Corps of Engineers model for river flood plain
7 determinations.

8 In that particular model we discussed
9 different n values for, say, the lower banks and a
10 different n value for, say, the main channel, and
11 hopefully, we come up with an n value that corresponds
12 to an average for that channel. And if there are big
13 differences within the channel, we may use multiple n
14 values and break up our channel accordingly.

15 JUDGE BRENNER: Mr. Sugarman, how much more do
16 you have?

17 MR. SUGARMAN: One or two questions.

18 BY MR. SUGARMAN (Resuming):

19 Q Now, you were asked by Judge Morris I believe
20 what the applicant had used the rating curve for.

21 A (WITNESS PHILLIPPE) Yes, sir.

22 Q And you indicated that they used it to get
23 stage or to get flow.

24 A (WITNESS PHILLIPPE) Flow, yes, sir.

25 Q Do they also use it to get velocity, and

1 specifically, with respect to Mr. Boyer's testimony that
2 he took a number off the rating curve to represent stage
3 and then converted it to velocity using Mr. Harmon's
4 measurements. Did that involve the rating curve -- and
5 adjusting them downward. Did that involve the rating
6 curve in the estimation of velocity?

7 A (WITNESS PHILLIPPE) Well, if he used the
8 rating curve to come up with a flow, and q flow is equal
9 to area times the cross sectional area times the
10 velocity -- and incidentally, that cross-sectional area
11 is perpendicular to the velocity; it is not just any
12 area and not just any velocity; it is a cross-sectional
13 area perpendicular to the velocity -- then one would
14 derive an average cross-sectional velocity given the
15 cross-sectional area and the flow. So in that sense, an
16 average velocity could be found for the whole cross
17 section.

18 Q And did you understand Mr. Boyer's testimony
19 that he, in effect, did that by taking Harmon's numbers
20 and adjusting them down based upon the rating curve of
21 relating stage to flow?

22 A (WITNESS PHILLIPPE) I didn't understand that.

23 Q Does the cross-sectional measurement have to
24 be perpendicular to velocity in order to be used to
25 evaluate velocity?

1 A (WITNESS PHILLIPPE) Yes.

2 Q Is there any indication as to what the cross
3 sections of this river are at this location as related
4 to the vector of the velocity?

5 A (WITNESS PHILLIPPE) Most of the cross section
6 are at some angle to what I would think would be the
7 principal vector of the velocity.

8 Q Are they sufficiently certain with respect to
9 that perpendicularity to be usable as such?

10 A (WITNESS PHILLIPPE) If I want to use plus or
11 minus some percent; Mr. Boyer just went through it.
12 It's 15 percent I've got about 97 percent of what the
13 true velocity is. If it's 25 percent, I've got -- what
14 was it -- 90 percent, or what have you. It is strictly
15 a trigonometric type relationship.

16 Q Now, Judge Morris asked you given steady state
17 conditions, would a change in elevation at the wing dam
18 impact the direction of the flows at Point Pleasant.
19 Your answer was that it would not, given steady state
20 conditions.

21 A (WITNESS PHILLIPPE) Given steady state
22 conditions it would not. Now, the corollary to that is
23 that if I have a base flow of around 2500 cfs and I get
24 a flood wave coming down through there from some release
25 or some upstream flooding or what have you, then that

1 component of flow has got to come through the
2 constriction of the Tohicken bar. At the Tohicken bar.
3 And the velocity vectors that will result as that flow
4 tries to expand out into the eddy will change from that
5 steady state condition, rather remarkably I would think,
6 depending on how rapid and how big that flood wave is.

7 And one of the points I would make at this
8 particular location for an intake is that those velocity
9 components will shift with those higher flows coming
10 down into this pool situation. If, however, the intake
11 is located further down in the pool, then those flows
12 have had a chance then to be damped out by the ponded
13 water there. So that the steamlines further down will
14 have tended to establish themselves again.

15 Q All right. In response to Mr. Conner you
16 indicated it is possible to get a smooth curve as a
17 rating curve for this river at this location. Would
18 such a smooth curve, however, also have the bumps that
19 you've indicated?

20 A (WITNESS PHILLIPPE) Yes, sir.

21 Q And finally, when you were referring to 1981
22 being a wet year, were you referring to calendar 1981?

23 A (WITNESS PHILLIPPE) That is what I had
24 remembered as being a wet year.

25 MR. SUGARMAN: Thank you.

1 JUDGE BRENNER: Okay. Judge Cole has a few
2 quick questions.

3 BOARD EXAMINATION -- Further

4 BY JUDGE COLE:

5 Q Mr. Phillippe, you identified station 9 plus
6 25 and 9 plus 30 as the area -- that section of the
7 river with the highest flow and the deepest part of the
8 river, did you not, sir?

9 A (WITNESS PHILLIPPE) Yes, sir.

10 Q Did you get that independent of -- how did you
11 obtain that number, sir?

12 A (WITNESS PHILLIPPE) The only cross-sectional
13 data that I was able to obtain for this particular
14 location was off of Policastro Exhibit 1, and I took
15 cross sections 100 feet, I took them parallel to the
16 intake, and I took them at 100-foot increments up to 500
17 feet across the bar, and I took them at 100-foot
18 increments down to about 300 feet where I ran out of
19 contour lines on that particular exhibit. Then I also
20 took the Corps of Engineer's cross sections which were
21 available, and they were plotted reversed to these, so I
22 flipflopped them and plotted them so that the
23 Pennsylvania shore would be on the same side and so
24 forth.

25 And so I have a stack of cross sections that I

1 plotted with areas with different depths that I used for
2 my own guidance in making calculations from the wing dam
3 all the way up to the Section 22.56 above the Tohicken
4 Creek.

5 Q All right, sir, thank you. Do you have
6 Applicant's Exhibit 2 with you, sir, and particularly,
7 Table 1, the velocity measurements of the Delaware River
8 flow along the river intake centerline?

9 A (WITNESS PHILLIPPE) Yes, sir, I do.

10 Q You were asked various questions concerning
11 the possibility of error in distance measurements.

12 A (WITNESS PHILLIPPE) Yes, sir.

13 Q Now, in view of what you said about the
14 location of the deep part of the channel and the highest
15 area of flow, and looking at the data for the flows at
16 3000 cfs and 4500 cfs, and based upon what you know
17 about what would likely be the velocity distribution
18 pattern around the central channel, does it appear to
19 you that there would be any obvious error in any
20 distance measurements associated with these readings?

21 A (WITNESS PHILLIPPE) With the second set of
22 measurements at the 4500 plus or minus, whatever it
23 turns out to be, those seemed to be more directly
24 located. The difficulty I would have with the 3000 cfs
25 measurements is that they are at 60 to 90 feet

1 increments apart from 860 to 930. Well, that is 70 feet
2 apart, so I don't know where in that particular cross
3 section the maximum current may have occurred.

4 Q All right, sir, but the maximum velocities
5 that are listed there are associated with the 9 plus 30,
6 are they not, sir?

7 A (WITNESS PHILLIPPE) Yes, sir.

8 Q So is it possible that you cannot determine
9 any error by looking at that; can you?

10 A (WITNESS PHILLIPPE) No, sir. But there again,
11 I don't know if his 9 plus 30 was more riverward or New
12 Jerseyward than the true 9 plus 30. He could have
13 gotten a peak velocity, if you will. If you look at the
14 4500 cfs curve, you will find that the peak velocity at
15 the top is at about station 940. So he may have been 10
16 feet, he may have been 20 feet off with his particular
17 measurement at the 3000 cfs.

18 Q All right, sir. Do you have --

19 BY JUDGE BRENNER (Resuming):

20 Q Excuse me, sir. You said the peak, using
21 these measurements on Table 1 for July 23rd, was 9 plus
22 40 or so? 9 plus 24, I think.

23 A (WITNESS PHILLIPPE) 9 plus 24, I'm sorry.

24 Q And I emphasize you're using surface.

25 A (WITNESS PHILLIPPE) I'm wrong, because I have

1 a scale of one inch equals 50 feet here instead of one
2 to 100, which I have been using elsewhere. So I am
3 wrong with that.

4 JUDGE BRENNER: Thank you.

5 MR. SUGARMAN: He's looking at the figure and
6 not the numbers.

7 JUDGE BRENNER: Why don't you look at the
8 numbers, sir?

9 JUDGE COLE: Well, the numbers are the origin
10 of the figures, and I am just looking at the numbers.

11 BY JUDGE COLE (Resuming):

12 Q Can you tell more by looking at the curves
13 than by looking at the numbers?

14 A (WITNESS PHILLIPPE) Well, I'm looking at both.

15 JUDGE BRENNER: You have the table there.

16 WITNESS PHILLIPPE: Yes, and I've plotted the
17 figures on top of it.

18 BY JUDGE COLE (Resuming):

19 Q Well, I guess what I would like to get is your
20 opinion about -- well, what in this data makes you think
21 that there is likely to be an error, and then, what is
22 your best judgment as to if there is an error, what is
23 it likely to be as a probable thing. And what is it
24 likely to be as a maximum.

25 A (WITNESS PHILLIPPE) Okay, I will first say

1 that within any set of data it is plus or minus
2 something from the truth, and there is some
3 reasonableness in what I see before me. In fact, maybe
4 a lot of reasonableness; I don't know. But what I have
5 difficult with is what the locations actually were.

6 It would appear that at about station 9 plus
7 30, given that particular intake, that I would get a
8 maximum velocity, and I think that is reasonable.
9 Whether it's 9 plus 30 or 9 plus 25 or 9 plus 40 or 9
10 plus 50.

11 One of the problems I have with where that
12 maximum velocity will be depends on the fact that I
13 believe that there are cross current considerations,
14 given the different flow regimes that we're going to be
15 working with. And what deflects off, if you will, the
16 bar from the Tohicken and what components go to New
17 Jersey and finally flow back toward the intake. So I
18 don't know.

19 On its face, it would appear that at the 300
20 cfs flow measurement, that the station 9 plus 30
21 represents the maximum flows, and give or take a little
22 bit, may be correctly located. I don't know, because
23 there are -- what my difficult is, is that I'm so close
24 to the influences of that Tohicken bar that I really
25 don't know what the flow patterns are and I don't have

1 enough data to say yea or nay what they are.

2 Q All right, sir. If we make the assumption
3 that the velocity measurements were accurate and
4 reported accurately, --

5 A (WITNESS PHILLIPPE) I don't have any
6 difficulty with the magnitude of the numbers that are
7 reported.

8 Q All right, sir. Based upon the manner in
9 which they measured distances, can you give any estimate
10 of possible error associated with the manner in which
11 they measured the distances, assuming that the
12 velocities that they measured are, in fact, correct?

13 A (WITNESS PHILLIPPE) With the stadia
14 measurements, I would say they could be plus or minus
15 five feet, roughly. With the location of where they
16 were, given that particular method. I don't know what
17 the particular conditions were on July 23rd. If there
18 were a lot of heat waves it might be higher than that.
19 If it was very still and no heat waves then plus or
20 minus five feet. And with the range finder methods,
21 there is no way I could really determine how far off
22 they were, given the fact that it was calibrated five
23 months later.

24 And if it was a mechanical adjustment problem,
25 maybe a screw loose there so when they calibrated it

1 they got one thing and if they calibrated it five months
2 later and it jostled around in the case a little bit it
3 might have another set of measurements. So in that
4 respect, they may have been out in plus or minus 20 or
5 25 feet from where they should have been is my judgment
6 of the size of the area.

7 JUDGE COLE: Thank you.

8 JUDGE BRENNER: I hope we've completed this
9 witness. Is that the case?

10 MR. CONNER: Yes.

11 JUDGE BRENNER: Mr. Phillippe, thank you very
12 much. We appreciate your presence and patience with us
13 over the weeks here, and especially last evening and
14 today.

15 WITNESS PHILLIPPE: Thank you for your
16 patience with my long-winded answers.

17 JUDGE BRENNER: Well, you got a lot of
18 long-winded questions.

19 We will break until 2:05 and then we will come
20 back and finish up with Del-Aware's one hour of the
21 staff. I want to talk about Professor Lewis's testimony
22 and if we do agree as a Board with it, and therefore
23 bind it in, I hope the corrections made as to where the
24 inserts are to be inserted --

25 MR. SUGARMAN: I gave that back to you last

1 night.

2 JUDGE BRENNER: I know that, but I hope they
3 were made for the reporter so that the copy that we bind
4 in is very clearly delineated. And if you take a look
5 at some of your changes, it still doesn't make a lot of
6 sense, although I can now make better guesses;
7 particularly the one on page 2, or both of them on page
8 2. The English doesn't quite follow. I think there is
9 a word wrong or reversed or something.

10 MR. SUGARMAN: I beg your pardon?

11 JUDGE BRENNER: I think there's a word or two
12 missing or reversed or something is still askew,
13 although it is easier now.

14 And we will also tell you when we come back
15 the format we want the findings in, and we will do that
16 first so that we don't run out of time at the end of the
17 day.

18 WITNESS PHILLIPPE: Excuse me, sir. On the
19 figure that I did in pen, is this the original copy that
20 is to be bound in, and does it need to be darker or did
21 I do it on another one?

22 JUDGE BRENNER: Why don't you check with Mr.
23 Sugarman? As long as you get a copy somewhere that you
24 could mark up that everybody has looked at, we will be
25 happy. We are not going to bind it in because of its

1 size. We will keep it as an exhibit, though. And we
2 would appreciate copies, also, as well as the parties.
3 If you can agree on copying just that portion of it.

4 MR. SUGARMAN: That is what I'd like to do,
5 sir.

6 JUDGE BRENNER: Then maybe we can bind it in
7 and give copies to the parties that way.

8 All right. We will come back at 2:10.

9 (Witness Phillippe was excused.)

10 (Whereupon, at 12:55 p.m., the hearing in the
11 above-entitled matter was recessed for lunch, to
12 reconvene at 2:10 p.m. the same day.)

13

14

15

16

17

18

19

20

21

22

23

24

25

AFTERNOON SESSION

1

2

(2:10 p.m.)

3

JUDGE BRENNER: Good afternoon.

4

Before we resume the cross examination of the
5 Staff's witnesses by Mr. Sugarman for Del-Aware, the
6 Board would like to get our guidelines as to the format
7 of the proposed findings of fact and conclusions of
8 law.

9

We have previously discussed, I believe, in
10 one of our prior orders -- and if I am incorrect, I am
11 discussing it now -- the extent to which the Board has
12 to rely heavily on proposed findings by the parties.
13 And if they are well-balanced findings as opposed to
14 findings as of the filing party's prefiled written
15 testimony was the only thing at the hearing and thereby
16 just providing us a brief written summary of the written
17 testimony as if there had been no cross examination by
18 other parties, that is not a balanced finding, and your
19 chances of having such findings adopted a very low.

20

We have seen findings -- I have seen findings
21 that are of that cut and paste variety from the prefiled
22 testimony. Sometimes it's appropriate; sometimes it's
23 not. We have all been at this hearing. There has been
24 a lot of cross examination. We expect the transcript to
25 be reflected in the findings and in order for the

1 findings to be well balanced we expect it to represent
2 what transpired and not just what the parties thought
3 would be the case in advance of the hearing.

4 In short, we expect a thorough record search
5 and inclusion in the findings of the transcript as well
6 as the prefiled testimony.

7 As to format, we would like the findings to be
8 in the form of a proposed initial decision as if the
9 Board was speaking and for it to be in two sections.
10 One would be a finding section and the other would be an
11 opinion section, and this is similar to formats that
12 have now begun to be used in recent initial decisions by
13 licensing boards, and I refer to some of those as
14 examples, although they are not the only examples.

15 But for some guidance you might look at the
16 Susquehanna initial decision, which was issued on April
17 12, 1982, and the San Onofre initial decision, which was
18 issued on May 14, 1982. Now I am referencing them as to
19 format. In terms of total volume, which is something I
20 will come to at the end, they are large because they
21 represented close to a full operating license case
22 decision, which is not what we have here.

23 However, as to format you will see that they
24 have similarities and differences, but those examples
25 will fall within the range of the description that I am

1 about to give now, notwithstanding the fact that they
2 differ even as compared to each other.

3 The findings section is essentially what has
4 been issued in the past as an initial decision prior to
5 the two-section approach by licensing boards. However,
6 what we consider the findings section now is rather
7 drastically boiled down to the essentials, including, of
8 course, any necessary number of subsidiary findings of
9 fact with references to the record leading up to the
10 ultimate findings of fact.

11 However, unlike the past practice, the
12 discussion and rationale included in the findings
13 section is limited. In addition to boiling down the
14 factual findings closer to the essentials, the findings
15 should include rationale only to the extent necessary to
16 support the findings, which are, in turn, based upon the
17 facts in the record.

18 In addition, there is also a conclusions of
19 law section, which would be very similar to the summary
20 of law section that has always traditionally appeared,
21 except in this instance it will be limited only to the
22 issues we have litigated so far.

23 Now the other section in addition to the
24 findings section is what we might call the opinion
25 section, and the opinion section would discuss the

1 important issues in the proceeding and how they were
2 resolved. The opinion section is usually, in fact,
3 perhaps necessarily written after the findings section,
4 although obviously as you are preparing this you go back
5 and forth to some extent in working up to your final
6 versions -- back and forth in the sense of your
7 preparation.

8 In terms of the mechanical sequence in the
9 proposed initial decision that you should submit, the
10 opinion section would be first and then the findings
11 section, even though, as I said, the findings section is
12 the one you undoubtedly have to substantially write
13 first. The opinion section typically is organized with
14 a very brief synopsis of the issues, but the bulk of the
15 opinion is sub-headed by the issues and subissues which
16 we have litigated, and then contains a discussion,
17 issue-by-issue, of those issues and their resolution.

18 It is in the opinion section that you would
19 have the references to the controlling law, including
20 the case law, and they would be cross referenced to the
21 numbered findings of fact in the opinion section rather
22 than references directly to the record. The findings of
23 fact, as we have discussed, is where the references to
24 the record would be.

25 The opinion should include the rationale to

1 support the conclusions, which are in turn based upon
2 the findings. So it is in the opinion section that you
3 see a lot of rationale that used to be included weaved
4 in with the findings in the former one-section approach
5 of licensing board decisions.

6 Obviously, the findings and opinion sections
7 are interdependent and mutually essential to a full
8 statement of facts found and the law applied, as well as
9 the analysis and reasoning from which the facts in the
10 law would be derived.

11 I think the examples we have cited will be
12 helpful for you to look at to see where redundancies are
13 avoided, because if you just listen to the description I
14 gave you it sounds as if you will be restating the same
15 thing twice, but that isn't the effect. There is some
16 overlap, but the repetition is not that great. You have
17 flexibility also. Some rationale would fall in-between
18 rationale needed to support the essential findings as
19 distinguished from rationale to support the opinion in
20 the conclusions and opinions section.

21 You don't have to put such rationale in both
22 sections. Just put it wherever you think it is best
23 suited. However, when in doubt as to what section to
24 include the rationale within, it is probably better to
25 put it in the opinion section.

1 I would hope that Mr. Sugarman can get access
2 to those two opinions I cited rather quickly through the
3 other parties in the case, perhaps before he leave here
4 today. In fact, let's go off the record for a minute.

5 (A discussion was held off the record.)

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

7 In terms of the findings schedule, obviously
8 we won't stay with the initial due dates. We will take
9 the schedule and shift it, starting from today, from the
10 schedule proposed and ordered by the Board, and in doing
11 that, by my calculations and, I'm sure, you will all be
12 quick to tell me when I get it wrong -- but the
13 Applicant's proposed findings will have to be received
14 by the Board and parties on November 9.

15 Del-Aware's proposed findings will have to be
16 received by the Board and parties on November 16.
17 Staff's proposed findings would have to be received by
18 the Board and the parties on November 23. And
19 Applicant's reply findings would have to be received by
20 the Board and the parties on November 30.

21 One footnote here. Parties have in some of
22 the following -- in this portion of the case, that is,
23 the contentions we are trying here have come up with
24 some ways of avoiding service on the entire service
25 list, and in large part those approaches have been fine

1 because the parties have been giving notice by cover
2 letter as to what was being filed so that everybody in
3 the entire large case had notice of what was filed and
4 if they wanted it they could ask for it.

5 I think it is easier to just file it with all
6 the parties, if cost isn't a problem. But if cost is a
7 consideration to any of the parties -- and I'm thinking
8 particularly of the non-government parties -- you can do
9 it the way you have done it with one caveat. Del-Aware,
10 for one, and perhaps others, have not been serving the
11 Appeal Board panel.

12 MR. SUGARMAN: We missed that a couple of
13 times, but we are back to doing it.

14 JUDGE BRENNER: Good, because we have been
15 running copies of what you have filed with us for them.
16 Even though they don't have an Appeal Board formed, they
17 keep a docket. In fact, that is not to be confused with
18 the fact that when and if they form an Appeal Board, in
19 that case you have to serve the individual Appeal Board
20 members in addition to the panel. So please do that in
21 the future.

22 MS. HODGDON: Judge Brenner, you said that --
23 to be received by the Board and parties to this hearing
24 on the same day, and everybody else to get a mail copy?

25 JUDGE BRENNER: Yes. I'm glad you clarified

1 that, that as we have been doing all along, the received
2 dates are only for the immediate parties here. The
3 received date means before 5:00. We have had problems
4 with that in the past and it's cost us a week sometimes
5 because we gear our travel schedule and if we leave on
6 that day then we are out of town on another hearing and
7 we lose the week to have the documents in our
8 possession. And that has hurt us sometimes in the past,
9 hurt us in the sense that we had to squeeze two
10 weekends' work into one weekend when we did get back.

11 All right. That's all we have.

12 (A discussion was held off the record.)

13 JUDGE BRENNER: The reporter reminds me that
14 we have Xerox size copies, standard size copies of
15 Del-Aware 25 and 26 and I propose we bind them into the
16 record at this point for convenience.

17 (Del-Aware Exhibit Numbers 25 and 26 follow:)

18
19
20
21
22
23
24
25

1 JUDGE BRENNER: In addition, we will want
2 three copies for the official record and hopefully, at
3 least as to Del-Aware 26, since there are larger copies
4 available, the three copies for the official record can
5 be those large copies, if they are available. I think
6 that would be better. If they are not available, it is
7 not essential, but that would be preferred.

8 For 25, you can use whatever size you want.
9 The pertinent information is readable either way.

10 (A discussion was held off the record.)

11 MR. SUGARMAN: The scale is the same. It's
12 not a reduction.

13 JUDGE BRENNER: What I'm thinking of is the
14 Appeal Board.

15 MR. SUGARMAN: Well, this is not a reduction.
16 It is the same size. It is just half of the sheet.

17 JUDGE BRENNER: All right, fine. We will take
18 the small copies. Mr. Sugarman points out to me that
19 the only thing in writing is on the small part.
20 Whereupon,

21 REX G. WESCOTT

22 and

23 MICHAEL T. MASNIK

24 were recalled as witnesses and, having been previously
25 duly sworn, were further examined and testified as

1 follows:

2 CROSS EXAMINATION - Resumed

3 BY MR. SUGARMAN:

4 Q Mr. Wescott, when we broke yesterday you were
5 explaining the basis upon which you, as you indicated,
6 it gave you some comfort as to the numbers. You were
7 here for Mr. Phillippe's testimony this morning, were
8 you not?

9 A (WITNESS WESCOTT) That is correct.

10 Q With respect to the basis of your
11 calculations, do you agree that if the bottom bathymetry
12 is impacted by the bar of the Tohicken Creek or by other
13 factors that would make it non-regular, that that would
14 affect the location of the distribution of the velocity
15 points across the channel?

