

Regulatory Docket File



NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

TOLEDO EDISON COMPANY and
CLEVELAND ELECTRIC ILLUMINATING CO.

Docket Nos.

(Davis-Besse Nuclear Power
Station, Units 1, 2 and 3)

50-346A
50-500A
50-501A

and

CLEVELAND ELECTRIC ILLUMINATING
CO, et al.

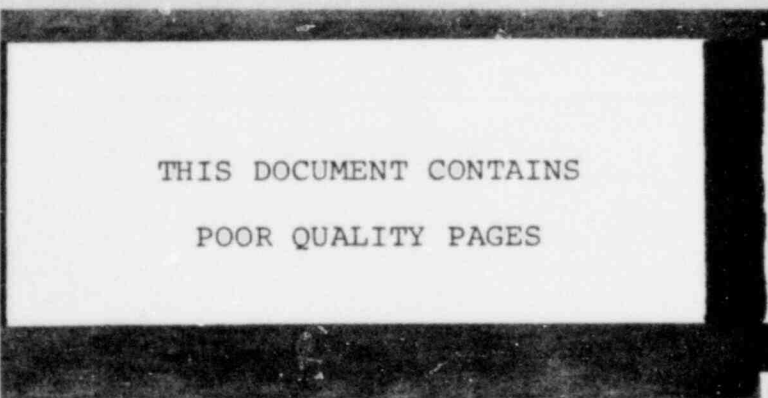
50-440A
50-441A

(Perry Nuclear Power Plant,
Units 1 & 2)

Place - Silver Spring, Maryland

Date - Tuesday, May 11, 1976

Pages 9180 - 9361



THIS DOCUMENT CONTAINS
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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In the Matter of	:	Docket Nos.
TOLEDO EDISON COMPANY and	:	50-246A
CLEVELAND ELECTRIC ILLUMINATING CO.	:	50-500A
(Davis-Besse Nuclear Power Station	:	50-501A
Units 1, 2 and 3)	:	
and	:	
CLEVELAND ELECTRIC ILLUMINATING CO.	:	50-440A
<u>et al.</u>	:	50-441A
(Perry Nuclear Power Plant	:	
Units 1 and 2)	:	

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First Floor Hearing Room
7915 Eastern Avenue
Silver Spring, Maryland
Tuesday, May 11, 1976

The hearing in the above-entitled matter was reconvened, pursuant to adjournment, at 9:30 a. m.

BEFORE:

MR. DOUGLAS RIGLER, Chairman

MR. JOHN FRYSIK, Member

MR. IVAN SMITH, Member

APPEARANCES:

(As heretofore noted.)

C O N T E N T S

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	<u>Witness</u>	<u>Direct</u>	<u>Cross</u>	<u>Redirection</u>	<u>Examine</u>	<u>Re-examine</u>	<u>Vote</u>
1							
2							
3	Lynn Firestone	9191	9208				9192
4							
5							
6							
7	<u>Exhibits</u>			<u>For Identification</u>			<u>In Evidence</u>
8	Applicant's 123, prepared testimony of Lynn Firestone			9155			9308
9							
10	Applicant's 123, addendum to prepared testimony of Lynn Firestone			"			"
11							
12	Applicant's 124, "The CAPCO Group Probability Technique for Timing Capacity Additions and Allocation of Capacity Responsibility"			"			"
13							
14							
15	Applicant's 125, "Capacity Allocation Study"			"			"
16							
17	Staff Exhibit 213, "Daily Capacity Margin Function"			9297			
18							
19							
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P R O C E E D I N G S

2 MR. RIESER: Mr. Chairman, there is a matter
3 still outstanding. That is the matter of the exhibit
4 marked for identification as Applicants Exhibit 120(OL).

5 I don't recall if that had been moved into
6 evidence before, but if it hasn't, I would move it into
7 evidence.

8 MR. MELVIN BERGER: The Department objects to the
9 admission of this document on a number of different grounds.

10 First of all, we have a document here which is
11 a fairly detailed engineering study, and it draws a number
12 of conclusions, such as one that appears on page numbered
13 1 that based on analysis of recent and projected trends, and
14 then they draw a conclusion from that.

15 Without the opportunity to cross-examine the
16 preparer of the document, the Department has no way to find out
17 the basis behind this.

18 In that particular paragraph, for example, we don't
19 know what trends they were looking at, as far as Aspinwall
20 was concerned.

21 Are they looking at projecting into the future on
22 Aspinwall's ability to buy power from Duquesne Light and
23 sell it? And it was available on that basis? Or were
24 they looking at Aspinwall having to generate their own power,
25 because Duquesne was refusing to sell the system wholesale power?

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1 I think the entire document really should be
2 given a full and fair opportunity to cross-examine on
3 conclusions like that and other information contained in this
4 document.

5 In addition, I would note that virtually the entire
6 document is concerned with a ten-year period from 1955 through
7 1964, which, of course, is prior to the September 1, '65
8 cut-off date. And I would also note that the Department
9 has been held strictly to that date by Applicants who have
10 objected, and usually successfully, to virtually every document
11 that dealt with events that occurred prior to September 1, '64.

12 If that date is to apply to the Department's
13 getting information in on events occurring prior to that
14 date, I think it would have to apply to Applicants, as well.

15 MR. RIESER: I take issue with the Department's
16 statement that the basis for the conclusions is not clear from
17 the document.

18 I believe that the report is very clear. The
19 conclusions they outline are supported by other information
20 contained in the document.

21 I think the Department would have no difficulty
22 determining what was the basis of the conclusions made.

23 Secondly, I might point out we have a problem here,
24 because the situation with respect to the Borough of Aspinwall
25 took place in the middle of 1966, and this report is being

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1 submitted to show the situation that existed as of
2 September 1, 1965, already very close to the cut-off date.

3 That is part of the problem. I think the
4 document is relevant, because it contains recommendations
5 that were made to the Borough of Aspinwall.

6 Regardless of the justification for the
7 recommendations, the fact that someone was recommending to the
8 Borough to sell its system is a materially relevant fact
9 for this proceeding.

10 CHAIRMAN RIGLER: Who is the somebody?

11 MR. RIESER: The somebody is an organization
12 known as the Pennsylvania Economy League.

13 CHAIRMAN RIGLER: Who are they?

14 MR. RIESER: They are an independent corporation
15 which is funded by various sources that hold themselves
16 out to municipalities in Pennsylvania to perform whatever studies
17 those municipalities might ask that institution to do.

18 In this case a transmittal letter by the
19 Pennsylvania Economy League recites that the Borough of
20 Aspinwall requested the Pennsylvania Economy League to study
21 their system and make various recommendations.

22 MR. MELVIN BERGER: Mr. Chairman, I think that the
23 Department -- this is one of the problems we have with the
24 document. We must have an opportunity to determine how
25 independent the Pennsylvania Economy League is. We have reason

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1 to believe that it is in part, or has been in the past, in
2 part, funded by Duquesne Light.

3 MR. RIESER: I see no reason why the Department
4 couldn't do that, whether or not this document were to be
5 introduced into evidence.

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#2 1 CHAIRMAN RIGLER: The objection will be sustained
arl 2 and we will not receive it into evidence. The reason for
3 that ruling is that although it is advanced as an unsponsored
4 document, it is not a self-generated document from the
5 Duquesne files. It does not represent a document that was
6 prepared by personnel of Duquesne in the ordinary course of
7 their business, which makes it, as the Department has
8 pointed out, difficult to accept the conclusions as the
9 conclusions of Duquesne or to accept the information as
10 something that has been developed by Duquesne.

11 And without the opportunity for cross-examination
12 we cannot receive this the same as other unsponsored
13 documents.

14 MR. RIESER: Begging your pardon, that ground
15 sounds like a concern over authenticity which I did not hear
16 raised by the Department.

17 CHAIRMAN RIGLER: It shouldn't have sounded
18 like a rejection on the grounds of authenticity. The Board
19 might accept the preparation by the Pennsylvania Economy
20 League, although my question as to who they are still stands.

21 I'm not satisfied as to what the source of their
22 fund might be. In terms of our sustaining the objection,
23 you might be better off if they were entirely funded by
24 Duquesne, because our problem is we can't look behind the
25 validity of the conclusions as the document is offered now,

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1 so the objection is sustained.

2 MR. CHARNO: Mr. Chairman, may we inquire at
3 this time if Duquesne Light has closed the presentation of
4 its direct case with the exception of any joint case being
5 put in by all of the Applicants?

6 MR. REYNOLDS: Mr. Chairman, could I, before
7 we move on, ask for a clarification? We have had a number
8 of unsponsored documents that have been put in and not
9 offered by the Applicant in this proceeding. I'm not
10 clear as to what the basis is for the last ruling. Could
11 you provide a clarification for the record, because there
12 are -- there are a vast number of documents which were not
13 generated by the Applicant or authored by the Applicant
14 which have come into this proceeding as unsponsored documents
15 by all of the other parties.