16 A (WITNESS WESCOTT) Yes, I agree with that.

17 Q And your methodology would not reflect that,
18 would it?

19 A (WITNESS WESCOTT) Well, yes, it would, if I
20 understand your correction, if I understand your
21 question correctly. I plotted the velocities. I had
22 the cross section, so I really had a velocity at each
23 point and I had a depth at each point, and so when I
24 integrated them, when I came up with the discharge -- is
25 that what you are talking about?

1 Q Yes. You say you measured them at each
2 point. What do you mean by "each point"?

3 A (WITNESS WESCOTT) I plotted them at each
4 point.

5 Q What do you mean "at each point"?

6 A (WITNESS WESCOTT) At each given point.

7 Q Given by whom?

8 A (WITNESS WESCOTT) The Applicant.

9 Q Do you mean you took the 100-foot sections and
10 made each 100-foot section a block for purposes of
11 distributing velocity?

12 A (WITNESS WESCOTT) No. I believe what I did
13 is I plotted the sections or plotted the velocity
14 measurements through a smooth curve and then I actually
15 took 20-foot intervals.

16 Q But you didn't have data at 20-foot intervals,
17 right?

18 A (WITNESS WESCOTT) No. I just interpolated
19 between the points.

20 Q So if the interpolation -- and you say you
21 interpolated on the basis of the proportionate change
22 between the points?

23 A (WITNESS WESCOTT) That is correct.

24 Q That were shown?

25 A (WITNESS WESCOTT) That is correct.

1 Q And given that the Applicant had provided data
2 based upon 100-foot measurements, in other words
3 measurments at intervals of 100 feet, and your were at
4 20 feet, but interpolating between those 100 feet, if
5 the 100-foot intervals failed to disclose the
6 bathymetry, then your calculations in turn would fail to
7 reflect the bathymetry. Isn't that correct?

8 A (WITNESS WESCOTT) Well, first of all, are you
9 talking about the November 7, 1980 measurement?

10 Q No. I'm talking about the cross section.

11 A (WITNESS WESCOTT) The cross section, the
12 Applicant provided points, I believe, at less than 100
13 feet.

14 (Pause.)

15 A (WITNESS WESCOTT) It appears the way the
16 Applicant has constructed the cross section is the way
17 we normally construct a cross section. He plotted the
18 elevation each time that he drew a line across the river
19 at the intake across the contour line. At least that is
20 the way it appears to me in this cross section, which is
21 the way one normally constructs a cross section from a
22 map.

23 Q But didn't you hear Mr. Bourquari testify that
24 those contour lines were based upon a survey at 100-foot
25 intervals?

1 A (WITNESS WESCOTT) No, I didn't hear that, but
2 if he did say that, I would believe it.

3 Q The location of the contour lines themselves
4 may be interpolations; isn't that correct?

5 A (WITNESS WESCOTT) Normally they are.

6 Q So when you say you provided points, you
7 provided interpolated points?

8 A (WITNESS WESCOTT) That's correct.

9 Q And you interpolated points between the
10 interpolated points, is that correct?

11 A (WITNESS WESCOTT) You could say that, yes.

12 Q So the description you had of the bottom
13 bathymetry in the cross section was only accurate to
14 within 100-foot cross sections or 100-foot intervals.

15 A (WITNESS WESCOTT) Normally when we talk about
16 accuracy in the bottom profile we are talking about how
17 much the elevation may vary for a particular station.
18 We don't worry about how far, let's say, the exact point
19 of 21.5 is from a certain area. We pick a station,
20 let's say, seven plus 50, and what we are really
21 concerned about is whether that's at elevation 60 or 61
22 or 59 because that's how we determine that the area is
23 in the depth.

24 And he is drawing two-foot contours and from
25 the way they look I would tend to believe that those

1 bathymetric contours are probably accurate vertically
2 within a foot.

3 Q And how about horizontally?

4 A (WITNESS WESCOTT) Well, I don't think
5 horizontal error has any meaning in this context because
6 we've got stations set up across the -- across the cross
7 section. What we want to know is the depth at those
8 stations. I mean, when you talk about horizontal
9 accuracy, I think what you are talking about in terms of
10 topography or bathymetry or anything else is how far an
11 exact elevation is from where it is shown to be, and
12 that just really isn't of any consequence. It is what
13 the elevation is at a point that is important.

14 Q Why is it that it is the elevation at a point
15 that is the only important thing?

16 A (WITNESS WESCOTT) Because that is how we
17 determine our hydrolic parameters.

18 Q I'm sorry. I don't understand what that
19 means. That is how you determine hydrolic parameters.
20 Could you explain that, please?

21 A (WITNESS WESCOTT) Well, the cross sections is
22 what gives us area, what gives us hydrolic radius, and
23 depth.

24 Q And the cross section is a function of three
25 dimensions, isn't it, or at least the bottom dimension

1 is one of the three?

2 A (WITNESS WESCOTT) Well, in the case of a
3 cross section, really characterizing it in two
4 dimensions.

5 Q And isn't the distribution of depths at the
6 bottom one of the dimensions?

7 A (WITNESS WESCOTT) Depth is a dimension.

8 Q And if the depth changes, doesn't it vary the
9 cross section?

10 A (WITNESS WESCOTT) Yes, if there is an error
11 in depth, that means the cross section has either less
12 or more area or less or more depth at that particular
13 station.

14 Q So isn't it relevant to know whether -- what
15 the depth, the actual depth, is all the way across that
16 partition?

17 A (WITNESS WESCOTT) In my judgment, it was
18 sufficient to know within a foot, and that is from
19 two-foot contours, and that is what I assume the cross
20 section is.

21 Q How can it be sufficient to know within a foot
22 if it is two-foot contours?

23 A (WITNESS WESCOTT) Generally if you have a map
24 that is set up by two-foot contours, the error would be
25 plus or minus a foot.

1 Q I'm not talking about the error. I'm talking
2 about change. I'm talking about slope. How do you know
3 what the slope is within those 100-foot intervals?

4 A (WITNESS WESCOTT) What slope are you talking
5 about? Are you talking about the slope down from the
6 shore down to the channel?

7 Q Yes.

8 A (WITNESS WESCOTT) You are not going to show
9 every little bump as long as you are taking 100-foot
10 stations. I will admit to that. But normally the
11 amount of error that can be induced by missing all of
12 these little irregularities is not going to be enough to
13 affect the basic conclusion or number that you are going
14 to get, whether it be cross-sectional velocity or
15 whether you are doing a backwater computation.

16 Q You do admit that it has an effect?

17 A (WITNESS WESCOTT) Yes, but relatively small
18 would be my opinion.

19 Q Now in terms of assigning the different
20 discharges to the different partitions as you went
21 across the river, how did you assign the discharges to
22 the different sections?

23 A (WITNESS WESCOTT) Okay. What I did is for
24 each 20-foot interval I determined what the average
25 depth would be. I determined what the velocity would be

1 from the smooth curve I had drawn through the
2 Applicant's points, and I multiplied the two.

3 Q So that if the velocity --

4 A (WITNESS WESCOTT) And then I multiplied by
5 20, of course.

6 Q If the velocity as determined by the Applicant
7 was not accurate for that 20-foot contour, it didn't
8 represent that 20-foot interval, then your calculation
9 would be off for that 20-foot interval?

10 A (WITNESS WESCOTT) That is correct.

11 JUDGE MORRIS: Excuse me just a minute, Mr.
12 Sugarman. I'm afraid we are building a large building
13 here on a foundation that I am uncertain about.

14 I seem to recall that the cross section data
15 were made at transects 100 feet apart, but I think the
16 elevation of the bottom were made at smaller intervals.
17 Are you able to put your fingers on the answer to that
18 question?

19 WITNESS WESCOTT: No, sir, I'm not. In fact,
20 I was a little bit surprised when Mr. Sugarman said 100
21 feet apart because that is quite a distance, but I
22 thought it was being taken directly from testimony, so I
23 accepted it. But I would tend to think that certainly
24 depth measurements, if you have a river that is 500 feet
25 wide, you would certainly take your depth measurements

1 much closer than 100 feet apart.

2 JUDGE MORRIS: What would a reasonable
3 interval be, do you think?

4 WITNESS WESCOTT: Gosh, it depends upon what
5 you are doing.

6 JUDGE MORRIS: Well, going across the Delaware
7 River where it's 500 feet wide.

8 WITNESS WESCOTT: I would say 25-foot
9 intervals would probably be reasonable and they might
10 even be closer. I think it has a lot to do with how
11 they did it, whether they set up a line that went across
12 the river or whether they had to station themselves from
13 a boat.

14 If they had a line going across, why it would
15 be much easier to take a lot of measurements and I would
16 say probably they took them about the same place they
17 took their velocity measurements, at 25-foot intervals.

18 JUDGE MORRIS: Well, I just really wanted to
19 point out the uncertainty of the assumption that was
20 made for this line of questions.

21 MR. SUGARMAN: I appreciate that, Judge
22 Morris. I do remember asking Mr. Bourquard the
23 question, and he responded that the Major survey of 1967
24 was the basis for that cross section.

25 JUDGE BRENNER: Is that something you can find

1 in a minute or two, because, if not, I have another
2 suggestion.

3 MR. SUGARMAN: No, I can't find it.

4 JUDGE BRENNER: You can't find it in a minute
5 or two?

6 MR. SUGARMAN: No, I can't find it. I don't
7 think I'm going to be able to find it. If I hit on it,
8 it would just be luck.

9 JUDGE BRENNER: You would like to know that
10 because you want to ask Mr. Wescott a series of
11 questions based on that, right?

12 MR. SUGARMAN: Yes. I don't want to ask him
13 any irrelevant set of questions.

14 JUDGE BRENNER: But if it is what you thought
15 it was, you have questions you want to ask him?

16 MR. SUGARMAN: Yes, sir.

17 JUDGE BRENNER: Can we get Mr. Bourquard up
18 there for a question or two? It's always dangerous to
19 hang around, Mr. Bourquard.
20 Whereupon.

21 E. H. BOURQUARD
22 was recalled as a witness and, having been previously
23 duly sworn, was further examined and testified as
24 follows:

25 JUDGE BRENNER: We don't want to develop new

1 testimony. We want to recapitulate old testimony. Do
2 you recall being asked what the intervals were that Mr.
3 Major used in his contour line development?

4 WITNESS BOURQUARD: Yes. As Judge Morris
5 said, there were sections, not points. There were
6 sections taken across the river at 100-foot intervals,
7 for a total of 12 such sections.

8 Now as to how close the points were between
9 the individual sections, I can't give you that. I don't
10 have a section with me. I thought I did, but I don't.
11 But the general procedure was to go out and they would
12 be doing soundings and they would, as they went along,
13 and dropped something at whatever interval they
14 thought -- probably 20, 30 feet. They would take a
15 reading and move all the way across the river in that
16 fashion.

17 JUDGE BRENNER: One line, so to speak, per
18 section and the move on to the next 100-foot section?

19 WITNESS BOURQUARD: Yes, they would go all the
20 way across the river and then move up to the next
21 section and do the same thing there.

22 JUDGE MORRIS: Were the plumbing as they went
23 across?

24 WITNESS BOURQUARD: I wasn't there, Judge
25 Morris. I assume that is what they did. They were

1 reading from water level down and took a reading on
2 water level as they went across, but I'm not sure. I'm
3 only estimating or, I would say, guesstimating, which
4 you normally do in this case.

5 JUDGE MORRIS: Before they started this
6 operation, would they have in mind the contour interval
7 that they wanted to come up with?

8 WITNESS BOURQUARD: No, sir. I think they
9 would be looking for breaks in the natural ground.

10 JUDGE MORRIS: I don't mean the
11 configuration. I mean whether it was a two-foot or a
12 ten-foot separation of contours.

13 WITNESS BOURQUARD: Between points, you
14 mean -- between where they would take the sounding?

15 JUDGE MORRIS: I am looking ahead to the final
16 product, which we have before us, which shows the
17 contour lines of the river bottom at two-foot contour
18 intervals, and I'm asking would they, before they
19 started this operation, know that that is the way they
20 were going to draw it?

21 WITNESS BOURQUARD: No, sir. They would try
22 to locate the break points.

23 JUDGE MORRIS: We're still not communicating.
24 I don't mean where the contours would be located, but I
25 mean whether it be ten-foot contour lines like the

1 topographical maps are sometimes, or 20-foot or 50-foot
2 or two-foot.

3 WITNESS BOURQUARD: I know what you mean. You
4 mean looking for the relative accuracy or the degree of
5 accuracy of the space between the contours. They are
6 only working at a depth of about ten to fifteen feet,
7 which is the depth of the river, and they would be aware
8 of that at the time, so I assume they would be trying to
9 get accuracy within where a foot would break.

10 In other words, if they got one 9 feet, they
11 would probably go out and maybe try to find one that was
12 around ten feet on across the river in that fashion.
13 But they wouldn't necessarily look for ten feet. In
14 other words, when they got to where they thought it
15 probably was ten feet, they might get 10.2 or something
16 like that, and that would be the reading there.

17 JUDGE MORRIS: So if they move from one spot
18 to another perhaps they plumbed almost continuously as
19 they moved, and then when they saw a difference of one
20 or two feet they would stop and take an accurate
21 measurement?

22 WITNESS BOURQUARD: I would think they would
23 do that, yes, sir.

24 JUDGE MORRIS: Which would permit them
25 ultimately to draw contour lines at two-foot intervals,

1 for example?

2 WITNESS BOURQUARD: Yes, sir.

3 JUDGE MORRIS: Thank you.

4 JUDGE BRENNER: The obvious question is since
5 you don't know what they did, how do you know your
6 assumption about how they proceeded is reasonable?

7 WITNESS BOURQUARD: Well, that is the usual
8 way of doing it is the only thing I can say, not being
9 there. In other words, if I had done it, that would be
10 the way I would do it.

11 JUDGE BRENNER: You said you didn't recall the
12 intervals at which they decided to record the
13 measurement. However, I take it from the way you then
14 describe the usual method, there really are no --

15 WITNESS BOURQUARD: There are no fixed
16 intervals ordinarily. They would be as Judge Morris
17 mentioned. They would probably be sounding out there.

18 JUDGE BRENNER: So what did you mean when you
19 earlier said you thought it would be 25 to 30 feet
20 across?

21 WITNESS BOURQUARD: Well, I would guess that
22 would be where they would try to start getting it -- 20
23 or 25 feet -- but that is nothing more than an
24 estimate.

25 JUDGE BRENNER: In other words, even if they

1 didn't find a break sooner, they would take the
2 measurement accurately at that point?

3 WITNESS BOURQUARD: Yes, sir.

4 JUDGE BRENNER: Something you said -- and I
5 don't remember exactly why, but even though you don't
6 have their work with you that you had actually seen a
7 section of the work?

8 WITNESS BOURQUARD: Yes. We had twelve
9 sections.

10 JUDGE BRENNER: And on those sections, if one
11 had them here, you could tell what the intervals were?

12 WITNESS BOURQUARD: Yes, sir.

13 JUDGE BRENNER: So you were going somewhat on
14 a recollection, although not a clear one, as opposed to
15 just a supposition? I don't know how much you
16 remember.

17 WITNESS BOURQUARD: I remember the sections
18 and the contour intervals are taken by locating where
19 the, say, 60 contour or 62 contour would intersect these
20 various sections, and that would be plotted on a sheet.
21 In other words, all twelve sections were tied into a
22 base line along the river and a reference to that base
23 line.

24 JUDGE BRENNER: You can see which points were
25 actually measured points on those sections, then?

1 me at somewhat a loss as to where to go from here
2 because of the uncertainty of the situation.

3 BY MR. SUGARMAN: (Resuming)

4 Q Do you agree with Mr. Phillippe that the
5 intake is located close to the toe of the slope of the
6 Hickory Creek channel and close to the toe of the ridge
7 from the bar?

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 A (WITNESS WESCOTT) Yes, I do.

2 Q Do you agree that the crosscurrents from that
3 channel could intersect with the flows from the main
4 channel in about the center line of the eddy -- I mean
5 of the intake?

6 A (WITNESS WESCOTT) As I said before, and I
7 hope I'm saying the same thing, that it appears that you
8 could have a crosscurrent of not more than 30 degrees at
9 the intake.

10 Q By "crosscurrent" you mean the main channel
11 crossing across the intake?

12 A (WITNESS WESCOTT) I mean one of the stream
13 tubes, one probably the most toward Pennsylvania, going
14 at an angle of 30 degrees toward Pennsylvania across the
15 intake.

16 Q And are you speaking of a current from the
17 main channel?

18 A (WITNESS WESCOTT) Yes, I am.

19 Q Now, could you also have a current coming down
20 the Hickory Run channel toward the intake?

21 A (WITNESS WESCOTT) If you had enough flow in
22 Hickory Run, it is possible; but I really haven't tried
23 to analyze how much flow you could possibly have in
24 Hickory Run as compared to flows that you would most
25 likely have in the Delaware River.

1 Q Well, when we say the Hickory Run channel are
2 we also talking about the eddy flow?

3 A (WITNESS WESCOTT) I really don't know if
4 Hickory Run is a contributor to the eddy. I think the
5 main contributor to the eddy is the bar that extends out
6 from Tohicken Creek.

7 Q I'm not asking you whether it's a contributor
8 to the eddy. I'm asking you whether -- and let me try
9 to be clearer -- I'm asking you whether it could be a
10 pathway for the eddy flow; in other words, on Judge
11 Morris' clock from 12:00 to 3:00?

12 A (WITNESS WESCOTT) Yes. I think that would be
13 possible looking at the bathymetry here.

14 Q And do you have any feel for what the flow
15 through that channel would be; that is, reflecting both
16 eddy flow and Hickory Run or Hickory Creek flow?

17 A (WITNESS WESCOTT) Well, the applicant did
18 make a measurement, a velocity measurement of velocities
19 in the eddy at I guess it was the July 23rd, 1981, and
20 if we integrated these with depth, I guess we could come
21 up with a discharge. I did that rather crudely at one
22 time, and I think I came up with, well, the total
23 upstream component turned out to be almost 100 CFS. And
24 this is a pretty crude measurement, but that was, I
25 think, a good order of magnitude.

1 Q The total --

2 A (WITNESS WESCOTT) Upstream discharge; that
3 is, discharge going against the flow in the main
4 channel. Is that what you mean?

5 Q At 4500 CFS?

6 A (WITNESS WESCOTT) Well, I don't think it was
7 4500 CFS, to be honest with you. I would really rather
8 call it just the July 23rd, 1981 measurement.

9 Q Do you have an opinion as to what the flow was
10 on July 23rd? I mean the flow at Point Pleasant on July
11 23rd?

12 A (WITNESS WESCOTT) Yes. I believe it was
13 around 5600 CFS. Now, that seems like an awful exact
14 number, but I looked at the flows at Trenton on the 23rd
15 and 24th, and I think we went from a flow of almost
16 6,000 down to a flow of almost 5,000. So I assumed,
17 well, the discharge is probably some place in the
18 middle. Then I went through, tried integrating velocity
19 with depth.

20 Now, I recognized this doesn't go all the way
21 across the channel, so what I did was using the November
22 7th distribution as kind of a guide, continued that
23 velocity distribution on which really didn't -- you
24 know, we were already about three-quarters of the way
25 across the channel, and I came up with about 5600 CFS.

1 But I think there is probably a good chance for an error
2 of a couple of hundred, maybe as much as 300 CFS either
3 way in that particular estimate.

4 Q Well, if the velocities were what they are
5 represented at 5600 CFS, and if you assume that with me
6 and if you use your formula to calculate downward from
7 those velocities to what the velocities would be at 2500
8 feet, ignoring the November 7th measurements, what would
9 you get as a velocity past the intake or in the vicinity
10 of the intake at 2500 CFS?

11 A (WITNESS WESCOTT) Well, one of the reasons I
12 didn't do it exactly that way is because remember I said
13 before I went back and looked at the vertical
14 distribution of velocities at November 7th for 3000
15 CFS. Well, when I tried to do the same thing with the
16 velocity profile taken on July 23rd, I came up with a
17 very high n value that would really represent to me
18 something was wrong, and when I plotted these values it
19 appeared that the lowermost value, the one taken at 10
20 feet, was really out of place. In fact, you can see it
21 is virtually no higher than the flow, than the velocity
22 taken at 3000 CFS.

23 So I assumed that that velocity was probably
24 in error and probably should be more like 1.8 feet per
25 second. But, you know, based upon all of these things

1 that I've had to do with the data, I really didn't try
2 to extrapolate down because I really didn't feel it
3 would be very defensible.

4 Q Are you talking about the applicant's July
5 23rd measurement?

6 A (WITNESS WESCOTT) That's right. I believe
7 his bottom measurement is in error. I believe it was
8 way too low.

9 Q The bottom measurement at what station?

10 A (WITNESS WESCOTT) I think it must be pretty
11 close to --

12 JUDGE BRENNER: Why don't you tell us the
13 number you didn't like, and we will give it to you in
14 meters, feet and stations?

15 (Laughter.)

16 WITNESS WESCOTT: Okay. I guess that would be
17 8.49, I think is the velocity that is probably in error.

18 BY MR. SUGARMAN: (Resuming)

19 Q At the 10-foot depth?

20 A (WITNESS WESCOTT) At the 10-foot depth.
21 There could have been a lot of things that would cause
22 an error like that. I think when you're getting close
23 to the bottom you could have debris down there. A lot
24 of things could be disturbing the velocity.

25 Q That could be the crosscurrent coming in,

1 couldn't it?

2 A (WITNESS WESCOTT) Well, you don't seem to see
3 that same effect, though, at 3000 CFS flow, and I don't
4 think you would have that much of a difference in your
5 crosscurrent. I mean that you would have -- that you
6 would find that much of a difference. In other words,
7 at 30 degrees the cosine is just really an adjustment by
8 something less than nine-tenths, and here we're finding
9 something that's only 60 percent of what I would expect
10 it to be; so I really didn't think that that was a
11 crosscurrent effect. I just felt it was a bad data
12 point, and I really couldn't tell too much from it all.

13 Q Well, why didn't you use the 4-foot and 7-foot
14 depths then to calculate, to make a reference point to
15 adjust the data down for velocities?

16 A (WITNESS WESCOTT) Well, after correcting, I
17 don't think I worked it out, but I think it will come
18 out that way. Do you mean to use the 4? Okay. So what
19 you want me to do is define the velocity at 4 feet below
20 the surface for 2500 CFS based upon what it was at 4
21 feet below the surface at 5600.

22 Is that what you're asking me?

23 Q Right. And 7 feet below.

24 A (WITNESS WESCOTT) Well, that is going to take
25 a little bit of doing.

1 Q You didn't do it previously?

2 A (WITNESS WESCOTT) I made some calculations in
3 my head. I didn't write them down because it seemed
4 like I came out with about the same number, but I didn't
5 write them down. And I'm trying to quickly see here if
6 I have anything that would allow me to calculate it
7 relatively quickly.

8 JUDGE BRENNER: Is that what you want him to
9 do, Mr. Sugarman?

10 MR. SUGARMAN: Yes. If you have something
11 that can allow you to calculate it.

12 WITNESS WESCOTT: I have a calculator here. I
13 can do it.

14 JUDGE BRENNER: How long will it take?

15 WITNESS WESCOTT: Five minutes. Maybe he
16 could ask Mr. Masnik some questions while I do it.

17 JUDGE BRENNER: I'm sure Dr. Masnik will thank
18 you for that.

19 (Laughter.)

20 JUDGE BRENNER: Do you want to come back to it
21 after a break on just that one point?

22 MR. SUGARMAN: Maybe. We will see.

23 WITNESS WESCOTT: If I may something, I think
24 we're going to come out with about the same thing I had
25 before. I think it's going to be a confirmation of it.