16 CHAIRMAN RIGLER: We have taken objections to
17 the documents on an individual basis and made our rulings
18 accordingly. I see no need for clarification. That
19 objection wasn't raised. Perhaps the Board didn't have
20 to consider it.

21 MR. REYNOLDS: That objection was raised
22 continuously and overruled.

23 CHAIRMAN RIGLER: You made inquiry of Duquesne
24 about the completion of their case?

25 MR. CHARNO: That's correct.

1 MR. RIESER: Mr. Chairman, I have a little bit
2 of difficulty responding to that inquiry. Perhaps you can
3 correct me if I'm wrong.

4 It is my understanding that, or at least it is
5 my impression that it has been considered that Duquesne
6 has no case separate from the other Applicants, and in that
7 light I can't really say Duquesne's case is closed because
8 Duquesne is one of the Applicants.

9 If, on the other hand, our case is something
10 separate from that of the other Applicants, then perhaps
11 I can respond to your request.

12 MR. CHARNO: The Department's inquiry is directed
13 to whether Duquesne intends to put on any further exhibits
14 through its separate counsel or any further witnesses. It
15 is our understanding that joint counsel is putting on expert
16 testimony and that each company's individual counsel is
17 presenting something resembling a direct case for the
18 individual company.

19 I am asking if Duquesne's individual counsel
20 has completed the presentation of their case as opposed
21 to the expert testimony and exhibits being placed in evidence
22 by counsel for all of the Applicants.

23 MR. RIESER: I'm not prepared to be able to say
24 whether or not that is the case today.

25 CHAIRMAN RIGLER: All right. It seems to me that

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1 one issue that was left open was the so-called Rule 18
2 issue. In our discussion of that we invited Duquasne's counsel,
3 Mr. Olds, to consider bringing another witness in to
4 testify with respect to the applicability of that rule.
5 And to the scope of the rule. And he indicated that he would
6 consider that invitation.

7 The Board did not require them to do so. I
8 suppose that really rests with the discretion of Duquasne's
9 counsel.

10 MR. RIESER: I think that's correct.

11 Mr. Chairman, I might point out in light of your
12 ruling on the Pennsylvania Economy League report submitted
13 to the Borough of Aspinwall, it might be necessary --

14 CHAIRMAN RIGLER: I can't hear you.

15 MR. RIESER: In light of your ruling on Applicant's
16 Exhibit 120, it might be necessary for us to obtain a witness
17 from the Borough of Aspinwall to identify this report and
18 testify as to the circumstances under which it was received
19 or prepared or from the Pennsylvania Economy League. That
20 is just one example of why it is difficult to respond to the
21 Department's inquiry.

22 MR. CHARNO: Again the Department's objection did
23 not go to the authenticity of the report, but the circum-
24 stances under which it was prepared and the assumptions
25 underlying the report.

1 CHAIRMAN RIGLER: All right. Mr. Smith has
2 reminded me pursuant to Mr. Reynolds' inquiry, and I will
3 not prolong this, that we also, in making our evidentiary
4 rulings sometimes have looked to the reliance of the
5 company in whose files an unsponsored document was found or
6 to their action in connection with that document.

7 MR. ZAHLER: Applicant's next witness is Lynn
8 Firestone.
9 Whereupon,

10 LYNN FIRESTONE

11 was called as a witness on behalf of Applicant
12 and, having been first duly sworn, was examined and testified
13 as follows:

14 MR. ZAHLER: Mr. Chairman, at this time I would
15 like to mark some documents for identification. I request
16 that Applicant's exhibit 122 be marked as the prepared
17 testimony of Lynn Firestone, consisting of a cover sheet
18 and 27 pages of testimony.

19 Applicant's Exhibit 123 be marked as the addendum
20 to the prepared testimony of Lynn Firestone, consisting of a
21 cover sheet and two pages of testimony.

22 That Applicant's Exhibit 124 be marked as IEEE
23 paper of nine pages entitled "The CAPCO Group Probability
24 Technique for Timing Capacity Additions and Allocation of
25 Capacity Responsibility," authored by Lynn Firestone,

1 Alexander H. Montoy and William D. Masters.

2 Applicant's Exhibit 118 be marked as an 11-page
3 document entitled "Capacity Allocation Study," consisting
4 of a four-page summary, Exhibits 1 through 4 revised, and
5 Exhibits 5 through 7.

6 DIRECT EXAMINATION

7 BY MR. ZAHLER:

8 Q Mr. Firestone, are the documents that have been
9 marked as Applicant's Exhibit 122 and 123 the testimony
10 you prepared for filing in this proceeding?