1 But I'm certainly willing to do it and show it to you.

2 BY MR. SUGARMAN: (Resuming)

3 Q Now, your use of the November 7th, 1980
4 partitioning is dependent on Mr. Harmon's measurements
5 being in the partitions in which you place them, is that
6 correct?

7 A (WITNESS WESCOTT) That is correct.

8 Q So that if he were 25 foot too far offshore or
9 too close to the shore or whichever in his measurements,
10 that would shift that partition over, is that correct?

11 A (WITNESS WESCOTT) Yes. I accept Mr.
12 Phillippe's estimate that that 25-foot shift would still
13 allow the discharge measurement to check.

14 Q But would it create the same curve of
15 velocities, or would it move the points out 25 feet into
16 the river?

17 A (WITNESS WESCOTT) Of course, it would move
18 the velocity profile 25 feet out into the river.

19 JUDGE BRENNER: While we're on that subject, I
20 was going to ask you anyway, Mr. Wescott, what about
21 more than 25 feet, would you still get within the same
22 range of check?

23 WITNESS WESCOTT: No. I took a look at that,
24 and I didn't think 50 feet would do it. I think
25 something would have run a bell when I plotted

1 velocities versus cross-section if they were 50 feet
2 off. But 25 feet, yes, that is a possible error, I
3 think.

4 JUDGE BRENNER: Close to what you would
5 consider the maximum possible error or maximum
6 reasonable error?

7 WITNESS WESCOTT: I think 25 or 30, right.

8 JUDGE BRENNER: Do you agree that the error
9 would be in the correction we discussed with Mr.
10 Phillippe; that is, that the measurement taken was
11 actually further out in the river than Mr. Harmon
12 thought he was?

13 WITNESS WESCOTT: Well, if we're talking about
14 30 feet, yes, but if we're talking about something less,
15 then of course it could be either way.

16 JUDGE BRENNER: And that is consistent with --
17 well, all right. I understand. Something less being?

18 WITNESS WESCOTT: Let's say 10 or 15 feet. I
19 think even 15 feet you could have it in the opposite
20 direction and still the flows would check out. What
21 would happen is you would have high velocities and
22 shallow depths, and then you would be losing all of that
23 discharge. You would be coming out with far less than
24 what you would be expecting.

25 JUDGE BRENNER: Okay. Incidentally, I'm

1 inclined to ask you to do that calculation over a break
2 even if Mr. Sugarman doesn't.

3 WITNESS WESCOTT: You mean the one Mr.
4 Sugarman asked me?

5 JUDGE BRENNER: Yes. And then come back and
6 tell us what you did. So don't forget about it
7 completely, but don't do it now.

8 WITNESS WESCOTT: Okay.

9 JUDGE BRENNER: I guess for the 4 and 7-foot
10 depths, if you can, unless you want to come back and
11 tell us why there is some anomaly there such that you
12 don't want to or you wouldn't think it was reasonable.

13 WITNESS WESCOTT: Now, we want these right at
14 the intakes. That would mean slightly interpolating is
15 what I assume, so it would be consistent with my other
16 calculations.

17 JUDGE BRENNER: Well, give us the answer for
18 that point and then tell us how you would interpolate it
19 over.

20 WITNESS WESCOTT: I will do it as many ways as
21 I can.

22 BY MR. SUGARMAN: (Resuming)

23 Q Coming back to the use of your November 7th,
24 because of the way you considered the bottom to be isn't
25 it true that you could have moved the whole total

1 velocity a hundred feet, each sections toward the -- a
2 hundred feet towards the Pennsylvania shore, and your
3 discharge calculation would still have been in the 3000
4 CFS range?

5 A (WITNESS WESCOTT) I don't think so. As I was
6 just explaining to Judge Brenner, I think an error would
7 have shown up if I had shifted it even 50 feet.

8 Q Well, how far off was your calculation of
9 discharge from the measured value?

10 A (WITNESS WESCOTT) Well, mine was about 70
11 CFS. I took the measured value at Trenton as being
12 about 3000 CFS, and I got 3070.

13 Q Well, how did you figure the measured value at
14 Trenton as being 3000 CFS when the numbers for that day
15 and the next day were both in the 2800, or the value for
16 the next day was in the 2800 range, 2800 and something?

17 A (WITNESS WESCOTT) That was November 7th.

18 Q November 7th and November 8th, 1980, right.
19 But I mean taking out, translating Trenton back to Point
20 Pleasant.

21 JUDGE BRENNER: Well, let him answer your
22 question about Trenton flows first, since you have
23 stated that he has it wrong, and then if that is not
24 what you meant, you can go on to your next question.

25 WITNESS WESCOTT: Okay. 2970, 2860 -- well,

1 maybe 2950 would have been a better number.

2 BY MR. SUGARMAN: (Resuming)

3 Q What was the number at Trenton on November 8th?

4 A (WITNESS WESCOTT) 2860.

5 Q And what was the number at Trenton on November
6 7th?

7 A (WITNESS WESCOTT) 2970.

8 Q So wouldn't something like 2900 or 2875 have
9 been the right number or maybe 2925.

10 A (WITNESS WESCOTT) Okay. 2925.

11 Q So you were off 150. Now, if you had moved
12 the whole velocity blocks 100 feet towards the
13 Pennsylvania shore, might that not have reduced your
14 error and brought you into closer proximity to Trenton,
15 to the adjusted Trenton value?

16 A (WITNESS WESCOTT) Well, let's see. Let me
17 look at my plot here. Okay. You're talking about a
18 100-foot shift of the velocity measurement to -- okay, I
19 will tell you something that would have rung a bell,
20 though, because I would have seen the highest velocity
21 way out of the channel and over going up the bank on the
22 New Jersey side.

23 Q Well, something would have rung a bell, but
24 wouldn't it have produced -- you were using this to
25 calibrate the discharge, to calibrate the

1 velocity-to-discharge relationship, weren't you?

2 A (WITNESS WESCOTT) Well, no. I was basically
3 using it to get a check on the applicant's
4 measurements. I wanted to know if their instrument
5 maybe had a systematic error that was causing them to
6 read 25 percent too high or something like that. That
7 is what I was really interested in when I did this.

8 Q But didn't you in your testimony take it as
9 confirming the velocity distribution across the channel
10 or the velocity relationship in the distribution across
11 the channel at these flows?

12 A (WITNESS WESCOTT) Yes.

13 Q And, therefore, if it doesn't conform with the
14 flows as measured at Trenton and adjusted downward for
15 Point Pleasant, doesn't that suggest that there is
16 something wrong with it?

17 A (WITNESS WESCOTT) Well, anything within 10
18 percent I would have taken as probably pretty close to
19 confirmation. I was looking for gross errors.

20 Q Well, if the flow the next day at Trenton was
21 2860, right?

22 A (WITNESS WESCOTT) Right.

23 Q And you adjust that downward to Point Pleasant
24 and you get 2774.

25 A (WITNESS WESCOTT) Did you multiply by .97?

1 Q Right. I will do it again to be sure. 2774.
2 Your value that you came up with was 3070. I would say
3 that is 10 percent off.

4 A (WITNESS WESCOTT) We came up and we said 2925
5 was probably the most likely flow.

6 Q At Trenton. That is if you averaged November
7 7th and November 8th.

8 A (WITNESS WESCOTT) I come up with 2837.

9 Q That is if you averaged the two days. I took
10 the next day down to 97 percent and compared it to the
11 3070, and you're off by 10 percent.

12 A (WITNESS WESCOTT) Well, you have to bear in
13 mind that the applicant by doing it a different way came
14 up with 2840 which was on the other side. So I don't
15 think there is a consistency of being too high here that
16 we can keep going down. The fact is he did it in one
17 way looking at some -- probably he maybe took his points
18 at a different place. I didn't see his calculations. I
19 kind of wish now that they would have been sent.

20 But the fact that I went and did it
21 independently and came up with something a little bit on
22 the other side kind of gave me a pretty good idea that
23 it was some place down in the 2900 through 3000 range.

24 And I think we are still missing the point;
25 that if we shift 50 feet, we are going to wind up with a

1 peak discharge well out of the main channel over into
2 the Jersey side. And if I saw that, I would know
3 something was wrong; and that is why I say that a
4 50-foot shift just isn't likely here. I mean I don't
5 expect any possible shift of any more than 25 to 30 feet.

6 Q But you would say that a 30-foot shift towards
7 New Jersey of the peak would be as consistent with the
8 data as what the applicant reported.

9 A (WITNESS WESCOTT) I haven't gone through and
10 calculated. I'm saying that it appears from just
11 looking at the velocities and looking at the profiles
12 that that is possible.

13 Q All right. Now, coming back to the July 23rd,
14 1981 values, and coming back to the location and the
15 current -- that is, the speed of that eddy flow in Judge
16 Morris' 12:00 to 3:00 range -- did you -- which of the
17 values in the stationing on July 23rd that the applicant
18 has shown would you consider to be the eddy return
19 flows, the 12:00 to 3:00 flows? And there might be more
20 than one.

21 A (WITNESS WESCOTT) I think the eddy extends
22 probably from about where it goes to zero here, which
23 is, oh, from what I can gather --

24 JUDGE BRENNER: Are you working with something
25 that we have also?

1 WITNESS WESCOTT: Yes. This is my figure
2 240.27-2.

3 Okay. As I recall, this would be, oh, about
4 674. I would have to look on the chart to get the exact
5 station anyway. It's the station between the 650 and
6 the 700.

7 BY MR. SUGARMAN: (Resuming)

8 Q Would you mind using Del-Aware 2 or
9 Applicant's 2? It is the Table No. 1.

10 A (WITNESS WESCOTT) Okay. I would feel more
11 comfortable with the curve, but I think I will look at
12 both.

13 Q All right.

14 A (WITNESS WESCOTT) 674 I think is probably the
15 beginning of the return flow or just to the outward of
16 that. Okay, 674 to -- no, I'm sorry. I'm looking at
17 the long line here. It's closer to about between 674
18 and 699 is where you're going to get -- where the return
19 flow is probably going to start; and it is going to
20 extend over to what appears to be, oh, about 770.

21 Q I beg your pardon. Over to where?

22 A (WITNESS WESCOTT) About 770.

23 Q Then the 12:00 to 3:00 section, do you see
24 that there? In other words, the circling flow in the
25 downstream direction?

1 A (WITNESS WESCOTT) Well, the 12:00 to 3:00, as
2 I understand, that is the component going back into the
3 channel, going toward New Jersey.

4 Q Going toward New Jersey, right, down the
5 Hickory Creek channel.

6 A (WITNESS WESCOTT) Oh, I see what you're
7 getting at. Yes, if I was to make a guesstimate of which
8 part was from let's say 6:00 to 9:00 and 9:00 to 12:00
9 and so on, I guess the 6:00 to 9:00 would be a little
10 bit less than that.

11 Q No. I'm not asking about that. You may
12 answer if you like, but I am trying to find out about
13 the 12:00 to 3:00 flow; in other words, the flow down
14 the backside after it goes up to the bar and as it comes
15 down the Hickory Creek channel.

16 A (WITNESS WESCOTT) It is in the neighborhood
17 of 775.

18 Q Out to where?

19 A (WITNESS WESCOTT) Well, I can't really tell
20 exactly where that begins and where it ends from
21 velocity measurements that were put along a profile.
22 All I can tell is the directions, whether they're going
23 upstream or downstream. So I don't see how I could
24 really use this to determine how wide that flow is that
25 is going from 12:00 to 3:00.

1 Q Can you use it to determine what the speed of
2 that water is coming down that Hickory Creek channel?

3 A (WITNESS WESCOTT) Well, it is hard to tell.
4 We have a downstream component near shore of I guess
5 about .1 feet per second now. If we assumed that that
6 is all Hickory Run, I guess we can say it's .1 feet per
7 second.

8 Q Wouldn't it be out in the channel? If the
9 eddy is a clockwise eddy, wouldn't that 12:00 to 3:00
10 flow be riverward of the center of the eddy? If the
11 center of the eddy is at 7 plus 74, then wouldn't the
12 riverward side of the eddy be further out?

13 A (WITNESS WESCOTT) The riverward side of the
14 eddy?

15 Q Right. The other side of the clock.

16 A (WITNESS WESCOTT) Yes. Because I'm saying
17 774 is kind of the center of this, so right.

18 Q So where -- can you tell what the speed of
19 that flow down the Hickory Creek channel would be?

20 A (WITNESS WESCOTT) Do you mean while it's
21 still in the Hickory Creek channel?

22 Q I beg your pardon?

23 A (WITNESS WESCOTT) Do you mean while it's
24 still in the Hickory Creek channel?

25 Q Yes. While it's still in the Hickory Creek

1 channel.

2 A (WITNESS WESCOTT) No, I don't know what the
3 flow was or what the discharge was. I mean if I go back
4 and use these, if I say that everything that was causing
5 the .1 foot per second is discharge from Hickory Creek,
6 it might be possible if I had a cross-section, but I
7 don't even know if that is a valid assumption to start
8 with.

9 Q I'm afraid we're missing each other. Isn't
10 the Hickory Creek channel out in the river, out
11 riverward?

12 A (WITNESS WESCOTT) Well, when you said Hickory
13 Creek channel I thought you meant the land channel. You
14 mean the submerged channel?

15 Q The submerged channel, right. That is why we
16 were having confusion. I'm sorry.

17 A (WITNESS WESCOTT) I see what you're saying.
18 So at the intake this submerged Hickory Creek channel is
19 about at station 8 plus 40 or something like that.

20 Q Something like that. Now, if you look at
21 those tables or those values on that July 23rd table,
22 does that give you an idea of what the speed of that
23 flow is?

24 A (WITNESS WESCOTT) It looks like an average
25 velocity of -- if we call it station 8 plus 49, we're

1 getting an average -- okay, we're getting a average
2 velocity of about 1.6 feet per second there.

3 Q Okay. Now, you agree that at various
4 velocities up to the time when the bar is overtopped
5 there would be the potential for crosscurrents from the
6 Hickory Creek channel and from the main channel to be
7 moving toward the intake at a vector and not parallel to
8 it?

9 A (WITNESS WESCOTT) Well, the Hickory Creek
10 channel flow -- and I recall now your other question as
11 to whether I thought it followed Hickory Creek channel
12 -- I think probably the eddy does upstream, but when you
13 get down toward the intake I think it is probably
14 shoreward of the Hickory Creek channel because this is
15 where your main channel flow from the main channel is
16 coming across here. I mean this is where your flow is
17 expanding and your eddy is going to be, I think,
18 shoreward of this.

19 Q Would that be true at falling stages?

20 A (WITNESS WESCOTT) I tend to think so. I'm
21 not sure exactly how stages going to -- how moving
22 whether the stage is rising or falling is really going
23 to affect the position of the eddy, basically because we
24 have kind of a level pool back here that is caused by
25 the Lumberville wing dam. So I don't see how rising or

1 falling stage is going to -- perhaps if you explain that
2 to me maybe I can give you a better answer.

3 Q Well, will rising stage bring more water
4 across through that, down the riffle and then down below
5 the bar begin to expand out with more force?

6 A (WITNESS WESCOTT) As stage rises, yes, flow
7 will rise, and yes, we will have more flow going over
8 the bar.

9 Q And before we get over the bar -- in other
10 words -- or before we get over much of the bar and while
11 it is still -- there is this unexposed bar to a
12 considerable extent or the bar is exposed to a
13 considerable extent, will there be a tendency for that
14 flow to move at the surface of the river, to move, to
15 expand out rapidly into the eddy as it gets below the
16 bar?

17 A (WITNESS WESCOTT) Well, I think the higher
18 your velocity, the farther downstream it is going to go
19 before it expands.

20 Q So, therefore, will there be or will there not
21 be a tendency for the bar to, as Mr. Phillippe said, to
22 shield or to separate that channel flow from the eddy
23 down to the toe of the bar, and as you get closer to the
24 toe of the bar at the lower depth in the water column?

25 A (WITNESS WESCOTT) Your question got a little

1 bit confusing. Are you asking me is there a tendency
2 for that bar and its submerged components to tend to
3 shadow the cross-section and therefore separate the eddy
4 from the main channel flow?

5 Q Yes.

6 A (WITNESS WESCOTT) Yes. I would say that is
7 correct.

8 Q And so as you get down in a condition of
9 rising stage which we have just discussed, would there
10 be a tendency for that to interact with the eddy flow
11 coming down from the direction of the bar along the
12 Hickory Creek channel in the vicinity of the intake?

13 A (WITNESS WESCOTT) When you say rising stage,
14 are you trying to say that we have an eddy whose
15 definition has basically been defined by one flow, and
16 now all of a sudden this eddy that has been defined by
17 one flow is being faced with a flow that is considerably
18 higher?

19 Q Yes.

20 A (WITNESS WESCOTT) Okay. I would think that
21 would require an awfully fast rising stage. I would
22 think the velocities in the eddy would respond
23 relatively quickly to velocities in the main channel and
24 tend to come in to equilibrium with what it should be.

25 I'm not sure that you're going to have a

1 problem with that eddy that is at one place that has
2 been developed for one flow and all of a sudden now
3 having to interact with a significantly higher flow.
4 And I don't really foresee that happening. I would tend
5 to think the eddy would change relatively quickly with
6 the flow condition.

7 Q As it changes would that in turn cross
8 crosscurrents in the area of the intake or involve
9 crosscurrents in the area of the intake?

10 A (WITNESS WESCOTT) I think the significant
11 crosscurrents are going to be caused by the flow
12 expanding after it has been pinched, so to speak, by
13 this bar.

14 Q I understand what you're saying about that,
15 and I think we have that. I'm trying to -- now I want
16 to come to the case of reducing discharge in the main
17 channel. When the discharge down the main channel is
18 reduced will the eddy not expand out?

19 A (WITNESS WESCOTT) Yes, I would say it would
20 move out a little bit.

21 Q And wouldn't that move more flow down that
22 Hickory Creek channel towards the intake and get you
23 into a crosscurrent in the area of the intake as there
24 is less energy in the main channel and more energy
25 coming down the -- relatively more energy coming down

1 the Hickory Creek channel?

2 A (WITNESS WESCOTT) Do you mean will the eddy
3 come all the way out of the Hickory Creek channel, this
4 lower velocity flow?

5 Q Yes.

6 (Pause.)

7 A (WITNESS WESCOTT) I tend to think not, the
8 reason being that at a measured flow of 3000 CFS we
9 really hardly see this eddy at all, at least by the
10 velocity measurement. You know, we have a slack water
11 area in there, but we don't really see any reversed flow.

12 It seems to me that observations -- I think it
13 may have been Mr. Harmon that seemed to say that when
14 you get down into the low flow conditions, you really
15 don't see much of an eddy there, which I what I would
16 expect.

17 So it seems to me more likely what happens is
18 your flow decreases; that your eddy tends to go away.
19 It probably moves slightly toward the channel, but it is
20 also decreasing tremendously, so you're really getting
21 maybe a slack water area a little bit closer. But I
22 don't think it extends all the way to the intake. You
23 have got that expanding flow here that even when the
24 flow is low it is still pushing positively toward
25 Pennsylvania.

1 Q Again, I'm talking about a time of falling
2 stage.

3 A (WITNESS WESCOTT) I recognize that.

4 Q Where the flows have been higher and now
5 they're getting lower.

6 A (WITNESS WESCOTT) I still think the eddy
7 would probably respond relatively quickly to the flow
8 conditions in the channel. That would be my opinion.

9 Q Now, do you feel that the crosscurrent from
10 that Hickory Creek channel would never be in the intake;
11 the current from the Hickory Creek channel, the eddy
12 current downstream would never be in the intake or
13 probably never be in the intake or maybe in the intake
14 at some time?

15 A (WITNESS WESCOTT) Let me put this in terms
16 maybe that I can understand. You mean that if we were
17 to go up and let's say put a slug of dye in the Hickory
18 Creek, would we ever see it down at the intake?

19 Q Right.

20 A (WITNESS WESCOTT) Yes. I think sometimes we
21 would. It would be somewhat dispersed, I think.

22 Q All right. Now, do you agree that as you go
23 further upstream along that intake as the intake array,
24 the channel velocity is further from the Pennsylvania
25 shore?

1 A (WITNESS WESCOTT) Do you mean the maximum
2 velocity?

3 Q Yes. The area of maximum velocity that you
4 talked about as having an angle of let's say up to 30
5 degrees.

6 A (WITNESS WESCOTT) Well, it is hard to say.
7 You know, we're looking at two different cross-sections,
8 so we have to get a common reference point on both of
9 them before we really -- do you want to talk about the
10 line as drawn on Policastro 1 for the boundary between
11 Pennsylvania and New Jersey? Do you want to use that as
12 a common reference or something?

13 Q No. I'm just talking about the intake
14 alignment. If you look at the end of the intake
15 alignment and now look upstream, downstream along the
16 intake, as the intake moves from downstream to upstream,
17 at the upstream end is the main flow further away from
18 Pennsylvania side than it is, let's say, at the lower
19 end or in the center line.

20 A (WITNESS WESCOTT) Maybe I'm a little bit
21 confused. I thought you meant physically moving the
22 intake upstream.

23 Q No, sir. I just meant if you will follow the
24 alignment of the intake as it proceeds upstream -- and
25 now I'm asking you with reference to the upstream end of

1 the intake.

2 A (WITNESS WESCOTT) In other words, the face of
3 the structure with the stream line?

4 Q Exactly. Assume a section 37 feet upstream of
5 the center line section. Would the main flow of the
6 river be closer to New Jersey and further from
7 Pennsylvania up at that end?

8 JUDGE BRENNER: Could you give me that line
9 again, Mr. Sugarman? I missed it.

10 BY MR. SUGARMAN: (Resuming)

11 Q As you move up the intake upstream, if you
12 were going upstream in a boat would the flow be further
13 away from the intake or be closer to the Jersey shore at
14 the upper end than at the lower end?

15 A (WITNESS WESCOTT) I'm not sure what you mean,
16 but I think in reference to the screen, yes, the
17 velocity at the upper end is going to be slightly
18 farther from the edge of the screen than let's say at
19 the lower end.

20 Q All right. Now, you heard what Mr. Phillippe
21 said and what the witnesses have said about ice and
22 other debris conditions that could exist because of the
23 crosscurrents in that area. Do you agree with that
24 testimony?

25 A (WITNESS WESCOTT) I really haven't heard all

1 of it. I am of the understanding that the applicant is
2 going to put in some posts for protection for ice around
3 the intake structure.

4 Q Do you have an opinion as to whether there
5 would be substantial amounts of ice and debris coming
6 across that crosscurrent and into the intake?

7 A (WITNESS WESCOTT) I'm not sure what the
8 crosscurrent has to do with it. I would think it is
9 conceivable you could have debris and you could have ice
10 moving downstream.

11 Q And would the crosscurrent -- would that
12 tendency for it to spread out as it gets down the riffle
13 and at the intake cause it to be in the crosscurrent of
14 the river moving in that direction at some angle, cause
15 such ice and debris to tend to be moved over toward the
16 intake along its sides broadside, so to speak?

17 A (WITNESS WESCOTT) Well, at low flows I think
18 is the only time that you have that crosscurrent there,
19 and I think we all agree on that. There appears to be a
20 tendency for the things to move that way, yes, from the
21 bottom bathymetry.

22 Q Are there locations in the river that you have
23 observed either at that alignment, further out or
24 anywhere else or further downstream along the river that
25 in your opinion would represent better alignments for

1 the intake, both in terms of maintaining one foot per
2 second velocity and in terms of protecting the intake
3 itself, if you know?

4 A (WITNESS WESCOTT) Well, I assumed that was
5 going to be a question you were going to ask sooner or
6 later, and in spite of all the thought I've given it, I
7 am really not sure how to answer. I think they are all
8 a bit of a tradeoff. I think right where the intake is
9 is probably reasonably good as far as velocities are
10 concerned. I'm not sure that moving it down is going to
11 get you into better shape, because you are getting into
12 deeper water as you move farther and farther down.

13 Now, if you're talking about right in a few
14 hundred feet around here, I don't think there is really
15 much difference.

16 JUDGE BRENNER: When you say move it down, are
17 you moving the whole thing down including the gate well
18 area downstream?

19 WITNESS WESCOTT: Well, you know, if you don't
20 move the gate well, then you might run into how far you
21 can get water through the pipe there regarding your head
22 losses. So it is hard to say what is feasible, I mean
23 how far you can move the intake without moving the gate
24 well and the pumphouse.

25 JUDGE BRENNER: What if you kind of tilted it

1 downstream so that the head is down, the intake screens
2 are downstream at a distance of about -- so that would
3 be outer screens rows about 275 feet from the gate well,
4 and you end up within the 58-foot contours?

5 WITNESS WESCOTT: I think what you are going
6 to lose down there is probably velocity. I mean you're
7 going to have a flow that has expanded somewhat more out
8 into the whole channel. So even though your
9 orientation, your flow might be parallel to the stream,
10 to the alignment of the intake, your velocities are
11 certainly going to be lower, I would expect. So I'm not
12 sure that you're going to gain be velocity down there.

13 And ice, I really don't know that that is a
14 problem. I mean they are putting in protection.

15 BY MR. SUGARMAN: (Resuming)

16 Q Do you know what force those guard posts can
17 sustain?

18 A (WITNESS WESCOTT) No, I do not.

19 Q Do you know what force the intake screens can
20 sustain?

21 A (WITNESS WESCOTT) No, I do not.

22 JUDGE BRENNER: Mr. Sugarman, how much more do
23 you have?

24 MR. SUGARMAN: Well, I haven't gotten back to
25 Mr. Masnik.

1 JUDGE BRENNER: Your hour ended a while ago or
2 a few minutes ago to be exact, but I didn't charge you
3 with Mr. Bourquard, so this is your first warning.

4 How much more do you have?

5 MR. SUGARMAN: I will just do whatever I
6 have. I guess I have about 15 minutes with Mr. Masnik.

7 You will recall, sir, that this is all based
8 upon Mr. Masnik's change to his testimony -- I mean Mr.
9 Wescott's change to his testimony since I estimated
10 cross examination time, not that I estimated accurately
11 anyway.

12 JUDGE BRENNER: I should have bet somebody a
13 nickel that I was going to hear that at this point.

14 (Laughter.)

15 JUDGE BRENNER: How much redirect does the
16 staff have?

17 MR. RUTBERG: We have maybe 15 or 20 minutes
18 of Dr. Masnik.

19 JUDGE BRENNER: Well, why don't you talk to
20 each other and give me a total in a moment.

21 Mr. Conner, do you have anything of the staff
22 witnesses?

23 MR. CONNER: I would guess unless the Board
24 asks the questions first about 10 minutes.

25 JUDGE BRENNER: Staff?

1 MS. HODGDON: A half an hour with both
2 witnesses.

3 JUDGE BRENNER: Okay. We can allow you that
4 if those are your estimates, but that's it.

5 We are going to take a break now. Let's make
6 it a ten-minute break. No. Let's make it 15 minutes
7 because he has to do a calculation or two.

8 But before we break, in discussing the
9 findings I neglected to tell you about our page
10 limitation. This is to make life easier for you,
11 hopefully. Judge Morris was getting me to add
12 "hopefully" in that.

13 Seventy-five pages totally, absolutely. Not
14 75 1/2 pages. Seventy-five pages counting both sections.

15 Okay. We will come back at 3:45, and we will
16 give you the time you estimated; that is, 15 minutes to
17 Mr. Sugarman; 10 minutes to the applicant; 10 minutes --
18 well, the applicant really shouldn't go ahead of the
19 staff; you had your chance at cross, and we will let you
20 come back at the end and see if there is anything not
21 asked that you still want to ask; 20 minutes for the
22 staff; and we have some questions.

23 So we will be back at 3:45.

24 (Recess.)

25

1 JUDGE BRENNER: Okay. After we complete this
2 panel, I want somebody to remind me to get to Professor
3 Lewis's testimony. We have no problem with it. We are
4 going to have it bound in. Mr. Richter's testimony is
5 already in. However, I want an affidavit from Professor
6 Lewis that he has read the copy comporting with the copy
7 bound in the transcript, so show him the one in the
8 transcript, and the affidavit, as soon as possible,
9 within the next week or so, and it should swear or
10 affirm that it is true and correct, and I don't want any
11 additions or afterthoughts, just that as written it is
12 true and correct.

13 MR. SUGARMAN: Well, you do understand that
14 Mr. Conner and Ms. Hodgdon and I agreed on the
15 amendments to his testimony.

16 JUDGE BRENNER: I am not taking any testimony
17 in that a witness hasn't verified as true and correct.

18 MR. SUGARMAN: I understand your concern.

19 JUDGE BRENNER: Normally I wouldn't be so
20 picky, but we had at least one occasion where, due to
21 logistics, the witness hadn't read it, and I don't know
22 if Professor Lewis has read this, and I hope he has.

23 MR. SUGARMAN: He read it as the typed
24 version.

25 JUDGE BRENNER: Well, that just proves my

1 point. I am not putting in testimony changes that a
2 witness hasn't read. It is his testimony, not yours.

3 MR. SUGARMAN: Of course, but we made --

4 JUDGE BRENNER: I don't care what you did if
5 he doesn't approve it and swear to it.

6 MR. SUGARMAN: I understand.

7 JUDGE BRENNER: I mean, am I right? Am I
8 missing something?

9 MR. SUGARMAN: No, you are absolutely right.
10 I just don't want you to think that -- I don't want to
11 be misrepresenting anything to you. I want you to know
12 how we did it.

13 JUDGE BRENNER: Well, that surprises me,
14 because I would have thought somebody would have called
15 him up and read him what changes were being made, and
16 that is what I would have done, and that is what I would
17 have expected any other lawyer to do, and there has been
18 time on this one. It has been quite a number of days
19 now.

20 MR. SUGARMAN: Well, I never thought of it, to
21 be honest with you. I just never thought of it. I
22 think it would have been a good idea.

23 JUDGE BRENNER: Okay. Let's put it in subject
24 to his saying it is true and correct, and explain to him
25 that I don't care if he would have expressed some of the

1 words differently, and that is not what we are
2 interested in.

3 A Number Two housekeeping matter, so you don't
4 cut me short at the end of the day. We were supposed to
5 get the Nanticote study in full to make an exhibit.

6 MR. SUGARMAN: The staff has pages they want,
7 and we have pages we want, so we thought we would put it
8 in together.

9 MR. RUTBERG: But it is not a full copy of the
10 exhibit. It is just the pages that either of us want.

11 JUDGE BRENNER: How about the applicant?

12 MR. RUTBERG: We did not really coordinate
13 with the applicant on this.

14 MR. CONNER: We have no objection.

15 JUDGE BRENNER: All right. Who wants the
16 exhibit?

17 MR. RUTBERG: We were going to do it as a
18 joint exhibit.

19 JUDGE BRENNER: Don't do that.

20 MR. RUTBERG: It can be a Del-Aware exhibit,
21 as far as we are concerned.

22 JUDGE BRENNER: I will be glad to mark it for
23 identification. This is Del-Aware Exhibit 27 for
24 identification, and it being excerpts from -- and the
25 cover cuts off the date. All right. If you look at the

1 second page, you will get a full title, Ecological
2 Studies of the Nanticote River and Nearby Area, Volume
3 II, Profile Wire Studies by Delmarva Ecological
4 Laboratory, Inc., Middletown, Delaware, dated December,
5 1980. They are excerpts. I am not going to go through
6 the page numbers that are included. Presumably all of
7 the copies have the same pages that are being marked.

8 MR. SUGARMAN: They should all end up with
9 Page 101.

10 JUDGE BRENNER: And hopefully, all the pages
11 in between are the same.

12 (The document referred to
13 was marked for
14 identification as
15 Del-Aware Exhibit Number
16 27.)

17 JUDGE BRENNER: We have an exhibit we want to
18 mark as Board Exhibit 2 solely for identification, and
19 that is the copy we received yesterday of the
20 transmittal, including the Corps of Engineers
21 environmental assessment of the Point Pleasant diversion
22 project. The entire exhibit is marked for
23 identification. It includes a cover letter from an
24 attorney, Mr. Richmond, to Mr. Conner. We are including
25 the cover letter because it serves as an index of what

1 is enclosed, and that is all it does.

2 And according to the cover letter, and I hope
3 all of these things are included, it includes a letter
4 dated September 28th, 1981, to Colonel Baldwin from the
5 Pennsylvania Historic Museum Commission, and I don't see
6 that in the package. Ah, yes. All right. Also a letter
7 dated September 30th, 1982, from Mr. Gordon of the
8 National Marine Fisheries Service to Mr. Sugarman, and
9 again, these are just for identification, and partly
10 because they are in the package. A letter dated August
11 5th, 1982, from Mr. Hoffman of EPA to Mr. Cianfranni of
12 the Corps, the Army Corps of Engineers, environmental
13 assessment. As I indicated, it was signed by Colonel
14 Baldwin on October 14, 1982, and apparently released
15 some days thereafter.

16 And also a memorandum of agreement between the
17 Corps of Engineers, the Advisory Council on Historic
18 Preservation, and the State Historic Preservation
19 Officer. As I said, given the time, I just haven't gone
20 through it and culled out that which we wouldn't need,
21 so it is all in as Board Exhibit 2 for identification.
22 The main reason for marking it as a Board exhibit for
23 identification is an identification with this record of
24 the previously vaunted and legal argument assessment of
25 the operational impacts of this intake by the Corps,

1 which we were told by parties would be forthcoming, and
2 therefore we need not do anything, and the extent of
3 their assessment as disclosed herein is here for
4 identification.

5 (The document referred to
6 was marked for
7 identification as Board
8 Exhibit Number 2.)

9 MR. CONNER: Can I take this opportunity to
10 update the Board on the other developments that we have
11 been --

12 JUDGE BRENNER: No, because are worried about
13 finishing today.

14 MR. CONNER: Shall I send them to you in the
15 mail?

16 JUDGE BRENNER: Yes, unless you think it
17 really would affect something we are doing here today.
18 It is hard for me to judge, since I don't know precisely
19 what you want to tell us.

20 MR. CONNER: Well, you have asked us
21 periodically, and we have offered periodically to do
22 this, but the time has never been right.

23 JUDGE BRENNER: How long will it take you?

24 MR. CONNER: We have this stack of material
25 that is mostly the PUC things that you have been asking

1 about, up to and including the material you just
2 identified, and finally the Army Corps of Engineers
3 permit, which was issued yesterday, the permit itself,
4 dated October 25, 1982.

5 JUDGE BRENNER: Why don't you do it in the
6 mail after, unless there is a particular point you think
7 you need to make while we are here.

8 MR. CONNER: I would not propose -- Let me ask
9 the Board, does it want the various motions before the
10 PUC, and if so, do you want the attachments to the
11 motions in the Commonwealth's Court, which are rather
12 voluminous documents, which I don't think is anybody's
13 particular interest?

14 JUDGE BRENNER: Why don't you give us the
15 motions without the attachments, and then we can judge
16 better from there?

17 MR. SUGARMAN: Sir, may I look at the
18 attachments and provide those to the Board which I think
19 may be relevant to the Board? I think some of those
20 attachments -- I mean --

21 JUDGE BRENNER: No, I don't want to get into
22 it now. Our premise and our initial consideration of
23 the admissibility of that contention, which is, I take
24 it, your immediate interest in saying what you just
25 said, is a premise on Unit 2 not being in existence,

1 regardless of whether that premise is totally erroneous
2 or not, and that is our first thought.

3 If we have to get beyond that, then and only
4 then would we have to decide how problematical the PUC
5 action to date is. So let's leave it at that.

6 MR. CONNER: Well, I would note Mr. Sugarman
7 is in all of these cases --

8 JUDGE BRENNER: No, he is talking about giving
9 it to us. He knows he has it.

10 MR. SUGARMAN: I am not in that case.

11 (Whereupon, a discussion was held off the
12 record.)

13

14

15

16

17

18

19

20

21

22

23

24

25

1 JUDGE BRENNER: Okay. Mr. Sugarman, continue.

2 BY MR. SUGARMAN (Resuming):

3 Q Mr. Westcott, you made the calculation Judge
4 Brenner was talking about before the break?

5 A (WITNESS WESTCOTT) That is correct.

6 Q And what, converting those calculations to
7 station 8 plus 49 to 2500 cfs using the same methodology
8 used for the November 7, 1980 calculations, what values
9 do you get at four feet and seven feet in depth?

10 A (WITNESS WESTCOTT) Okay, I get one foot per
11 second at four feet, .8 feet per second at seven feet.

12 Q And at 10 feet, what number do you get?

13 A (WITNESS WESTCOTT) I did that real quick, I
14 didn't write that down, but I think I got .34 for that.

15 Q .34?

16 A (WITNESS WESTCOTT) Based upon that .7 reading.

17 Q But you indicated before you feel it's
18 anomalous.

19 A (WITNESS WESTCOTT) That is correct.

20 Q How did that compare to the numbers you got by
21 adjusting the November 7th valuations downward.

22 A (WITNESS WESTCOTT) I'm sorry, could you repeat
23 that?

24 Q How did that compare with the numbers that you
25 got when you adjusted the November 7th values down?

1 A (WITNESS WESTCOTT) Well, the November 7th
2 values didn't have a station 8.49, so I compared those
3 at 8.62 and that was really the only place that I
4 thought would be a good place to compare.

5 Q And what values did you get at 8 plus 62 on
6 November 7th?

7 A (WITNESS WESTCOTT) May I state everything I
8 did for station 8.62?

9 Q Well, I assume it's the same as what you did
10 for the 7th.

11 A (WITNESS WESTCOTT) Well, there are different
12 numbers from adjusting the 5600 down from 8.62 to 8.49.
13 It is farther out. The intake is at 8.62.

14 Q Yes. Did you, in taking those numbers from
15 the July 23rd reading, you interpolated them out to 8
16 plus 62?

17 A (WITNESS WESTCOTT) That is correct.

18 Q Okay. Did you -- the November 7th ones you
19 didn't have to interpolate; they were at 8 plus 60
20 already.

21 A (WITNESS WESTCOTT) Well, very close.

22 Q 8 plus 53?

23 A (WITNESS WESTCOTT) Something like that.

24 Q Did you interpolate those out or did you take
25 them as shown on Del-Aware 2?

1 A (WITNESS WESTCOTT) I think I gave them -- I
2 think interpolated just so everything -- very close to
3 what they are. But I just wanted to keep everything
4 even.

5 Q Okay. What values did you get at 4 feet, 7
6 feet and 10 feet on November 7th?

7 A (WITNESS WESTCOTT) Based upon the 3000 cfs
8 flow, I got 1.07 feet per second at four feet, and .93
9 feet per second at seven feet.

10 Q And how about at ten feet?

11 A (WITNESS WESTCOTT) I didn't do that.

12 Q And that was in adjusting those November 7th
13 values down to 2500 cfs?

14 A (WITNESS WESTCOTT) That is correct.

15 Q And that is assuming that the flows at the
16 time of the actual readings, the November 7th readings,
17 were 3000 cfs?

18 A (WITNESS WESTCOTT) that is correct.

19 Q Those numbers are approximately -- it looks
20 like -- about 15 percent different for the seven foot
21 depth. Do you agree with that?

22 A (WITNESS WESTCOTT) 15 percent different from
23 what?

24 Q From each other. They both represent
25 calculated values at 2500 cfs.

- 1 A (WITNESS WESTCOTT) That's correct.
- 2 Q For more or less the same point?
- 3 A (WITNESS WESTCOTT) Well, the same station but
4 different depths.
- 5 Q No. The seven foot reading for November 7th
6 was .93.
- 7 A (WITNESS WESTCOTT) That is the seven foot
8 calculation based upon November 7, 1982. 1980 data is
9 .93.
- 10 Q Right. And if you just change your phrase
11 there, November 7 to July 23rd, it is .79.
- 12 A (WITNESS WESTCOTT) No, not at 8.62; then it is
13 1.14.
- 14 Q 1.14?
- 15 A (WITNESS WESTCOTT) The .8 I gave you before
16 was at station plus 49.
- 17 Q Oh, I see. So at 8 plus 62, it is 1.14?
- 18 A (WITNESS WESTCOTT) That's right. It is a
19 little bit bigger based upon the July 23rd data.
- 20 Q So the difference between those numbers is
21 about 20 percent for the same spot calculated at the
22 same flow, from .93 to 1.14?
- 23 A (WITNESS WESTCOTT) Yes, I guess probably right.
- 24 Q Now, does that give you confidence in the
25 ability to accurately determine the velocities past the

1 screen during the periods of ecological concern, based
2 upon those numbers?

3 A (WITNESS WESTCOTT) Yes.

4 Q Wouldn't you prefer to have more data?

5 A (WITNESS WESTCOTT) Well, you know we always
6 prefer to have more data but we always have to kind of
7 weigh our data collection desires with what we are
8 really trying to do, and for the purposes of what we
9 were trying to calculate. In other words, get a
10 relatively decent estimate of what the flow is. I think
11 the data is adequate.

12 Q A relatively decent estimate of what the flow
13 is?

14 A (WITNESS WESTCOTT) Right.

15 Q What is a relatively decent estimate of what
16 the flow is?

17 A (WITNESS WESTCOTT) I guess in this case, as I
18 understand it, I don't think there is a great big cutoff
19 as far as the different velocities or velocity ratios
20 that we're trying to establish. It is not, as I see it,
21 of great importance to be exactly more than -- to have a
22 bypass velocity of exactly twice the intake velocity.
23 It seems to me like an estimate that is probably within
24 10 or 20 percent is going to suit the purposes for what
25 I'm trying to do, so Mr. Masnik can make an evaluation.

1 Q Wouldn't you want to have -- wouldn't you
2 think that Mr. Masnik or any biologist wouldn't want to
3 have the intake in the area of the highest velocity?

4 A (WITNESS WESTCOTT) That's not for me to answer.

5 Q Well, suppose I gave you that as a given.
6 Would you feel that this is the area of the highest
7 velocity?

8 A (WITNESS WESTCOTT) No. The main channel is
9 the area of the highest velocity.

10 Q Do you see any reason why you can't locate
11 this intake in the main channel?

12 A (WITNESS WESTCOTT) Yes.

13 Q Why?

14 A (WITNESS WESTCOTT) Scour.

15 Q What?

16 A (WITNESS WESTCOTT) Scour.

17 Q What is scour?

18 A (WITNESS WESTCOTT) Well, when you have flood
19 flows and high velocities you often get scour. In fact,
20 I think one of the reasons they're putting a rib wrap
21 around this intake is to eliminate the possibility of
22 scour where it is. It is certainly safer where it is
23 than in the main channel.

24 Q Well, if the purpose of the rib wrap is to
25 eliminate scour, do you see any reason why you couldn't

1 eliminate scour with rib wrap in the main channel?

2 A (WITNESS WESTCOTT) I think you would really be
3 kind of pushing it there, the reason being that just
4 upstream you have a very deep scour hole that appears,
5 that I would be willing to guess very well might go down
6 to bedrock. You see that very deep hole on Policastro
7 Exhibit 1 where the flow has been pinched, and I think
8 it has been gouged out there.

9 Q Is it possible to scour beyond bedrock?

10 A (WITNESS WESTCOTT) Well, it depends upon what
11 the bedrock is.

12 Q Do you know what the bedrock is here? If I
13 told you it was hard argelite, what would you think
14 about scouring beyond bedrock?

15 A (WITNESS WESTCOTT) Given enough time, it is
16 possible.

17 Q How much time? In the hundreds of years or
18 thousands?

19 A (WITNESS WESTCOTT) You know, it's not
20 something that I've really evaluated. It would just be
21 one of my concerns as an engineer to put that out any
22 further.

23 Q Well, didn't you express any concern, then,
24 when you received the applicant's evaluation stating
25 that this was in the main channel?

1 A (WITNESS WESTCOTT) Well, you know, it depends
2 upon how you define main channel. I think everyone has
3 a different definition of main channel. If I said put
4 it out, -- I think I said put it out farther into the
5 main channel, didn't it? Or did I say put it out in the
6 main channel?

7 Q No, you said it is not in the main channel.
8 You said if it was in the main channel you would have a
9 scour problem.

10 A (WITNESS WESTCOTT) I meant put it out farther
11 in the main channel because I think previously you asked
12 me if I agreed with Mr. Phillippe that it was on the
13 side of the main channel and I said yes, which I still
14 agree with.

15 Q Well, have you made any calculation indicating
16 what the increased risk of scour is if you go out
17 further, in light of the rock that's here?

18 A (WITNESS WESTCOTT) Well, it appears to me that
19 from the velocity profile you are looking at maybe
20 raising the velocity maybe two or three times.

21 Q And do you know what that would do to the risk
22 of scour?

23 A (WITNESS WESTCOTT) Well, it is not simply the
24 risk of scour. It is also, as you have higher
25 velocities you can move larger objects, maybe boulders,

1 down the channel.

2 Q Do you think there could be boulders coming
3 down this channel?

4 A (WITNESS WESTCOTT) It is conceivable at high
5 enough flows.

6 Q How big?

7 A (WITNESS WESTCOTT) It depends upon the
8 velocity. I haven't made the calculations.

9 Q If you were to move the intake downstream into
10 the area closer to the Lumberville wing dam, are there
11 places where you would get equal velocities and without
12 the cross currents and without the potential involvement
13 of rocks and ice?

14 A (WITNESS WESTCOTT) I'm sure you could find a
15 place where you would find the same velocity.

16 Q Do you know of any effort having been made to
17 do so?

18 A (WITNESS WESTCOTT) No, I do not.

19 Q Did you ask the applicant if they had
20 evaluated other locations that would avoid cross
21 currents and involvement with the boulders coming down?

22 A (WITNESS WESTCOTT) No, I did not.

23 Q Did you ask the applicant to provide you with
24 any consideration of any alternatives whatsoever?

25 A (WITNESS WESTCOTT) No, I did not.

1 Q Is it your understanding that this is a review
2 of a proposed facility that comes within the National
3 Environmental Policy Act?

4 A (WITNESS WESTCOTT) Oh, yes.

5 Q Aren't you aware that you are required to
6 review alternatives?

7 (Pause.)

8 A (WITNESS WESTCOTT) I thought my counsel was
9 going to say something but I guess not.

10 Q Is it not your normal practice to review
11 alternatives?

12 A (WITNESS WESTCOTT) At the construction permit
13 stage, yes.

14 Q Do you recall what the description of this
15 intake was at the construction permit review stage?

16 A (WITNESS WESTCOTT) I recall it just as an
17 intake located at Point Pleasant. That is my
18 recollection.

19 Q So when would alternatives be reviewed?

20 A (WITNESS WESTCOTT) I think that is a legal
21 question and I really don't know.

22 Q Mr. Masnik, do you believe --

23 JUDGE BRENNER: Mr. Sugarman, let me jump
24 back. Mr. Westcott, I thought after being here as long
25 as we have been here I wouldn't hear anything brand new

1 at the last minute, but I was wrong. You, in talking
2 about the scour concern, you talked about velocities two
3 or three times the velocities at the proposed location.
4 Am I right, did you say that?

5 WITNESS WESTCOTT: That is correct.

6 JUDGE BRENNER: I'm looking at Table 1 to
7 Applicant's Exhibit 2 for identification. These are the
8 measurements by Mr. Harmon on both November 7 and July
9 23rd, looking at even higher velocities, the higher
10 flows where you have a closer range overall. You show
11 me where we have velocity changes two or three times.

12 WITNESS WESTCOTT: I realize what you're
13 saying.

14 JUDGE BRENNER: Well, that was a very
15 important statement you made, and what you say here
16 becomes written very quickly.

17 WITNESS WESTCOTT: Well, I will tell you why I
18 made it, and of course, it was an estimate. Maybe twice
19 would be closer, but your flow is constricted at the
20 higher place.

21 JUDGE BRENNER: Wait a minute. Let me stop
22 you and then I will let you explain it after because we
23 do have time problems, and maybe I didn't ask what I
24 want to know as specifically as I should have.

25 In your answer you said if you move into the

1 main channel; where were you moving from, approximately?

2 WITNESS WESTCOTT: Well, I would say in the
3 area of greatest velocity, probably around station 9
4 plus 20, something like that, 9 plus 20.

5 JUDGE BRENNER: Well, I don't have a station 9
6 plus 20. Maybe you do.

7 WITNESS WESTCOTT: Oh, I see. You mean what
8 station on the table.

9 JUDGE BRENNER: How about 9 plus 24?

10 WITNESS WESTCOTT: All right.

11 JUDGE BRENNER: At 9 plus 24, comparing that
12 to -- let's say for ease I will use Table 8 plus 74, and
13 I recognize that is New Jerseyward of the intake a
14 little. There is a velocity increase at one foot of
15 depth, but if you look at four feet there is a decrease
16 from 2.8 to 2.6 feet per second. And if you look at
17 seven feet there's an increase, only one-tenth of a foot
18 per second from 2.6 to 2.7. If you look at 10 feet,
19 where I assume you would want to look if you were
20 worried about scour, the increase is 1.5 to 2.2.

21 . So tell me why I should worry about scour out
22 there and not worry about it at the proposed location.

23 WITNESS WESTCOTT: Well, one of the reasons is
24 I think looking at the bottom bathymetry, one seems to
25 see kind of what appears to be a scour hole right in the

1 area of highest velocities, and just upstream where it
2 is pinched, it looks like quite a deep scour hole.

3 Now, where the intake is right now you are
4 kind of getting away from it, but I still think the rib
5 wrap protection is a good idea. I think that is
6 possibly going to be one of the more serious problems,
7 even where it is.

8 JUDGE BRENNER: All right. We're not
9 disputing whether or not you should have rib wrap. Do
10 you think these velocity measurements are accurate, and
11 if so, it is right that going from 1.5 to 2.2 feet per
12 second suddenly introduces problems such that we
13 shouldn't consider that location?

14 WITNESS WESTCOTT: Well, one of the reasons I
15 hesitated to try to extrapolate the July 24rd flows down
16 is because I think when you extrapolate a velocity
17 distribution you really have to stay pretty close to the
18 same flow and the same cross-sectional area. And we're
19 going from basically low flows up to flood flows.

20 JUDGE BRENNER: Wait a minute, I'm sorry. I'm
21 interrupting more than I would normally because of the
22 time, but I guess I'm not clear. I'm looking at solely
23 at July 23rd, 1981, the same flow, the same cross
24 section, the same depth except according to Mr. Harmon,
25 I am now out approximately 25 more feet. I'm sorry, 50

1 more feet.

2 WITNESS WESTCOTT: My estimate of why you
3 might find scour farther out in the channel rather than
4 where you were was based more on what the bottom
5 bathymetry looks like than what these low flow velocity
6 profiles look like.

7 I mean, I see what appears to me to be
8 evidence of deep scour out toward the middle of the
9 channel.

10 JUDGE MORRIS: Does scour take place at
11 velocities under 6000 feet, or flows?

12 WITNESS WESTCOTT: I would say no. I would
13 say you're talking about basically flood flows when
14 you're talking about scour.

15 JUDGE MORRIS: And how many cubic feet is that
16 per second?

17 WITNESS WESTCOTT: I don't know what the mean
18 annual flood is. I know the flow record was around
19 340,000. You're talking about an order of magnitude
20 difference.

21 JUDGE BRENNER: Where did you get your two to
22 three times increase in velocities?

23 WITNESS WESTCOTT: Well, I can't remember how
24 I said it. If I misspoke, I meant to say could be two
25 to three times the velocity at the intake.

1 JUDGE BRENNER: Okay, I will maybe come back
2 to it. Mr. Sugarman, can you finish up in a few minutes?

3 MR. SUGARMAN: Yes, sir, I will. I mean, this
4 is a whole new thing, obviously, but let me just ask
5 this.

6 BY MR. SUGARMAN (Resuming):

7 Q Mr. Westcott, when did you conceive of scour
8 as a potential problem?

9 A (WITNESS WESTCOTT) When you asked me -- oh,
10 you mean as a potential problem for the intake?

11 Q Yes.

12 A (WITNESS WESTCOTT) Well, we always look at
13 that when we look at what takes place.

14 Q No, Mr. Westcott. We're getting down to the
15 time wire. When did you conceive of scour as a possible
16 problem with respect to this intake?

17 A (WITNESS WESTCOTT) When I saw the applicant's
18 rib wrap on it.

19 Q Have you estimated, in response to Judge
20 Morris's concern have you estimated what the difference
21 between the velocity would be at the proposed intake
22 location and at station 90 plus 10 or 90 plus 20 or
23 anywhere at flood flows?

24 A (WITNESS WESTCOTT) No, I have not.

25 Q Then how do you know there would be any

1 difference at flood flows between the propensity to
2 scour at the proposed location versus the one out
3 further or in the main channel, however you want to
4 define it?

5 A (WITNESS WESTCOTT) Because the bathymetry
6 seems to indicate it.

7 Q Have you gone down and checked the bathymetry
8 there?

9 A (WITNESS WESTCOTT) No, I have not.

10 Q Now, the other question I wanted to ask you is
11 you changed your testimony yesterday, and you attributed
12 the changes to information that you had just received
13 within the last day or two based upon other testimony.

14 A (WITNESS WESTCOTT) Well, there were a number
15 of items. One of the big factors also was the Board's
16 interest in velocity distribution.

17 Q You say the Board's interest in velocity
18 distribution was what caused you to change your
19 testimony?

20 A (WITNESS WESTCOTT) One of the causes.

21 Q Well, I suggest to you, sir, -- and we will
22 leave it for the record to decide -- I would like you to
23 point to me where you testified to the basis upon which
24 you formed the conclusions that are in your testimony.
25 And I would like you to tell us one iota of testimony

1 within the last few days in this case that went into any
2 of the bases that you gave us for changing your
3 testimony.

4 A (WITNESS WESTCOTT) Well, as I recall it, my
5 testimony originally stated, and it stated correctly at
6 the time it was written, that I hadn't drawn a
7 conclusion as to the applicant's velocity measurements.
8 After being informed by my counsel that the Board would
9 be asking me about velocity measurements, I knew that I
10 had to say -- that I would be asked specific questions
11 and if I had conclusions I would have to state them. So
12 I stated my conclusions in my testimony.

13 Q So the result, so contrary to your counsel's
14 representation and to your representation, the basis of
15 changing your testimony was that you decided to do more
16 work, not any information you received in the course of
17 the last few days of this hearing?

18 A (WITNESS WESTCOTT) Mr. Sugarman, as I recall,
19 you were informed on Friday that we would have a change
20 in testimony.

21 Q That is correct, but not of what it was.

22 A (WITNESS WESTCOTT) I think we may have read
23 part of it, and then Mr. Phillippe did some more work.
24 My counsel, -- I talked to Ms. Hodgdon on Saturday and
25 Sunday after receiving it, and that is when I worked out

1 those words that went into the record on Monday morning.

2 Q The record will show whether anything in your
3 testimony related to anything Mr. Phillippe produced.

4 Now I want to turn to Mr. Masnik because I
5 only have a couple of minutes left.

6 JUDGE BRENNER: In fact, it was your time, but
7 I think you repeated a dialogue I had with the witness.
8 That is your business if you want to be redundant.
9 Let's wrap it up in about five minutes.

10 BY MR. SUGARMAN (Resuming):

11 Q Mr. Masnik, or, Mr. Westcott, one more
12 question. You agree that you have no vectors on either
13 of those velocity measurements, is that right?

14 A (WITNESS WESTCOTT) That is correct.

15 Q You also agree that your Manning's n number
16 would be a function of the bathymetry of the bottom?

17 A (WITNESS WESTCOTT) No. Roughness.

18 Q Roughness I mean, and it would be roughness
19 across the entire cross section that would determine the
20 Manning's n number, right?

21 A (WITNESS WESTCOTT) No, not in this particular
22 instance. It would be roughness right at that point.
23 It is the velocity profile at that station that I
24 back-calculated the Manning's n from.

25 Q Don't you have to know the velocity

1 distribution cross the channel in order to get that?

2 A (WITNESS WESTCOTT) No.

3 Q Isn't the Manning n number not an accepted
4 method of achieving accurate results but just for your
5 own internal guidance?

6 A (WITNESS WESTCOTT) Well, that method was
7 presented and in open channel flow, and it comes
8 directly from logarithmic distribution. I think it was
9 set up so that the USGS could possibly determine, or
10 that Manning's n values could be determined from USGS
11 stream-gauging data. That is why they used the .2 and
12 the .8, which is the USGS procedure.

13 Q But the formula that you used to get Manning's
14 n numbers is not an accepted method; is that right?

15 A (WITNESS WESTCOTT) No. Normally you don't get.

16 Q Thank you.

17 MR. RUTBERG: Let the witness finish his
18 answer.

19 BY MR. SUGARMAN (Resuming):

20 Q Go ahead.

21 A (WITNESS WESTCOTT) No. Normally you determine
22 Manning's n values from going out, and one way is to
23 look at a stream and another way is to run backwater
24 profiles and see if you can match recorded flood data.
25 Those are the accepted ways, because you are looking for

1 a Manning's n value all the way across the channel.

2 My purpose in using this method was to see if
3 the vertical velocity profile made sense. It was one of
4 the checks that I used on the applicant's data. That
5 was the whole intent and purpose of the Manning's n
6 value calculation. It was not to use that n value for
7 further calculations.

8 Q But it didn't give you a representative
9 velocity cross section across the entire channel; is
10 that right?

11 A (WITNESS WESTCOTT) No.

12 Q And it didn't verify the applicant's
13 distribution of velocities across the channel.

14 A (WITNESS WESTCOTT) I didn't check it all the
15 way across the channel; I just checked it at the intake
16 location.

17 Q Mr. Masnik, the results in the Nanticoke study
18 which you asked Mr. Miller and McCoy to look at and
19 which you say you are familiar with on page 23, in
20 considering the Nanticoke study, do you consider it
21 authoritative?

22 A (WITNESS MASNIK) I consider it a study of one
23 of many studies.

24 Q You asked Mr. Miller and Mr. McCoy to consider
25 it, did you not?

1 MR. RUTBERG: I don't think the witness asked
2 Mr. Miller and Mr. McCoy any questions.

3 JUDGE BRENNER: Why don't you rephrase it?

4 BY MR. SUGARMAN (Resuming):

5 Q Do you recall your counsel asking Mr. Miller
6 and Mr. McCoy to consider it?

7 A (WITNESS MASNIK) Yes, I did.

8 Q Was that based upon your advice that that
9 would be a relevant study to consider?

10 A (WITNESS MASNIK) Yes.

11 Q And when you had it presented to them, was it
12 with your knowledge that they were being presented with
13 an excerpt which said that on page 16, that the screen
14 afforded positive savings for most groups. Specimens
15 for groups four millimeters and larger were highly
16 significant. When you presented that, were you aware
17 that that high level of significance was shown in Table
18 46 which you did not present, to be as little as 11
19 percent savings?

20 A (WITNESS MASNIK) The highly significant had to
21 do with the statistical significance.

22 Q And what was the highly significant that was
23 used in Table 46? Wasn't it as little as 11 or 12
24 percent savings?

25 A (WITNESS MASNIK) I don't see the word

1 "significant" on Table 46.

2 Q No, but do you see the word "significant" on
3 page 16?

4 A (WITNESS MASNIK) That is correct.

5 Q Which refers to Table 46. And Table 46 shows
6 savings of 11 to 12 percent; is that right?

7 A (WITNESS MASNIK) I agree with that, yes.

8 Q All right. Now on page 23 of that text, do
9 you see where it says that the results of the test
10 program were perplexing in that the one millimeter slot
11 screen failed to demonstrate the degree of efficiency
12 expected considering the screen was specifically
13 designed and selected to protect this species. This
14 species being striped bass. Do you see that?

15 A (WITNESS MASNIK) Yes. And the previous
16 species that we were talking about were river herring.

17 Q And with respect to river herring, --

18 A (WITNESS MASNIK) Which, incidentally, is the
19 species that is most closely related to the American
20 shad. And therefore, that is why we took that species
21 to show the individuals who were shown this report.

22 Q And the savings of river herring were as
23 little as 11 to 12 percent. right?

24 A (WITNESS MASNIK) Could you refer me to a table?

25 Q Table 46.

1 A (WITNESS MASNIK) That is correct. In the
2 smaller size ranges, below roughly 16 millimeters.
3 Above that, the savings was 100 percent.

4 Q Now, again referring to striped bass on page
5 27, the first full paragraph indicates that a curious
6 unexplained anomaly was that -- and I'm skipping down to
7 the middle of the sentence -- all showed a lower screen
8 efficiency for the nine to ten millimeter size than for
9 adjacent smaller or larger groups. This phenomenon may
10 be related to short-term developmental processes which
11 temporarily reduce the ability to sense or avoid the
12 screens.

13 Nov, could these problems be applicable to the
14 shad and/or to the sturgeon as well?

15 A (WITNESS MASNIK) I think you are asking me to
16 compare apples and oranges. The most closely related
17 species is the river herring, and in that size range the
18 savings were actually the highest, or close to the
19 highest, 15 to 17 percent.

20 Q 15 to 17 percent. Could it be problems with
21 developmental stages; for example, the beginning of fin
22 development, which would temporarily depress the ability
23 of the species to sense or avoid the screen, in the case
24 of shad?

25 A (WITNESS MASNIK) I suspect that that is the

1 case, once they are immediately upon hatching. As they
2 grow older, their ability to move through the water
3 column increases. So at the very, very early life
4 stages, on the order of five to 10 millimeters, or five
5 to seven millimeters, you would probably have less
6 savings than you would at larger sizes. But that is not
7 a behavioral factor; that is a developmental factor.

8 Q With respect to the sturgeon, do you agree
9 that it is possible that shortnose sturgeon will be
10 impinged or entrained? And assuming that they are there
11 in the area of Point Pleasant, that they will be
12 impinged or entrained on that screen?

13 A (WITNESS MASNIK) Are you specifying a
14 particular life stage, or do you want me to go through
15 all of the life stages?

16 Q At any life stage.

17 A (WITNESS MASNIK) I suspect that the
18 probability of any entrainment of eggs and larvae is
19 highly unlikely, and I expect that the possibility of
20 impingement of any life stage is highly unlikely.

21 Q What does highly unlikely mean? You are aware
22 that sturgeon have been impinged or entrained in the
23 Hudson River and Delaware River intakes?

24 A (WITNESS MASNIK) I am aware of that, but I
25 would like to say that that is at traveling screen

1 facilities, which is entirely different. I am also
2 familiar with some of those specimens, and those
3 specimens -- in fact, I have examined some of the
4 specimens and those specimens were not in the best
5 physical shape. In fact, most of the specimens that we
6 have collected from nuclear power plants that are
7 shortnose sturgeon that were impinged were specimens
8 that were in bad physical shape, either emaciated or
9 partly decayed.

10 Q And what is different about the traveling
11 screens from the wedge wire passive screens that would
12 preclude impingement or entrainment?

13 A (WITNESS MASNIK) I could talk on that for 20
14 minutes, but basically you're talking about higher flow
15 velocities, and the flow velocity normally doesn't drop
16 off with the degree with which it does here. And the
17 sturgeon have been known to have a very high swim speed,
18 so that we don't normally see sturgeon on traveling
19 screens. This seems to be a better design, so we are
20 even more likely not to see any here at all.

21 JUDGE BRENNER: Mr. Sugarman, it's 4:30.

22 MR. SUGARMAN: One more question.

23 BY MR. SUGARMAN (Resuming):

24 Q Biofouling would increase the velocity through
25 the screens, would it not, or debris?

1 A (WITNESS MASNIK) Yes, it would.

2 Q And at this Campbell study --

3 JUDGE BRENNER: That's two.

4 MR. SUGARMAN: This is the same question. Can
5 I finish it?

6 BY MR. SUGARMAN (Resuming):

7 Q In the Campbell study that you identified, did
8 they identify biofouling as a problem on Lake Michigan
9 fresh water?

10 A (WITNESS MASNIK) They said they had some
11 biofouling.

12 MR. SUGARMAN: Thank you.

13 WITNESS MASNIK: But I would like to elaborate
14 on that because number one, they don't have a
15 back-flushing mechanism that is similar to the one
16 planned here, or any at all. And second of all, --

17 JUDGE BRENNER: Dr. Masnik, let me interrupt
18 you for one second, but I will let you continue in a
19 moment. When you said one more question, I was going to
20 give you five more minutes, and I will still give that.
21 But I want you to come to a conclusion. The question
22 asked about the difference between the two screens was a
23 windup question, not a wind down question, and coming
24 this late in your examination of this witness, it was
25 rather surprising.

1 Let Dr. Masnik finish and then I will give you
2 five minutes to ask a few summary questions, but five
3 minutes. All right, Dr. Masnik.

4 WITNESS MASNIK: Number one, they do not have
5 a back flush procedure on this facility. And number
6 two, they anticipate a yearly cleaning by scuba divers,
7 which is simply, -- in fact, they conducted one of the
8 cleanings and they will conduct another one next month
9 in which the individual goes out there and just simply
10 scrapes the surface of the screen with some sort of a
11 brush or scraper.

12 And number three, the fouling organisms that
13 you would probably find in the Great Lakes would be
14 different than the ones you would in the Delaware River.

15 BY MR. SUGARMAN (Resuming):

16 Q On page 15 of your direct testimony you state
17 that withdrawal of the Limerick portion of the flow will
18 be reduced to 27 cfs for a flow augmentation of the east
19 branch of the Perkiomen Creek when flow in the Delaware
20 River drops to 3000 cfs at the Trenton gauge.
21 Therefore, the worst case condition would be 147 cfs
22 from the minimal allowable flow of 3000 cfs, or 4.9
23 percent. Is that your testimony? Is that your
24 understanding of what the flow is and what the worst
25 case condition would be?

1 A (WITNESS MASNIK) At the time that this
2 testimony was written, that's true.

3 Q So now we're talking about a higher withdrawal
4 from the river, is that correct, if we get down to 2000
5 cfs and we still have the maximum withdrawal?

6 A (WITNESS MASNIK) I don't know where the 2000
7 cfs came from.

8 Q Well we've had flows at 2000 cfs. I'm just
9 picking it. Say 2500. Say 2250.

10 A (WITNESS MASNIK) The Limerick station wouldn't
11 be operating.

12 Q It wouldn't?

13 A (WITNESS MASNIK) Well, under the agreement
14 with DRBC, that is the case. I mean, we can postulate
15 what would be the situation with Merrill Creek and other
16 things, but I'm saying that based upon what we had known
17 at the time this document was prepared, we looked at it
18 from the standpoint of 3000 cfs.

19 Now subsequent to that, I have looked at 2500
20 cfs based upon what we heard from the DRBC, Mr. Hansler,
21 and we essentially increased it to 5.9 percent. But
22 once again, we have looked at the return frequency of
23 those types of flows during the time of the year when we
24 expect larval fish and eggs to be present, and it is
25 down an order of one percent.

1 Q And even at higher flows with the
2 recirculation of the eddy flows past the intake and the
3 direction of the flow being -- the vector of the flow
4 being less than parallel direction to the intake, did
5 you take those factors into account? And I'm asking you
6 to assume them to be true. Did you take those factors
7 into account in forming your evaluation and your opinion?

8 A (WITNESS MASNIK) I took into account the
9 recirculation; I did not take into account the less than
10 perpendicular flow. But the reason I didn't take it
11 into account in my written testimony is because I didn't
12 feel that it was important based upon all of these other
13 field studies in which we had seen flow at every
14 conceivable direction to the screens.

15 Q And you get as much as half of or as much as
16 89 percent in the Nanticoke case of the larvae entrained
17 or impinged?

18 A (WITNESS MASNIK) That is not a fair
19 characterization. Savings may only be 12 to 13 percent
20 above what you would normally expect, had there been no
21 screen there at all.

22 Q Well, what would you normally expect if there
23 would be no screen there at all?

24 A (WITNESS MASNIK) Well, under ideal conditions
25 you would expect to withdraw the same number of larvae

1 from the water column that is contained in the water
2 column.

3 Q And by recirculating the water past the
4 intake, and even if there is a savings of 11 percent,
5 you could be losing 20, 30, 40 percent of the larvae in
6 that eddy; isn't that right?

7 A (WITNESS MASNIK) The probability of an
8 individual -- well, that is correct. In the eddy that
9 would be the case. But of course, then, you would
10 deplete the larvae in the eddy, and since the eddy is an
11 area of reduced interchange with the rest of the river
12 the larvae in the river would be less susceptible to
13 entrainment.

14 Q Except that as the water -- the stage rises
15 and the water comes down the river, it tends to spread
16 out into the eddy and deposit more larvae into it.

17 A (WITNESS MASNIK) But we're talking about a one
18 percent low flow condition; then you're talking about a
19 rising and falling stage condition. If you put on all
20 of these additional conditions, the probability of all
21 these things happening at the same time when also you're
22 having spawning for a sufficient length of time to
23 matter, is totally inconsequential. It just would not
24 all occur at the same time consistent enough to really
25 cause any detrimental effect to the species.

1 Q To the species?

2 A (WITNESS MASNIK) Certainly to the individual
3 that lands on the screen.

4 JUDGE BRENNER: Somebody take a deep breath
5 after the next sentence because I'm going to jump in.
6 Did you finish your answer, Dr. Masnik?

7 WITNESS MASNIK: Yes.

8 JUDGE BRENNER: We let you run quite a bit
9 over our estimate, and in addition, I know I've heard
10 these questions and answers before, although not
11 necessarily in the same words. So not only is it
12 running over, but it is non-productive.

13 MR. SUGARMAN: I agree, it is non-productive.

14 JUDGE BRENNER: I infer from that that you
15 have covered everything you needed to cover.

16 MR. SUGARMAN: That I don't know.

17 JUDGE BRENNER: Well, that is the inference I
18 drew when you go back and repeat. Twenty minutes for
19 staff, absolutely, positively.

20 MR. RUTBERG: Would it be okay to excuse Mr.
21 Westcott from the panel so he could meet with Ms.
22 Hodgdon?

23 JUDGE BRENNER: Yes, but when you're done,
24 they had better be back there.

25 REDIRECT EXAMINATION

1 BY MR. RUTBERG:

2 Q Dr. Masnik, yesterday I believe in response to
3 a question from Mr. Sugarman you were asked if you were
4 aware of the closest spot that eggs and larvae had been
5 found near the Point Pleasant location, and you
6 mentioned the Campbell station. Did you mean to say the
7 Campbell station?

8 A (WITNESS MASNIK) No, I did not. I mean to say
9 the Gilbert station.

10 Q Also, last night Mr. Sugarman asked you a
11 question and asked you to read a sentence on page 235 of
12 the Campbell plant study. Could you read that sentence
13 again into the record and -- well, read it into the
14 record.

15 A (WITNESS MASNIK) "During 1981, almost three
16 million larval alewives were entrained (29.2 percent of
17 the total), the most during June (2.3 million)."

18 Q Could you indicate for the Board what you
19 understood the 29.2 percent to mean?

20 A (WITNESS MASNIK) When they said 29.2 percent
21 of the total they meant the total number of organisms
22 entrained into the plant; not 29 percent of the total
23 number of alewives present in the area.

24 Q Okay, Dr. Masnik. Last night, also in
25 response to a question from Mr. Sugarman, you listed a

1 number of sampling studies designed to capture the
2 larvae of the shortnose sturgeon. Would you explain to
3 the Board the significance of these studies, as far as
4 your analysis is concerned?

5 A (WITNESS MASNIK) I think the reason that was
6 brought up -- I never did get around to it, but
7 basically what I wanted to show was that a considerable
8 amount of effort by the experts in the field has gone
9 into collecting or attempting to collect larval
10 shortnose sturgeon, and they have used the best
11 techniques available to them at the time and they just
12 have not been able to collect them.

13 Which leads you to believe that if you then
14 design an intake structure that is designed to not catch
15 shortnose sturgeon larvae, the chances are pretty good
16 that you probably are not going to do that. In fact,
17 one of the studies used a bottom hump where they
18 filtered something like seven or six million gallons of
19 water over the spawning site of the shortnose sturgeon
20 in the Connective River during the spawning season, and
21 after filtering all of that water, they came up with no
22 larvae. And that suction device was right on the bottom
23 and he moved it along the bottom over the spawning
24 grounds, and he did catch a few larvae using a set
25 plankton net, so it even appears that the larvae may

1 avoid pump flows like that.

2 JUDGE BRENNER: Tell me again what that proves?

3 WITNESS MASNIK: Say again?

4 JUDGE BRENNER: Tell me again what that proves.

5 WITNESS MASNIK: I'm just saying that if you
6 make all of these efforts to design an intake that will
7 not impinge organisms or entrain shortnose sturgeon,
8 then chances are you will not, if you put all of the
9 other effort into looking at studies or methods that try
10 to collect them.

11 BY MR. RUTBERG (Resuming)

12 Q In other words, the shortnose sturgeon is hard
13 to find.

14 A (WITNESS MASNIK) It is hard to collect.

15 JUDGE COLE: Are you saying you could do
16 almost anything and you wouldn't get them?

17 WITNESS MASNIK: I'm saying that the best
18 people in the field have attempted to collect these
19 larvae in the field using the best techniques available
20 and they have not been able to, in large numbers.
21 You're talking about 21, 22 larvae total that were
22 collected in the field.

23 JUDGE BRENNER: The sampler, I'm sure, for
24 scientific purposes went in there with a suction
25 device. He knew they were there. Is that what you're

1 telling me?

2 WITNESS MASNIK: Yes, he knew where the
3 spawning grounds were. He was there during the spawning
4 season and he traversed the river from one side to the
5 other with this suction device right on the bottom.

6 JUDGE BRENNER: And he knew there were larvae
7 present there, too?

8 WITNESS MASNIK: Yes, because he did catch a
9 few in one of these anchor plankton nets.

10 JUDGE BRENNER: I shouldn't do this on limited
11 time, but this reminds me a little bit of one of my
12 favorite environmental assessments of terrestrial
13 ecology when it was noted that bald eagles had been
14 spotted nesting in the area of the project but only
15 rarely.

16 (Laughter.)

17 BY MR. RUTBERG (Resuming)

18 Q Dr. Masnik, yesterday in response to a
19 question from Mr. Sugarman you indicated that applying a
20 percent of volume passing through the intake versus the
21 total volume passed the site at approximately 5 percent
22 the water flow in the intake. What additional factors
23 do you believe might tend to reduce the rate of
24 mortality of American shad below this 5 percent level at
25 the intake?

1 A (WITNESS MASNIK) Well, I think just to
2 summarize quickly, I felt that at the 5 percent flow, or
3 the 5 percent entrainment level, we would not find any
4 significant impact. The additional factors which I feel
5 will further reduce this is any bypass or washing
6 current that may occur there.

7 The fact that in the case of shad eggs, they
8 are demersal; they sink fast and they wouldn't normally
9 be found in the water column for very long. And also,
10 that the present spawning ground is quite a ways
11 upstream, and that if the spawning returns to the kind
12 of historical range that it had in the past, the
13 greatest spawning areas were further downstream in the
14 tidal areas and not, apparently, in the middle river or
15 the middle portion of the river.

16 And finally, in the biological importance of
17 designing an intake to protect an organism, it is more
18 important to protect the later life stages, and
19 evidently from the studies that have been conducted at a
20 number of facilities, impingement just does not seem to
21 be a problem with this type of intake.

22 Q Along those lines, Dr. Masnik, which would you
23 consider more biologically important to the population:
24 to the protect the larvae or the juvenile of the species?

25 A (WITNESS MASNIK) Certainly, the juvenile.

1 Q Would it be more important to the population
2 then to reduce impingement or entrainment?

3 A (WITNESS MASNIK) Certainly, to reduce
4 impingement.

5 Q And why is that?

6 A (WITNESS MASNIK) Because of the high mortality
7 rates that the early life stages experience.

8 Q Since you prepared your testimony, what
9 information have you received that would support your
10 assertion that impingement should not be a problem at
11 the Point Pleasant site?

12 A (WITNESS MASNIK) The Campbell study in Lake
13 Michigan at the end of one year, they did an impingement
14 study where they sent divers down to inspect screens,
15 and they attempted to inspect at least half of the
16 screens, and in most cases, inspected all of them
17 completely. They did it 16 times between the end of
18 April and the end of October 1981. The divers went down
19 and they visually inspected all of the screens to
20 determine if there were any impinged fish, and since
21 there is no backwash on this and the flow is constant
22 through that, you would expect that if there was any
23 impingement, for a gradual buildup of fish on the screen.
24 In all of the 16 observations, they determined
25 that there were no fish impinged on the screens; none.

1 And in fact, they saw some species of fish that actually
2 alighted on the screen and then swam off.

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 Q Do you have a copy of the transcript in front
2 of you or nearby -- yesterday's transcript?

3 A (WITNESS MASNIK) Yes, I do.

4 Q Would you turn to page 3,520?

5 A (WITNESS MASNIK) I have it.

6 Q Referring to 3,520 and towards the bottom of
7 the page was a question asked by Judge Cole. "So they
8 provided no numbers except a statement." Do you see
9 that?

10 A (WITNESS MASNIK) Yes, I do.

11 Q Do you remember your answer to that question?

12 A (WITNESS MASNIK) I essentially said that they
13 did not provide numbers, that the study only provided a
14 statement.

15 Q Is that still your belief?

16 A (WITNESS MASNIK) No, it is not. Over the
17 lunch period yesterday I did find some numerical data in
18 the report that essentially verifies the .53 percent
19 number that came up after lunch.

20 MR. SUGARMAN: What number? What was this?

21 MR. RUTBERG: The Campbell report.

22 WITNESS MASNIK: The statement that said using
23 the most conservative estimates of field population on
24 each date the highest percent of larval alewives
25 entrained relative to field population was .53 percent.

1 There are numbers in this report that verify that
2 statement.

3 MR. RUTBERG: Mr. Chairman, we have no more
4 questions of Dr. Masnik. I will check with Mr. Wescott
5 and Miss Hodgdon and see where we stand.

6 MR. SUGARMAN: I have one question on recross
7 as a result of his testimony just now and maybe this is
8 the best time to do it.

9 JUDGE BRENNER: All right, sure.

10 RE CROSS EXAMINATION

11 BY MR. SUGARMAN:

12 Q The Campbell screens you say they didn't find
13 impinged alewives. What was the screen slot opening in
14 this Campbell screen? Was it nine millimeters?

15 A (WITNESS MASNIK) 9.5.

16 Q 9.5 millimeters? How small or how large were
17 the alewives that would have had to be at the larvae
18 stage to be impinged rather than entrained -- larger
19 than nine millimeters, right?

20 A (WITNESS MASNIK) Certainly larger than nine
21 millimeters.

22 Q Much larger, in fact, given the length or
23 width or the length to width ratio? Couldn't any
24 alewife have been entrained rather than impinged given
25 the size of those screens?

1 A (WITNESS MASNIK) Certainly not. I would have
2 to sit down and do a calculation on that, but it would
3 be probably in the order of maybe 30 or 40 millimeters
4 maximum. Anything above that size would be impinged.

5 Q And anything above that size would be past the
6 transformation stage, right?

7 A (WITNESS MASNIK) Well, it probably would not
8 be a larvae, that's correct.

9 Q That's right. So you wouldn't expect to find
10 any impingement at Campbell. You would expect to find
11 entrainment.

12 A (WITNESS MASNIK) That's right.

13 Q And that's what they did find?

14 A (WITNESS MASNIK) Yes. But the entrainment
15 rate was so low relative to the ambient --

16 Q Three million larvae.

17 A (WITNESS MASNIK) It was on the order of .53
18 percent of what was out away from the intake.

19 Q Per day, right?

20 A (WITNESS MASNIK) Per sampling period, yes.

21 JUDGE BRENNER: Okay. Staff?

22 BY MR. SUGARMAN: (Resuming)

23 Q And Campbell is a lake situation, isn't it,
24 not a river?

25 A (WITNESS MASNIK) That is correct. In fact,

1 they used the bypass velocity for some of the
2 calculations at .25 feet per second.

3 Q And lake fish behave differently than river
4 fish?

5 JUDGE BRENNER: That's two more, Mr. Sugarman,
6 and starting from your one question that's quite a bit.
7 I was going to give you a chance for a quick round after
8 the Staff, but I hoped that it would be quick.

9 MR. SUGARMAN: I don't have to have any more
10 rounds with Mr. Masnik.

11 JUDGE BRENNER: Did you get an answer to the
12 last one when I jumped on you?

13 WITNESS MASNIK: I can't say that you can
14 universally say that lake fish behave differently than
15 river fish.

16 MR. SUGARMAN: I'm sorry. That answer leads
17 me to ask one more question.

18 JUDGE BRENNER: Well, when you ask a broad
19 question like that, that's the kind of answer you are
20 going to get. Why don't you tell him what you have in
21 mind in your question and get the answer?

22 BY MR. SUGARMAN: (Resuming)

23 Q Isn't it true that you can't draw any
24 conclusions as to how river fish behave in relationship
25 to their swimming characteristics and their avoidance

1 characteristics from what lake fish do?

2 A (WITNESS MASNIK) That is such a broad
3 question, I can't answer that question. We are looking
4 at a different species. We are looking at alewives
5 versus shad.

6 JUDGE BRENNER: Dr. Masnik, let me interrupt.
7 That is the question. Alewives in the vicinity of the
8 Campbell test as compared to shad and in the different
9 life stages of interest in the Delaware River in the
10 vicinity of Point Pleasant, do you think the differences
11 are such that the results would be not applicable, fully
12 applicable, or only partially applicable, and why, given
13 their different swimming characteristics?

14 WITNESS MASNIK: I would think that it would
15 be applicable and, if anything, conservative because the
16 eggs or the hatchlings of alewives are much smaller when
17 they hatch. The larvae are much smaller when they hatch
18 than American shad.

19 JUDGE BRENNER: Staff?

20 REDIRECT EXAMINATION ON BEHALF OF NRC STAFF

21 BY MS. HODGDON:

22 Q Mr. Wescott, have you participated as a Staff
23 reviewer in the preparation of the DES/FES at the
24 construction permit stage of any licensing proceeding?

25 A (WITNESS WESCOTT) No, I have not.

1 Q Are you aware that alternatives to the
2 applicant's proposed site are considered in the
3 environmental impact statement at the construction
4 permit stage?

5 A (WITNESS WESCOTT) Yes, I am.

6 Q And have you participated as a Staff reviewer
7 in the preparation of the DES/FES at the operating
8 license stage of any proceeding?

9 A (WITNESS WESCOTT) Yes, I have.

10 Q In proceedings other than this one?

11 A (WITNESS WESCOTT) Well, in proceedings, no.
12 I thought you were going to say plants.

13 Q Have you participated in the preparation of
14 the DES/FES on other OLS other than this one for
15 Limerick?

16 A (WITNESS WESCOTT) Yes, I have.

17 Q More than one?

18 A (WITNESS WESCOTT) Yes.

19 Q Would you name one, for example?

20 A (WITNESS WESCOTT) Yes. I participated in the
21 preparation of the DES and FES for St. Lucie, Callaway,
22 Wolf Creek.

23 Q And were alternatives considered?

24 A (WITNESS WESCOTT) No, they were not.

25 Q Are alternatives considered at the operating

1 license stage under the Commission's regulations and in
2 Part 51?

3 A (WITNESS WESCOTT) It is my understanding that
4 our Part 51 regulations only require consideration of
5 changes at the OL stage, but do not require
6 alternatives.

7 JUDGE BRENNER: Miss Hodgdon, normally I would
8 let you go, but we're on a tight time period. I'm not
9 going to do anything with his statement of what is
10 considered under NEPA at the OL stage. I have got my
11 own view of it. If you want to put it in the brief, go
12 ahead and do it. He's got a lot of facts he testified
13 to. Why don't you ask him about those?

14 MS. HODGDON: I'm going to ask him about scour.

15 JUDGE BRENNER: Fine.

16 BY MS. HODGDON: (Resuming)

17 Q Your testimony -- what does your testimony
18 concern?

19 A (WITNESS WESCOTT) My testimony concerned the
20 contention as it was written, and it addressed
21 relocation of the intake and the drawdown due to the
22 relocation, which was the Intervenor's contention.

23 Q And is it your testimony that you were not
24 concerned about scour but realized that the Applicant
25 may have been concerned because he proposed to place

1 riprap under the intake?

2 MR. SUGARMAN: I object to his speculating as
3 to what the Applicant may have been concerned with. The
4 question was is it your testimony that you weren't
5 concerned with it but you thought the Applicant may have
6 been.

7 JUDGE BRENNER: He can testify in his
8 professional experience why people put riprap under
9 intakes.

10 WITNESS WESCOTT: Yes, I thought the Applicant
11 was addressing it, and my testimony that I just stated
12 dealt with the contentions. scour was not a contention
13 or part of a contention.

14 BY MS. HODGDON: (Resuming)

15 Q And you mentioned scour for the first time in
16 relation to a proposal to change the intake further out
17 into the stream from the 245-foot relocated site?

18 A (WITNESS WESCOTT) Yes. As I recall the
19 question, Mr. Sugarman asked me if I thought putting the
20 intake out farther would be a good idea. And it was my
21 immediate reaction that no, it wouldn't, that scour
22 might present a problem out there, a serious problem.

23 Q But you were not concerned about scour because
24 you had not really considered a further relocation of
25 the site? Your review was addressed to the impact of

1 the intake at the site, that 245-foot site that we are
2 addressing here; is that correct?

3 A (WITNESS WESCOTT) That is correct.

4 MS. HODGDON: I have no further questions.

5 JUDGE BRENNER: Is that true for you too, Dr.
6 Masnik, if you were asked that same question by your
7 counsel -- that you hadn't considered in your assessment
8 of the impacts how they might be the same or differ at
9 the proposed location as opposed to a little further out
10 in the river, or not so far out in the river?

11 WITNESS MASNIK: I evaluated the intake as to
12 where it was, not at any other location.

13 JUDGE BRENNER: Okay.

14 We have got some questions and we don't want
15 to get cut off.

16 BOARD EXAMINATION

17 BY JUDGE COLE:

18 Q Dr. Masnik, would any of your conclusions
19 relative to the impact of the intake on shad or
20 shortnose sturgeon be changed in any way if the intake
21 were not oriented in the direction of the flow of the
22 river?

23 A (WITNESS MASNIK) I feel a minor reorientation
24 would not affect it. If you rotated it essentially 90
25 degrees, I think I would have to look at it again. I

1 did not evaluate that, but the fact that you have two
2 parallel trains, I think I would have to reexamine that.

3 Q All right, sir. We had some discussion at
4 various times today of cross currents at different
5 flows. The kinds of changes we were talking about there
6 could be of the order of 20 to 30 degrees off the
7 straight downriver orientation.

8 If we were to have cross currents and
9 directions of that order of magnitude, would that change
10 any of your conclusions relative to the impact on shad
11 and/or shortnose sturgeon in any of their life forms?

12 A (WITNESS MASNIK) No, I don't think so.

13 Q We have heard a lot of testimony about the
14 survival of shad from the egg stage to return spawners.
15 And I asked a question as to the likely survivor, given
16 one or two scenarios for an egg, for example -- an egg,
17 a fertilized egg, could go any one of several ways, one
18 of which was to go down to the bottom and fall into an
19 interstice in a rock or some protected section of the
20 bottom, or get off into an eddy somewhere and travel
21 downstream.

22 Do you have any knowledge of, sir, or do you
23 know of any studies to determine which ones, which of
24 those possible alternatives would more likely result in
25 a survivor than otherwise, sir?

1 A (WITNESS MASNIK) Yes. There were some
2 studies done in the '60s and there was an individual by
3 the name of Chittenden who published a Ph.D dissertation
4 and essentially he said that the eggs sink to the bottom
5 and they are normally swept under rocks and boulders.

6 Q This is for shad, sir?

7 A (WITNESS MASNIK) That is for shad, and he
8 uses the word "by eddy currents" and are secured there
9 due to their increased diameter from water hardening,
10 and they are normally in areas of low flow.

11 The implication is that those are the eggs
12 that have the highest survival probability. Eggs lying,
13 let's say, on a scoured portion of the bottom out in the
14 open, would be more than likely eaten by bottom
15 organisms very quickly.

16 Eggs that would sort of saltate down the river
17 in the water column would also probably meet pretty much
18 the same fate fairly quickly, so it's really only the
19 eggs that fall down in the rocks and are protected that
20 do have some sort of sweeping velocity over them. If
21 they fall down in an area where there is very quiet
22 water and no sweeping velocity, normally they will get a
23 cover of sediment, and they could also die in that
24 manner as well.

25 Q All right, sir, thank you.

1 With respect to the intake location as
2 proposed and the eggs that might be entrained by that
3 intake, then based upon what you just said, would the
4 intake be entraining, more likely, non-survivors or
5 survivors?

6 A (WITNESS MASNIK) It would entrain eggs that
7 probably had a higher probability of not making it.

8 Q All right, sir. Thank you.

9 A (WITNESS MASNIK) It is a very critical
10 period, once the eggs are released until they are in a
11 protected environment, and I mention that you are
12 talking about a 99.99 percent mortality and this is a
13 big factor involved in that.

14 Q I understand, sir. One further area now.
15 You discussed a little bit yesterday about the
16 observed avoidance behavior on a test screen, indicating
17 that the avoidance behavior, at least as observed in the
18 test screen, indicated that only ten percent of what you
19 would have expected to entrain, if there were absolutely
20 no avoidance behavior, was in fact observed on the test
21 screen. Is that correct, sir?

22 A (WITNESS MASNIK) I believe the study was the
23 Oyster Creek study, yes. That is, I believe I remember
24 saying, 91 percent, which is roughly ten percent.

25 Q I don't understand that 91 percent is not ten

1 percent.

2 A (WITNESS MASNIK) Well, it depends upon
3 whether or not you look -- which end you look at it
4 from. If it was ten percent -- well, if you look at it
5 from 90 percent, that means 90 percent of the organisms
6 avoided it, or ten percent didn't, I guess.

7 Q All right, sir. Now you also indicated
8 yesterday that this particular behavior, although
9 observed, was not as pronounced in a larger screen, and
10 I believe you also indicated that they did not provide
11 any numbers on that except that it was not demonstrated
12 to be as strong an avoidance. Is that correct, sir?

13 A (WITNESS MASNIK) Okay. I understand what you
14 are driving at now, yes, sir.

15 Q You do?

16 A (WITNESS MASNIK) Well, the ten percent
17 baffled me before, but okay, I understand.

18 Q I haven't asked my question yet. Well, if I
19 don't get to the point that you think I should be
20 getting at, I want you to speak up.

21 I want you to tell me why you think that --
22 why there is the difference. What do you think happens,
23 or if you think it's something else, tell me that too.

24 A (WITNESS MASNIK) The difference is I was in
25 error. The report, as I read it, it is laid out, I

1 think, a little cryptically and as a result all I could
2 ascertain from the report was that there was a
3 reduction. It did not specify the reduction, but the
4 way it was worded, it wasn't worded very strongly, so my
5 inference was that the reduction was not by a factor of
6 ten or only ten percent.

7 When I went back at noontime, as I mentioned
8 on redirect, and reread it, I found that in fact at
9 least for the herring -- or, well, the alewife, that
10 there was a substantial reduction and, in fact, it was
11 greater than a ten-to-one factor. And this is the
12 number of .53 percent that was brought up.

13 Q All right, sir. So that's factored.

14 A (WITNESS MASNIK) Right. Now that didn't hold
15 for all species. Now some species the number entrained
16 was higher than what was in the ambient, but for the
17 herring it was .53 percent.

18 Q Now herring is also the Alosa group.

19 A (WITNESS MASNIK) Yes. Herring is a common
20 name for -- well, shad aren't typically considered
21 herring. It is a common name. I guess if this
22 particular -- the Campbell study dealt with alewives,
23 which are considered a herring. The American shad is
24 considered a shad.

25 Q But they are both --

1 A (WITNESS MASNIK) They are both in the same
2 family. They are both closely related. They are both
3 in the same genus, in fact.

4 Q But as far as you are concerned, that is where
5 the comparison stops?

6 A (WITNESS MASNIK) Certainly, because they are
7 not the same species.

8 Q Now what did you think I was going to ask you
9 if that is not what I asked you?

10 A (WITNESS MASNIK) I thought you were going to
11 ask me what the factors were that contributed to the
12 difference in the scaling factor, and I said I was
13 incorrect.

14 JUDGE COLE: Thank you, sir. I have no
15 further questions.

16 WITNESS MASNIK: At least for this species.

17 JUDGE BRENNER: You don't get any extra credit
18 for asking the questions and answering them.

19 Judge Morris has some questions.

20 BOARD EXAMINATION

21 BY JUDGE MORRIS:

22 Q Mr. Wescott, I think I should have followed up
23 while the previous witness was on the stand, but I was
24 struck with a new word, which gather is a German word --
25 t-h-a-l-w-e-g -- thalweg.

1 A (WITNESS WESCOTT) I believe that is correct.

2 Q I thought I understood the use of it, but I
3 went and looked it up in the dictionary during the break
4 and I would like to know what your understanding of what
5 that term is.

6 A (WITNESS WESCOTT) My understanding was the
7 same as Mr. Phillippe's, or at least I think what he
8 said, that I would define a thalweg as the lowest point
9 on the channel line connecting the lowest points -- a
10 line running longitudinal to -- running along the
11 channel connecting each location of the lowest point.

12 In other words, it would define the deepest
13 part of the channel. That would be my understanding of
14 what a thalweg is.

15 Q That was number one definition in Webster's
16 Third International.

17 A (WITNESS WESCOTT) I thought that is what Mr.
18 Phillippe said.

19 Q Well, the reason for asking that first
20 question is then to ask you generally where would the
21 flow and the current -- the maximum flow in the river be
22 with respect to that characteristic.

23 A (WITNESS WESCOTT) Normally it would be in
24 that deepest part, but sometimes other factors can
25 influence it. But normally I would expect the highest

1 velocities in the deepest part of the channel.

2 Q And what would your opinion be at the location
3 of the intake structure -- proposed location of the
4 intake structure -- in the deepest part of the channel
5 ther?

6 A (WITNESS WESCOTT) Well, my concern, as I
7 stated before, was I thought that there could be a
8 possibility of high scour there or a good potential.

9 Q No. I am simply asking about the topography
10 of the river bottom and the location of maximum velocity
11 or speed of the water.

12 A (WITNESS WESCOTT) Do you mean would I put an
13 intake in it?

14 Q No. Forget the intake. Where would the
15 maximum speed of the water be with respect to the
16 thalweg?

17 A (WITNESS WESCOTT) I would generally think at
18 the thalweg, without looking at anything else.

19 Q Well, you spoke generally now. Put yourself
20 in the extension of the intake maze out into the deepest
21 part of the channel. Would you expect the maximum flow
22 there or somewhere else?

23 A (WITNESS WESCOTT) No, I would expect it in
24 this case in the maximum depth of the channel.

25 Q And would that take into account the contours

1 upstream?

2 A (WITNESS WESCOTT) Yes, in this case I believe
3 it does and I am going to check it again to make sure.

4 Yes, my plot of velocities pretty much showed
5 the highest velocity in the deepest point, which is what
6 I would expect.

7 Q In this particular configuration, as shown by
8 the contours on Applicant's Exhibit 4, which is known as
9 Policastro 1?

10 A (WITNESS WESCOTT) Right. That is correct.

11 JUDGE MORRIS: Thank you.

12 BY JUDGE COLE: (Resuming)

13 Q It was just a small point. When you said at
14 the deepest point, do you mean in the water column
15 directly above the point since the velocity right at the
16 bottom would be relatively slow?

17 A (WITNESS WESCOTT) Yes. If we are talking
18 about depth-integrated velocities, I would expect the
19 average velocity over the deepest point.

20 BY JUDGE MORRIS: (Resuming)

21 Q Dr. Masnik, are you familiar with what the
22 historical spawning grounds for shad were, say prior to
23 the oxygen block formation in the Delaware River?

24 A (WITNESS MASNIK) I think the majority of the
25 spawning historically -- and you have to understand that

1 there were not very good studies done back at the turn
2 of the century -- but they did find that an area a short
3 distance above Gloucester, New Jersey, which is at
4 river mile 96 -- it is actually across and upstream of
5 the mouth of the Schuylkill in the Delaware River -- it
6 is thought to be the historical principal spawning
7 grounds of the American shad and, of course, that is
8 down in the tidal area.

9 So they feel that the majority of spawning
10 historically was in the tidal area and the highest
11 densities, at least, were collected in this region near
12 Gloucester, New Jersey.

13 Q At that time was there also spawning upriver
14 in the upper reaches, say up near Easton, or do you
15 know?

16 A (WITNESS MASNIK) I can't answer that for
17 certain, but I would suspect that it was as well.

18

19

20

21

22

23

24

25

1 Q And what do you believe the pattern is now.
2 Over what stretch of the river does shad spawning take
3 place?

4 A (WITNESS MASNIK) Well, the principal spawning
5 ground is way upriver, and that is up above near the
6 Delaware water gap and above that, and on the East
7 Branch and the West Branch of the Delaware.

8 Q How many river miles would that extend over,
9 assuming that the spawning takes place in pools
10 in-between the riffles or wherever?

11 A (WITNESS MASNIK) I would have to look that
12 up, to be honest with you.

13 Q Can you make a rough guess?

14 A (WITNESS MASNIK) I would say the principal
15 spawning area now is 70 to 100 miles long.

16 MR. SUGARMAN: I beg your pardon?

17 WITNESS MASNIK: Seventy to 100 miles long.

18 BY JUDGE MORRIS: (Resuming)

19 Q Do you have any estimate of the number of shad
20 that spawn per year in the Delaware?

21 A (WITNESS MASNIK) We have an estimate of the
22 number that return, and we assume that the majority of
23 them that return would spawn, and we are talking like, I
24 think, in 1980 or '81 it was like a little bit more than
25 half a million returning shad -- 530,000 I think I

1 remember.

2 Q Now you said the majority would spawn. Does
3 that mean something over fifty percent?

4 A (WITNESS MASNIK) Oh, yeah, close to 90
5 percent. I'm certain there are probably some that
6 return that don't spawn, but I think that is a very
7 small number.

8 Q Close to 90 percent?

9 A (WITNESS MASNIK) Yes, I would say so, and
10 those are the ones, of course, that aren't caught.

11 BY JUDGE COLE: (Resuming)

12 Q I'm sorry. I want to make sure I know what
13 you mean by "returning shad." What do you mean by
14 that?

15 A (WITNESS MASNIK) These are shad that enter
16 the lower bay and move upstream to spawn, essentially.
17 The spawning migration are the shad that come upriver.

18 Q All right, sir, but it might be the first time
19 that they are going up. They are not necessarily return
20 spawners.

21 A (WITNESS MASNIK) That is correct. That's
22 right. Yes, we have heard that. I understand.

23 BOARD EXAMINATION

24 BY JUDGE BRENNER:

25 Q Mr. Wescott, following up on whether or not

1 the velocities would correlate well with the bathymetry
2 at the site, I am looking at the 4,500 cfs readings by
3 Mr. Harmon because the differentials are -- the
4 intervals are closer than the 3,000-foot readings and
5 using those readings at the Point Pleasant site there
6 really isn't much of an increase in velocity going from
7 250 feet out to 300 feet out at the middle depths of
8 interest here, or a four-foot depth and seven-foot
9 depth.

10 In fact, there is a slight decrease going from
11 250 to 275 and then a slight increase between that
12 interval overall -- a slight decrease at four feet from
13 2.8 to 2.6, and then a slight increase just a tenth of a
14 foot, from 2.6 to 2.7.

15 As I look at the stationing, the 900-foot
16 location, and you have to extend the center line
17 according to the scale to do that, would put me pretty
18 much in the middle of that 58-foot contour just to the
19 left of County -- where it says Bucks County. And you
20 can tell me if you think I'm wrong as to the location.

21 A (WITNESS WESCOTT) I think you are right --
22 about 900.

23 Q Would you expect the velocities to be -- why
24 aren't the velocities greater there, given the
25 bathymetry at 4,500 cfs?

1 A (WITNESS WESCOTT) What I did was when I
2 calculate velocities, first of all, I have always
3 compared them by averaging them, and you are right. The
4 velocity does tend to stay fairly level throughout there
5 and it doesn't show a great increase.

6 Now I don't know whether it is because the
7 bottom is relatively flat across the range there or
8 what. But one of the things, too, is I think flow is
9 starting to expand a little bit and that may have some
10 effect on distribution of flows across that cross
11 section.

12 Q Say that again? What is tending to expand a
13 little bit?

14 A (WITNESS WESCOTT) Well, the flow. It is kind
15 of confined by the bar, and then as it moves up it is
16 expanding a little bit.

17 Q Do you mean as Judge Morris suggested the
18 region of high velocity is getting wider?

19 A (WITNESS WESCOTT) That is correct. That may
20 be. Now the thing of it is that the higher the flow,
21 the less it is going to expand. The faster the water is
22 moving, it is going to expand to the same ratio a little
23 bit farther downstream than it is doing at, say, the
24 lower flow.

25 Q All right. And that is why the 3,000-foot

1 measurements, if I compare eight plus -- the station at
2 eight plus 60 to nine plus 30, more of an increase does
3 show at the four and seven-foot depth. Is that right?

4 A (WITNESS WESCOTT) Yes, I would say so.
5 That's correct.

6 Q So if I was interested in obtaining a higher
7 bypass velocity at a flow of approximately 4,500 -- and
8 I haven't forgotten your testimony that you think it is
9 somewhat higher --

10 A (WITNESS WESCOTT) 5,600, right.

11 Q I wouldn't be gaining anything if that was the
12 flow of interest by going further out.

13 A (WITNESS WESCOTT) Right.

14 Q And the reason I went through this little
15 exercise, if I am taking your statement that you would
16 correlate it with the bathymetry, I might have thought
17 oh, let me go out to the 58-foot contour, but that
18 doesn't necessarily hold true because of the other
19 considerations.

20 A (WITNESS WESCOTT) I think when I averaged
21 these at nine plus 24 I got 2.75 and at eight plus 74 I
22 got about 2.5, so there is a slight increase there, but
23 I wouldn't consider it really significant.

24 Q Let me try another statement on that same flow
25 day and you can tell me what I am leaving out and I see

1 what I consider some slight anomalies in comparing the
2 bathymetry.

3 A (WITNESS WESCOTT) I think you are right.

4 Q It looks like the main flow, if I look just at
5 the bathymetry, would move closer to the Pennsylvania
6 shore as I go approximately 100 feet downstream of the
7 proposed intake location.

8 A (WITNESS WESCOTT) I would agree with that.
9 That's the way it looks to me also.

10 Q If I look at the 250-foot distance at
11 Point Pleasant and then 100 feet downstream and that
12 should tell you if you are using the stationing it would
13 be eight plus 74 in that table, and I honestly forget
14 where I got the other table, but it is an identified
15 exhibit somewhere -- I believe Delaware Exhibit 9.

16 But in any event, looking at four feet and
17 seven feet again, at Point Pleasant it is 2.8 feet per
18 second going downstream at that same distance of
19 approximately 250 or eight plus 74. It is reduced to
20 2.6 feet per second and, similarly, at the seven-foot
21 depth there is a reduction from 2.6 feet per second at
22 Point Pleasant down to 2.4 feet per second.

23 Wouldn't you have expected an increase rather
24 than a decrease?

25 A (WITNESS WESCOTT) I didn't even worry about

1 the velocity measurements at a particular point when I
2 made my comparison. I averaged them. I averaged them
3 over the depth and just looked at depth-integrated
4 velocities, and that seemed to really follow the
5 contours.

6 Now whether it was the instrument that was off
7 by maybe a tenth of a foot per second or possibly some
8 turbulence in there -- it could have been a lot of
9 things causing that.

10 Q Judge Morris reminds me you already testified
11 that the velocities would decrease if you go
12 downstream. That is when I asked you that question
13 about swinging the end out, but I'm following up now,
14 asking you to look at the bathymetry and you are telling
15 me why that is occurring.

16 A (WITNESS WESCOTT) Okay. Now you just
17 mentioned flows at one depth. Is that what you want to
18 know -- why you go from 2.8 feet per second at 8.74 to
19 2.5 and 2.6?

20 Q Not specifically to the tenth, but why the
21 direction is in that direction.

22 A (WITNESS WESCOTT) I think those are just
23 either measurements in error or cross components of
24 velocity. I mean, the depth-integrated velocities are
25 increasing. I calculated 2.475 as an average velocity

1 at eight plus 74, 2.52 at eight plus 99, and 2.75 at
2 nine plus 24.

3 It is really -- I think it is very dangerous
4 to look at one set of readings at one depth and try to
5 draw too much from them. I think you have got to look
6 at the whole thing.

7 Q Let me find one more point for you and perhaps
8 we will have exhausted it.

9 Mr. Harmon has one point on his Table 3 which
10 is Del-Aware Exhibit 9 for identification. Do you have
11 that, sir?

12 A (WITNESS WESCOTT) Yes, I do.

13 Q At 300 feet, this is 100 feet downstream on
14 the transect. Do you think -- would that put me within
15 the 58-foot contour?

16 A (WITNESS WESCOTT) Well, it appears to, or
17 maybe just over it. I should really have a ruler and
18 maybe I do have one here.

19 Q I've got one.

20 A (WITNESS WESCOTT) I've got one too.

21 (Pause.)

22 A (WITNESS WESCOTT) I seem to find that 300
23 feature well beyond the center of the channel.

24 Q I'm sorry. Say that again.

25 A (WITNESS WESCOTT) I seem to find that 300

1 feature well beyond the center of the channel.

2 Q 100 feet downstream?

3 A (WITNESS WESCOTT) Right.

4 Q I'm looking at Bucks County indication, and
5 there is a contour line that runs just to the left of
6 "Bucks" and through the word "County", and that is a
7 58-foot contour line, correct?

8 A (WITNESS WESCOTT) Yes, that is correct.

9 Q You think the intake would be to the right
10 side of that line?

11 A (WITNESS WESCOTT) You mean if it was at 300
12 feet out?

13 Q Yes.

14 A (WITNESS WESCOTT) Yes, I do.

15 Q Measuring from the shore?

16 A (WITNESS WESCOTT) That is correct.

17 Q On a line parallel to the central line of the
18 intake?

19 A (WITNESS WESCOTT) Wait a minute. I will take
20 that back. The scale is very hard to read here. I may
21 be in error on that.

22 Q Let me ask you to assume that actually you are
23 a little to the left of that contour line and,
24 therefore, within those two 58-foot contour lines.

25 A (WITNESS WESCOTT) Okay.

1 Q The data reported by Mr. Harmon for July 24,
2 1981, shows lower velocities than the velocities he
3 recorded closer to the intake screens on the center line
4 of the Point Pleasant intake.

5 A (WITNESS WESCOTT) It was a different day also
6 and a different flow, I believe.

7 Q All right. So what I'm learning from this
8 conversation is that if one took the bathymetry to try
9 to pick the higher velocities, that would be a mistake
10 for specific looks in this general vicinity.

11 A (WITNESS WESCOTT) Yes. I really haven't
12 spent any time plotting up the data upstream and
13 downstream. One of the big problems with this data is
14 the upstream cross section, I think, was taken over two
15 different days, so you really don't know what its level
16 is signifying and the other one was another day. So you
17 really couldn't compare it on the same terms as the
18 cross section taken on July 23.

19 So I really hadn't spent a lot of time trying
20 to evaluate it. You may be right. Maybe the data does
21 show that, but if I had to guess where I think the
22 fastest part of the river would be, I would generally
23 pick the area of deepest depth.

24 Q Well, would it surprise you that Mr. Harmon's
25 velocity measurements are not consistent with that on

1 this 4,500-foot day?

2 A (WITNESS WESCOTT) Well, you know, the
3 differences in depth he shows really aren't very much.
4 I mean, you've got 11.5, 11.5 and 11.8, and I guess I
5 would feel better if I put them on a cross section
6 before I really made a conclusion as to whether they are
7 consistent or whether they are not as to what they
8 should be showing.

9 Q All right. Dr. Masnik, you discount this
10 thought of bypass velocity mitigating the impact on
11 either larvae or juveniles in your oral testimony, to
12 some extent in your written testimony. Is that because
13 your assessment is that the impact will be minimal as
14 the intake is proposed, even without taking account of
15 bypass velocity for the reasons you have given in your
16 testimony?

17 A (WITNESS MASNIK) Essentially that is the
18 case. I think the bypass velocity will contribute to
19 some reduction, but that is if we are already at the
20 level in which we are not going to have any detectable
21 change in the population.

22 Q If one were interested in further mitigating
23 an impact, if you assume spawning of shad in the
24 vicinity of the intake, just from a biological point of
25 view without considering the cost-benefit side that

1 might counteract that cost side, would it make -- would
2 it assist the mitigation materially in reality as
3 opposed to just theoretically to assure a reasonable
4 bypass velocity ratio of approximately two-to-one, or
5 would that make so little difference that we shouldn't
6 even be concerned with it?

7 A (WITNESS MASNIK) I could ask for some
8 definitions in that question, but I think the bottom
9 line is that I don't think the difference would be great
10 enough to even be detectable.

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

1 Q Would the difference --

2 A (WITNESS MASNIK) I based this on these field
3 studies that have been conducted, and in every single
4 case that I know of, the field studies were in areas of
5 varying flows that went from zero to a little bit more
6 than a foot per second depending upon tidal stage; in
7 the case of the lake, depending on weather conditions.

8 (Board conferring.)

9 JUDGE BRENNER: I'm going to try one or two
10 others and then I think we will come to the end, finally.

11 BY JUDGE BRENNER (Resuming):

12 Q You stated that you have to take another look
13 at the orientation of the screens. If the orientation
14 of the screens changed markedly, then you'd find that as
15 getting much closer to perpendicular turn -- that is,
16 the axis of the intake structures being perpendicular to
17 the flow; correct?

18 A (WITNESS MASNIK) That is correct.

19 Q I had thought that one reason you and, in
20 fact, other fisheries' biologists, like the proposed
21 arrangement as compared to this hypothetical alternate
22 arrangement of the screens would be that that would
23 allow more juveniles to avoid coming into contact with
24 the screens due to a quicker flow or a lower time of
25 exposure, if you will, and also would be directing less

1 larvae which might be potentially entrained. If we
2 assume entrainable size by the screens for less travel
3 time. Am I correct?

4 A (WITNESS MASNIK) That is the general theory
5 behind it, yes.

6 Q Well, wouldn't the thought of bypass velocity
7 assist that even further, given the orientation?

8 A (WITNESS MASNIK) Again, we can sit back here
9 and think what is important may not often be important,
10 and I think the only way that you can make a lot of
11 these determinations is to go out and do the actual
12 field trials that have been done in this case. The
13 field trials don't seem to support the theory that
14 bypass velocity was all that important.

15 Q I want to try to get a feel for -- I agree
16 with you. You could have asked me for a lot of
17 definitions in my broad question before and I want to
18 try to get a better feel for what you had in your mind
19 as significant, and I'm not going to walk into all of
20 the questions on significance again, but in an endeavor
21 to get a better feel in my judgment.

22 If this intake had been proposed in the
23 perpendicular orientation; that is, the length of the
24 axis perpendicular to the flow as distinguished from the
25 proposed location, would you have believed that there

1 would have been no measurable savings in turning it the
2 way it is now proposed; and therefore, would have
3 concluded that the proposed arrangement was acceptable
4 for the same reasons that you thought it acceptable not
5 to consider any bypass flow?

6 A (WITNESS MASNIK) Again, intuitively, I would
7 think that the present configuration would be
8 advantageous, but I really don't have any basis for
9 stating that, other than it seems reasonable to me. I
10 guess sound, biological judgment.

11 Q And applying that sound biological judgment,
12 you would have concluded that the orientation as
13 proposed is the more reasonable one?

14 A (WITNESS MASNIK) Yes, that is correct.

15 Q Why would your sound biological judgment not
16 similarly lead you to believe that you should have some
17 reasonable minimum bypass velocity to get some
18 reasonable bypass ratio at lower flows of 3000 or
19 perhaps somewhat less or somewhat more?

20 A (WITNESS MASNIK) I think initially it was my
21 feeling that bypass velocity was important, but after I
22 looked through Hanson's paper and then the subsequent
23 papers, when it became apparent to me that the bypass
24 flows at all of these field test facilities vary between
25 zero and a foot per second, and they were getting

1 reductions in entrainment up to 10 percent of what
2 ambient was, I concluded that perhaps Hanson's study was
3 not, in a sense, correct in saying that you require this
4 two-to-one bypass velocity.

5 Q Well, I didn't mean to include in my question
6 a requirement of a two-to-one bypass velocity; I was
7 purposely vague. Some larger bypass ratio than
8 one-to-one or less is what I had in mind. If I factored
9 that in, would your answer be the same?

10 A (WITNESS MASNIK) Yes, because I don't think
11 that there is a good foundation for that statement other
12 than Hanson's paper.

13 Q How about the intuition that it gets the fish
14 by the screen with less exposure time? Fish meaning
15 larvae and juveniles.

16 A (WITNESS MASNIK) I guess intuition-wise, yes,
17 I would say that would seem reasonable. And I have to
18 admit that none of these field studies incorporated, at
19 least the field trials, incorporated screens this
20 large. The only data that we have really is the
21 Campbell plant data that I was aware of, and there the
22 screen array is much larger than this and we still see
23 substantial reductions, at least in those species that
24 we have concern with. And there again, the bypass flow
25 is -- an average bypass flow is a quarter of a foot per

1 second, which is half of what the flow, the through-slot
2 flow.

3 Q In giving me your answers, are you inevitably
4 factoring in some thought internally -- obviously
5 internally if it is a thought -- that it might cost more
6 or change plans to move it out?

7 A (WITNESS MASNIK) No. I think the only
8 internal thought that I'm having that is factoring in
9 this is that I feel, even in a still water situation,
10 you would not have a detectable impact on the population.

11 JUDGE BRENNER: Okay, we are done.

12 MR. CONNER: You promised me ten minutes.

13 JUDGE BRENNER: No, I didn't promise you. I
14 was thinking you passed up your first round. I promised
15 you the opportunity to tell me whether you had questions
16 based upon the rounds. It doesn't have to be ten
17 minutes. How much do you have?

18 MR. CONNER: Actually, I think the Board has
19 covered all but one and a half of our areas, and I may
20 waive one of them.

21 JUDGE BRENNER: Okay.

22 EXAMINATION ON BOARD EXAMINATION

23 BY MR. CONNER:

24 Q Dr. Masnik, referring back to a discussion of
25 relocating the intake either in the 58-foot area or in

1 -- or whether there would be minimal cross currents, do
2 you recall that?

3 A (WITNESS MASNIK) Yes.

4 Q Do you believe that relocating the intake with
5 the same orientation as presently in such a location
6 would reduce the potential impact of entrainment and
7 impingement of the eggs, larvae and juveniles of the
8 shad and shortnose sturgeon?

9 A (WITNESS MASNIK) I assume you're talking about
10 impact to the population.

11 Q Yes.

12 A (WITNESS MASNIK) No, I would not say there
13 would be any difference since I don't predict there
14 would be any impact at the present location. Moving it
15 out there would not change it.

16 Q Mr. Westcott, you referred at one answer that
17 if dye were put in the Hickory Creek reach -- I think
18 the question was -- would it ever reach the intake, and
19 I believe you answered yes.

20 A (WITNESS WESTCOTT) Yes, I would expect it to,
21 looking at the contours, given the right flow conditions.

22 Q That is what I wanted to ask you. What
23 conditions are you anticipating there?

24 A (WITNESS WESTCOTT) Well, I would think that a
25 very low flow. One of the problems is the eddy really

1 isn't marked on here. Normally, I would expect that
2 when the eddy is formed that the flow from Hickory Creek
3 stays pretty close to the shore, and it is conceivable
4 that under flow conditions there flow is low enough that
5 flow would follow the channel. Also, I was thinking of
6 the condition where Hickory Creek flow is very cold and
7 dense as compared to Delaware River water, and that
8 seemed to be a condition where you might get a density
9 current going up there or something like that.

10 Q Do you believe that the flow of the river, the
11 main current of the river, would tend to push any flow
12 from Hickory Creek back into the shore in the vicinity
13 of the intake?

14 A (WITNESS WESTCOTT) Yes, I do.

15 Q Then given your dye example, what percentage
16 of the dye do you think the intake would see under these
17 assumed conditions?

18 A (WITNESS WESTCOTT) I really don't know. It
19 was more just -- the question, as I understood it is, is
20 it possible that something in Hickory Creek could get to
21 the intake, and I answered yes. And I wouldn't have any
22 idea how much. I wouldn't think very much.

23 MR. CONNER: All right, that's good, thank you.

24 MR. SUGARMAN: Can I have one question?

25 JUDGE BRENNER: Is there anything else?

1 MR. SUGARMAN: Based upon the Board's
2 questions I have I think one or two questions of Mr.
3 Masnik.

4 JUDGE BRENNER: All right.

5 BY MR. SUGARMAN:

6 Q In answer to Judge Brenner's last questions,
7 and also in answer to Mr. Conner's questions, you
8 indicated that you didn't think that the impact of the
9 intake would be detectable or that it would have any
10 impact on the population. And once again, you're
11 referring to some standard of impact in relationship to
12 the entire population of the shad in both of those
13 answers, is that corrent, when you say no detectable
14 impact?

15 A (WITNESS MASNIK) That is correct. To the
16 population.

17 Q And to the population means some ratio; is
18 that right?

19 A (WITNESS MASNIK) Not necessarily, no.

20 Q Well, we have already agreed it is detectable
21 to the individuals. What makes it detectable or not
22 detectable to the population?

23 A (WITNESS MASNIK) Well, if you can translate
24 what the intake would do to the population, and it may
25 result in a reduction in the population and it may

1 result, conceivably although not probably, in an
2 enhancement of the population.

3 Q And didn't we also establish that you could
4 have a 25 or 50 percent reduction in the population and
5 not be able to detect it?

6 A (WITNESS MASNIK) That is conceivable, yes.

7 MR. SUGARMAN: Okay, thank you.

8 JUDGE BRENNER: I think we have come to the
9 end of this panel.

10 MR. RUTBERG: Just one point of
11 clarification. Dr. Masnik, were you referring to the
12 total shad population or to the larval population?

13 WITNESS MASNIK: I'm talking to the
14 population; ultimately, to the adult population. But it
15 certainly is applicable to the larval population as well.

16 JUDGE BRENNER: Seeing nobody else leap for
17 the microphone, I'm going to dismiss you two gentlemen
18 before somebody else does that. We appreciate your time
19 and efforts here, and what you've been asked to do
20 required additional work during recesses and so on and
21 we have done that with other witnesses and we
22 appreciated it when they did it and we appreciated it
23 when you did it, also. So thanks very much.

24 (Witnesses Masnik and Westcott were excused.)

25 At this point, let's bind in the proposed

1 direct testimony of Professor Peirce Lewis as marked up
2 and agreed by the parties, and I emphasize the
3 "proposed" and Mr. Sugarman explained the situation
4 which we accept, and therefore, it is subject to
5 Professor Lewis's affidavit that it is true and
6 correct. And we discussed before the confines of what
7 he is supposed to do.

8 He is not supposed to redo it or resay it on
9 his third draft the way he would prefer to do it. I
10 just want to know if it is true and correct; that is,
11 whether everything in it is correct or whether there is
12 some change that was made by the parties that creates a
13 misleading impression absent some other change.

14 (The Proposed Direct Testimony of Professor
15 Peirce Lewis follows:)

16

17

18

19

20

21

22

23

24

25

DIRECT TESTIMONY OF PROFESSOR PEIRCE LEWIS

My name is Peirce Lewis. I am Professor of Geography at Pennsylvania State University, University Park, Pennsylvania. My curriculum vitae are attached. My specialty is the study of vernacular human landscapes in the United States, a subject about which I have written extensively for scholarly journals and about which I teach undergraduate and graduate courses at Penn State. I have been invited to lecture on these and related subjects to academic and professional audiences throughout the United States and Canada. For more than twenty years, my studies have focused particularly on vernacular cultural landscapes of Pennsylvania, their historic origins and evolution, and their historic preservation.

I have been asked to review a number of documents including: (1) A Survey of Cultural Resources in the Area of the Proposed Point Pleasant Pumping Facilities, Combined Transmission Main, Bradshaw Reservoir, North Branch Main and Perkiomen Main, Bucks County, prepared by Edward E. Shortman and Patricia Urban (1978); (2) Preliminary Case Report for Neshaminy Water Resources Authority, Point Pleasant Diversion Project, Point Pleasant, Bucks County, Pennsylvania, prepared by Elizabeth R. Mintz (1982); and (3) various reports, correspondence and testimony submitted by the Bucks County Conservancy to the U.S. Army Corps of Engineers and other agencies over the past few years, including a report entitled Point Pleasant Historic and Archeological District: Comments

On a one day ~~at~~ visit
to Point Pleasant
guided by Katherine
Averbach, interviews
ANK

on the Request for Determination of Eligibility by Ms. Mintz
for the U.S. Army Corps of Engineers (1981). This testimony,
~~which was written on September 19, 1982,~~ is based on my reading
of the above documents which include a description of the
Point Pleasant Historic District and on a review of topographic
maps of the area prepared by the U.S. Geological Survey and
xeroxed copies of plans of the pumping facilities prepared by
E.H. Bourquard Associates, Inc. for the Neshaminy Creek Water
Resources Development Plan and drawn to the scale of about
fifty feet to the inch. I have also seen documents to the
effect that the U.S. Army Corps of Engineers, the Commonwealth
of Pennsylvania and the federal preservation authorities all
agree that the Point Pleasant area is eligible for inclusion
on the National Register of Historic Places.

~~As of the date of this testimony,~~ I have not visited
Point Pleasant, but I expect to do so before making formal
oral testimony at the Hearing. It should be understood,
however, that this testimony is based entirely on written and
cartographic documentation, and not on firsthand experience.

On the ^{of the foregoing and} basis of what I have read, there seems to be
general agreement that the village of Point Pleasant is a
small but well preserved example of an early Nineteenth Century
canal town whose basic form had taken shape before the end of
the nineteenth century. Although there are many towns which
owe their original prosperity to canal traffic, most such
towns have subsequently been greatly altered by railroad
building and attendant industrial and commercial building.

The reason is obvious. Important canal routes very often became important railroad routes, and railroads not only wiped out the canals themselves (often physically) they attracted industrial and commercial growth which irreversibly changed the original character of the early canal settlement. That is what happened along the Erie Canal and along the main line of the Pennsylvania Canal between Columbia and Hollidaysburg. In cases where railroads did not replace canals, those towns often fell into economic depression and then subsequently decayed beyond repair. That is commonly true in New England and in upstate New York and in western Pennsylvania where most buildings were made of wood and decay or change occurred rapidly after the canal had gone into disuse.

Intact Nineteenth Century canal towns are relatively rare in the United States and there is consequently strong reason to pay special attention to preserving the ones that do exist. That is particularly true in places like Point Pleasant whose small size makes them particularly vulnerable to modern intrusions.

There is another reason why Point Pleasant appears to be especially important in historic terms. ~~From my reading of available documents~~ I gather that the village is a community with a strong ^{Eclectic And} vernacular flavor, not a place which is famous for its major historic monuments, but because it preserves the ordinary environment of the past and which continues to operate within the environment of the past. That environment is what preservationists have called in New Orleans the tout ensemble,

more than a single building, or two, or three, but rather the complete historic ambience. Such places are especially valuable because they help nourish "cultural memory" a tangible connection between contemporary Americans and ordinary people of the past. The words "ordinary" and "vernacular" are crucial to historians and historical geographers like myself. By and large, our written history is written by and for famous people. Ordinary people do not write history; instead, they build it. Thus, our knowledge of vernacular history necessarily depends on the presence of intact vernacular environments. Unfortunately, however, Americans have rarely been very successful in preserving such ordinary environments. But if they have, as I gather they have done in Point Pleasant, the value of such places is particularly great. Significant changes in such environments should be undertaken only under the most pressing of circumstances.

~~Documents seem to suggest that the pump station will be a fairly large scale affair, presumably much larger than most of the buildings in Point Pleasant. It is easy to imagine this project could irreparably and irreversibly damage the historical ambience of such a small and fragile nineteenth century community simply because it is inconsistent with the nineteenth century scale and character of the town.~~

Experience shows that places like Point Pleasant often retain their historical character partly because their residents like their antique qualities and because they like the slower and quieter pace at which such communities go

Unless care is taken to minimize noise & intrusiveness

about their daily business. It is not hard to imagine that this attitude could be changed markedly if local residents found noise from the pump station to be objectionable, if they found the coming and going trucks, people and dredging equipment to be objectionable, if, in sum, they found the arrival of large scale twentieth century technology to be inconsistent with the nineteenth century environment which they have learned to enjoy and to nourish. In short, ~~the~~ ^{if on a large scale} presence and operation of the pump station could easily ~~NOTIFY AND~~ ^{INTRUDE} undermine the willingness of local inhabitants to work to maintain the antique qualities which have apparently combined to make Point Pleasant a desirable place, partly as an outdoor museum of nineteenth century technology and life, but more importantly, as a functional link with an important time in America's past.

Unless care is taken
to minimize noise
and intrusiveness,

July, 1982

Personal Vitae

PEIRCE F. LEWIS

Address: Department of Geography
The Pennsylvania State University
307 Walker Building
University Park, Pennsylvania 16802

Phone: (814) 865-6071 or 865-3433

Primary professional interest:

The American landscape--origins, morphology and symbolism

Ancillary interests:

Historical geography of North American culture

Regional geomorphology of North America

Degrees earned:

Ph.D. (Geography), University of Michigan, Ann Arbor, 1958

M.A. (Geography), University of Michigan, 1952

B.A. (Dual majors in Philosophy and History), Albion College, 1950

Post-doctoral study:

Geomorphology, University of Washington, Seattle, 1957-8, under J. Hoover Mackin, Department of Geology

Quantitative methods in Geography, Northwestern University, N.S.F. summer institute, 1962

Primary academic positions:

Professor of Geography and member of the Graduate Faculty, Penn State University, University Park, Pennsylvania. 1962 to present.

Assistant Professor of Geography and associate member of the Graduate Faculty, Penn State University. 1958-1962.

Lecturer in Geography, University of Michigan extension. Summer, 1958.

National Science Foundation post-doctoral fellow in geomorphology. Department of Geology, University of Washington, Seattle. 1957-58.

Metropolitan Community Fellow in urban political geography. Interdisciplinary program, University of Michigan, Ann Arbor. Academic Year, 1956-57.

Teaching fellow, Department of Geography, University of Michigan, Ann Arbor, 1955-56.

Geographer, Military Intelligence Branch, Far East Command, U.S. Army Forces, Tokyo, Japan. (Research in the economic geography of continental Asia; civilian status). 1953-1955.

Map librarian, Department of Geography, University of Michigan, Ann Arbor, 1952-1953.

Concurrent academic positions:

- Visiting professor, Seminars in American Culture, New York State Historical Association, Cooperstown, Summer, 1981
- Visiting professor, Department of Geography, University of California, Berkeley, autumn 1976.
- Visiting professor, Department of Geography, Concordia University, Montreal, summer, 1976.
- Consultant and local author, Comparative Metropolitan Analysis Project (research program funded by the N.S.F. and sponsored by the Association of American Geographers). Field and archival research on the historical urban geography of New Orleans. 1973-74.
- Research associate, University of Montreal, with Prof. Pierre Dansereau. Field research on the folk architecture of St. Lawrence estuary and Canadian Maritime Provinces. Summer, 1970.
- Co-director (with Frederick L. Wernstedt), Experienced Teacher Fellowship Program in Geography, under the auspices of the U.S. Office of Education, Penn State University. 1967-68.
- National Science Foundation Fellow, Institute for the Study of Quantitative Methods in Geography, University of Chicago and Northwestern University. Summer, 1962.

Honors:

- Phi Beta Kappa, 1950.
- Omicron Delta Kappa (Undergraduate men's leadership honorary, 1950).
- Phi Kappa Phi, (Graduate academic honorary), 1956.
- First prize of \$1,000 awarded by the Association of American Geographers for the best paper by a geographer under the age of 35; XIX International Geographical Congress, Stockholm, Sweden, 1960.
- Society of the Sigma Xi, 1962.
- National Honors Award, Association of American Geographers, 1977, "for truly perceptive and eloquent studies of the evolving human scene in North America, for creative scholarship, advocacy, and teaching that have so greatly increased our sensitivity to the way in which habitat, history, society, and culture have interacted to mold the fascinating ever-changing landscape."
- Christian R. and Mary F. Lindback Award for distinguished teaching, \$1,000, Pennsylvania State University, 1981.
- Distinguished Teaching Award, National Council for Geographic Education (One of nine awards in North America), 1982.

Awards and grants:

- Association of American Geographers grant for study of American vernacular landscape, 1976-77.
- Pennsylvania State University, Faculty Research Fund Grants, to support research on the following topics:
- Images of America's past vernacular landscapes: the pictorial holdings of the Federal Government. 1979-81.
- Evolution of physical and cultural landscapes of central and eastern Pennsylvania. 1978-79.

Awards and grants continued:

- Evolution of the landscape of New Orleans, 1973.
- Rise and decline of Bellefonte, a small town in Pennsylvania. 1971-72.
- Studies on the diffusion of folk architecture from New England through New York State in the 19th Century. 1968-69.
- Studies on the origin and significance of the landscape divide between Pennsylvania and New York State. 1963-70.
- Investigation of the effect of Negro migration on the urban political geography of Flint, Michigan, from 1932 to 1962. 1963.
- Studies of the origin of various linear sand dune forms in the western United States. 1961-62.
- Laboratory analysis of grain-size of loessial samples from the Palouse Hills, Washington-Oregon, 1960.
- Association of American Geographers grant for support of studies on the diffusion of folk architecture from New England through New York State. 1968-69.
- U.S. Office of Education grant to organize symposium of experienced high-school teachers, national meetings of the National Council for Geographic Education, Houston, Texas. 1969.
- U.S. Office of Education grant for Experienced Teacher Program in geography, Penn State University. 1967-68. (Co-recipient with Frederick L. Wernstedt). U.S.O.E. granted a subsidiary award in 1968 to support a symposium of the same teachers at Penn State for the purpose of re-evaluating the original program.
- National Science Foundation Fellowship for attendance at Summer Institute for the Study of Quantitative Methods in Geography, University of Chicago and Northwestern University. Summer, 1962.
- National Science Foundation grant for attendance at the International Geographical Congress, Stockholm, 1960. (Grant was refused because of simultaneous award from the Association of American Geographers; see "honors", above).
- National Science Foundation Post-doctoral Fellowship with Prof. J. Hoover Mackin, Department of Geology, University of Washington, for study and research in map interpretation and the geomorphology of the United States. 1957-58.
- Horace H. Rackham School of Graduate Studies, University of Michigan, for cartographic work associated with research in urban political geography. 1956-57.

Membership in professional organizations:

American Studies Association
Association of American Geographers
Pioneer America Society
National Trust for Historic Preservation
The Cobblestone Society

University services:

University Senate, Penn State University, 1962-1968.
University Faculty Affairs Committee, Penn State University, 1962-1968.
The Dean's Committee for reorganization of the College of Mineral Industries,
Penn State University, 1963-1965.
Faculty Advisor and Resident Professor, Penn State University Study-Abroad
Program, University of Salamanca, Salamanca, Spain, 1964.
President's committee for the Regional Planning Curriculum, Penn State
University, 1970.
Committee for Promotion and Tenure, College of Earth & Mineral Sciences,
Penn State, 1976-present.
Chairman (elected), Geography Dept. Committee for Promotion and Tenure,
Penn State, 1978-80.
Review Committee, Graduate Program in Architecture, Penn State University,
1980-81.
Search committee, Dean of the College of Arts and Architecture, 1981-82

Professional service:

Committee on the Teaching of Local Geography, High School Geography Project
(A.A.G./N.S.F.). 1965-1970.
Representative of the Association of American Geographers to the U.S.
National Committee for the International Geographical Union. 1966-1970.
Steering Committee, National High School Geography Project (Association of
American Geographers/National Science Foundation). 1966-1970.
Committee on the use of topographic maps to illustrate cultural geography,
Commission on College Geography, Association of American Geographers,
1967-1972.
Visiting scientist, Association of American Geographers/National Science
Foundation, 1969-71, 1981-
Chairman and organizer of special session on Visual Blight in America. 1972
meetings of the A.A.G., Kansas City.
Research Committee, American Geographical Society, 1974.
Contributing Editor, Pioneer America, 1975-1978.
Chairman, National Honors Committee [elected], Association of American
Geographers, 1977-78
National Councillor (elected at large by national membership), Association
of American Geographers, 1981-1984.
Editorial Board, Journal of Historical Geography, 1982 -
Vice-President (elected), Association of American Geographers, 1982-83.

Community service:

State College (Pennsylvania) Borough Traffic Commission member, 1968-1970.
Co-author, State College (Pa.) sign-control ordinance, adopted into law, 1969.
State College Borough Planning Commission member, 1969-1976.
Board of Directors, Pennsylvania Roadside Council, 1969-1974.

Personal vitae, PEIRCE F. LEWIS--5

Courses regularly taught (The Pennsylvania State University):

LANDFORMS OF THE WORLD (Geog. 2) Elementary geomorphology for non-specialists. The study of landforms: their geographic distribution, their origins, and their relationship to human activity. Exclusively for undergraduates. Lecture and laboratory.

GEOGRAPHY OF INTERNATIONAL AFFAIRS (Geog. 28) The geographic foundations of world politics, with emphasis on international and intranational conflict. Primarily undergraduate foreign service students.

THE AMERICAN SCENE (Geog. 102) How Americans converted wilderness into domesticated landscapes, and how the American scene visibly reflects national and regional cultures. Primarily for non-majors. Extensive field work, designed to teach students to "read" cultural meaning in ordinary landscapes created by ordinary Americans.

*THE AMERICAN SCENE II (Geog. 404) How Americans created a modern national landscape, while spreading the national domain from the Appalachians to the Pacific. An upper-division course, aimed at undergraduate seniors and graduate students. Emphasis on western landscapes of recent date. Prerequisite: Geography 102, which emphasizes eastern landscapes created during colonial and early national times.

FIELD SEMINAR IN VERNACULAR LANDSCAPE STUDY (Geog. 525). Advanced seminar for graduate students and exceptionally capable undergraduate students. Intensive study of regional landscapes in the eastern U.S. and eastern Canada, culminating in a 14-day field trip in late spring. The purpose of the seminar is to apply the techniques of landscape-reading learned in classroom and local field work. Prerequisites: Geography 102 and 404.

* Geography 404, "The American Scene II", was first offered in the spring of 1982 on an experimental basis. It is being proposed to the Pennsylvania State University Senate Committee on Curricular Affairs for permanent inclusion in the curriculum. It will be offered annually.

Personal vitae, PEIRCE F. LEWIS--6

Invited lectures, 1978 to the present*

1978

Macalester College, St. Paul, Minnesota (Keynote address, Symposium on Neighborhood Conservation)
University of New Orleans (Sociology Department seminar)
Pennsylvania Council for Geographic Education (Keynote address, Clarion, Pennsylvania)
University of Northern Colorado, Greeley (University lecture)
Historic Deerfield, Massachusetts (Summer session lecture)
University of Southern Mississippi, Hattiesburg (Conference on a Sense of Place and Public Policy in Mississippi)
United States Military Academy, West Point

1979

Pennsylvania State Historic and Museum Commission, Harrisburg (Keynote address, first statewide conference on historic preservation in Pennsylvania) ✓
Charleston Neighborhood Association, Charleston, South Carolina ✓
University of South Carolina, Columbia (Department of History seminar and Department of Geography lecture)
Yale University (Department of the History of Art general lecture)
Indiana University of Pennsylvania
Indiana State University, Terre Haute
Ohio University, Athens (University lecture)
University of Tennessee

1980

University of British Columbia, Vancouver
Simon Fraser University, Burnaby, British Columbia
University of Victoria, British Columbia
East Carolina University, Greenville, North Carolina
University of Maryland (Keynote address, Conference on landuse in nonmetropolitan America, sponsored by National Science Foundation and Association of American Geographers)
Stetson University, DeLand, Florida (University lecture)
College of Charleston, South Carolina (Department of Fine Art conference on historic preservation) ✓
Yale University (Department of the History of Art seminar on map interpretation)

1981

Florida State University, Tallahassee
Queen's University, Kingston, Ontario
University of Kentucky, Lexington (Ellen Churchill Semple Lecture)
State University College of New York at Oneonta
New York State Historical Association, Cooperstown (Week-long series of lectures)
Franklin and Marshall College, Lancaster, Pennsylvania (Department of Art lecture)
Millersville State College, Pennsylvania
York College of Pennsylvania (History Department and College lectures)
American Studies Association (Special session on material culture)

1982 (to date)

University of Maryland, College Park
University of Miami, Coral Gables, Florida
Shippensburg State College, Pennsylvania (College symposium)
Massachusetts Institute of Technology (School of Architecture and Planning)
Central Connecticut State College, New Britain
Oklahoma State University, Stillwater (Society for the N. American Cultural Survey)

* Geography Department invited lectures unless otherwise specified

- 1960 "Linear Topography in the Southwestern Palouse, Washington-Oregon," Annals of the Association of American Geographers 50 (2): 98-111. (Awarded first prize, \$1,000, A. A. G. Participation Fellowships, 19th International Geographical Congress, Stockholm)
Reprinted in Fred E. Dohrs and Lawrence M. Sommers, Physical Geography, Selected Readings, Thomas Crowell, New York, 1966: 92-102.
- 1961 "Dichotomous Keys to the Köppen System," The Professional Geographer 13 (5): 25-31.
- 1963 "Questions Geographers Should Ask," The Pennsylvania Junior Geographer 2 (1): 23-29.
- 1965 "Impact of Negro Migration on the Electoral Geography of Flint, Michigan, 1932-1962: A Cartographic Analysis," Annals of the Association of American Geographers 55 (1): 1-25.
Reprinted in Roger E. Kasperson and Julian Minghi (eds.) The Structure of Political Geography, Aldine, New York, 1969: 364-406.
- 1967 "The Vicinity of State College: Being an Introduction to Divers Aspects of the Physical and Cultural Geography in a Certain Part of the Appalachian Mountain Region . . .," prepared for the Symposium of the Geography of Population Pressure upon Physical and Social Resources, University Park, Pa. (Multilithed).
- 1968 "On Field Trips in Geography," in J. F. Hart (ed.), Field Training in Geography, Association of American Geographers, Washington, D.C.: 51-66.
- 1970a "The Geography of Old Houses," Earth and Mineral Sciences 39 (5): 1-5.
- 1970b "Aesthetic Pollution: When Cleanliness Is Not Enough," Public Management 52 (7): 8-11.
- 1971 (with Kenneth Corey, et al.) The Local Community. Macmillan Company, New York.
- 1972 "Small Town in Pennsylvania," Annals of the Association of American Geographers 62 (2): 323-351. Reprinted in J. F. Hart (ed.) Regions of the United States, Harper and Row, New York: 323-351.
- 1973a (Ed.) Visual Blight in America. Commission on College Geography Resource Paper, 23, Association of American Geographers, Washington.
- 1973b "The Geographer as Landscape Critic," in Visual Blight in America (see 1973a): 1-22.
- 1974 "The United States: the Natural Landscape." The Encyclopaedia Britannica, 15th Edition, Vol. 18, Chicago: 905-918, 945.
- 1975a "Common Houses, Cultural Spoor," Landscape 19 (2): 1-22.

1 JUDGE BRENNER: Incidentally, Mr. Sugarman, if
2 Professor Lewis has a reaction anything other than
3 signing that affidavit, please talk to the parties first
4 so if any clarifying matters need be filed along with an
5 affidavit, you can work it out with them so that there
6 are no surprises and we can get representation that
7 everybody agrees that some further change is necessary.
8 And that will make it easier on us, and we are always
9 interested in that.

10 (Discussion off the record.)

11 JUDGE BRENNER: Is there anything else that
12 need be done on the record here?

13 Hearing nothing, there is one thing we would
14 like to do. We would like to thank everybody, for from
15 moment to moment in evidentiary hearings things happen
16 and we think everybody here has been most adaptable, and
17 if from moment to moment things haven't been as
18 congenial as we might have liked, we recognize that just
19 marks the intensity and hard work on the part of all the
20 parties, and we appreciate that also.

21 I would like to thank the parties for their
22 efforts in bringing all the witnesses before us that
23 have been here. We expect to have staff witnesses, and
24 we appreciate having the staff witnesses we had. We
25 appreciate having utility witnesses.

1 We would particularly like to thank Del-Aware
2 because when an intervenor brings witnesses in with
3 expertise in the area it makes our job much easier in
4 assessing what the controversies might be, and we
5 appreciate that very much, too. We know that takes
6 effort outside the hearing in addition to Del-Aware's
7 effort in the hearing, and we appreciate that.

8 We would like to thank Ray Heer on the record,
9 as I sometimes do because he's a great reporter from
10 proceeding to proceeding. If he remembers what
11 proceeding he is in at any given moment, he's a better
12 man than I.

13 And we would like to thank Cinty Minton, our
14 attorney assisting us here who has assisted us here.
15 You don't see much of what she does, which is 99 percent
16 of our work, but it is a lot, and we appreciate it. So
17 thank you all very much.

18 (Whereupon, at 5:50 p.m., the hearing in the
19 above-entitled matter was recessed.)

20

21

22

23

24

25

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 26, 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)