11 A Yes, they are.

12 Q Is the document that has been marked as
13 Applicant's Exhibit 124 the article referred to in the
14 testimony you prepared for this proceeding?

15 A Yes, it is.

16 Q Is Applicant's Exhibit 125 a further detail of
17 the study that is referred to in your testimony?

18 A Yes, it is.

19 Q Do you have any corrections to the testimony that
20 you prepared in this proceeding?

21 A Yes, I do. With respect to Exhibit 122, there is a
22 correction on page 2 that should be made. The second line,
23 the date 1967 should be changed to 1968.

24 On page 17, the first line, the word following
25 Schedule G, "principal," should be changed to the letters
"pre-."

1 Q So how does line 1 now read on page 17?

2 A "Pocket costs and schedule G pre-commercial."

3 Q Mr. Firestone, if I were to ask you the questions
4 contained in Applicant's Exhibits 122 and 123 today, would
5 your answers be as they are reflected therein?

6 A They would, yes.

7 MR. ZAHLER: I move into evidence at this time
8 Applicant's 122, 123, 124, and 125.

9 MR. CHARNO: I don't believe we have had any
10 statements by the witness with respect to 125.

11 MR. ZAHLER: The witness testified it was a
12 further detail of the study referred to in his exhibit.
13 If Mr. Charno would like to cross-examine him about that --

14 MR. CHARNO: I'm sorry?

15 MR. GOLDBERG: Before you rule on the offer of
16 these documents into evidence, I would like to ask the witness
17 some questions on voir dire.

18 VOIR DIRE EXAMINATION

19 BY MR. GOLDBERG:

20 Q Mr. Firestone, do you consider yourself an
21 expert in the field of probability techniques?

22 A Well, in certain areas of the field of probability
23 techniques, yes.

24 Q What are those areas?

25 A I consider myself to be expert in the theory of

1 what has come to be known as the PN allocation process.
2 In the analysis of and the establishment of the reliability
3 standard for our pool. I would not profess to be expert
4 in the operation of the digital computer that is necessary
5 to perform the probability calculations.

6 Q Would you please tell me what degrees you have
7 received in the field of probability statistics?

8 A I have received no degrees in the field of
9 probability statistics. I'm not really aware there are
10 such degrees.

11 Q You are not?

12 A No.

13 Q Would you please list all of the papers you have
14 written on probability techniques other than the one that
15 is marked as Applicant's Exhibit 124?

16 A This is the only published paper that I have
17 co-authored with these other gentlemen, the only published
18 paper I have participated in on probability.

19 Q Do you have any degrees in any field of
20 mathematics?

21 A No, my degree is in electrical engineering.

22 Q Have you ever done any graduate work in probability
23 and statistics?

24 A Informal study at the graduate level, but
25 again not resulting in receipt of a formal degree.

1 Q Would you state the courses you have taken in
2 college on probability and statistics?

3 A That taxes my memory some, but I have taken
4 college courses in advanced mathematics, theory of numbers --

5 Q Would you please limit your answer --

6 MR. ZAHLER: Could the witness please finish
7 his answer?

8 THE WITNESS: Of course, all of the basic
9 mathematics that are required in an engineering degree,
10 differential and integral calculus, advanced algebra,
11 trigonometry. Since graduating from college I have
12 mentioned taking other study courses. The most significant,
13 perhaps, is the time I spent in the power system engineering
14 course that General Electric Company offers.

15 That occurred, I believe, in the winter of 1957,
16 '58, and it was an eight-month course during which again there
17 was heavy concentration on differential calculus, theory of
18 numbers, matrix algebra, and of course the application of
19 those techniques in the other courses that I studied at that
20 time.

21 I have forgotten the year, but somewhere in my
22 past I took a course that was sponsored by the Akron Section
23 of the Institute of Electrical and Electronic Engineers
24 having to do with probability theory and probability
25 mathematics. To the best of my memory, that summarizes my

1 formal training in mathematics.

2 MR. GOLDBERG: I would like to move to strike
3 the witness' answer as unresponsive. The question was, if
4 you want me to rephrase it or I can ask the reporter to
5 read it back, please state all of the courses you have
6 taken in college on probability techniques or probability
7 and statistics.

8 Mr. Firestone's answer to the field of mathematics
9 as a whole. With the exception of one course, all were
10 not in the field of probability statistics.

11 CHAIRMAN RIGLER: Technically you may be correct
12 that the answer did not directly respond, but I believe it
13 certainly develops the area of the witness' knowledge,
14 which seems to be what you are probing. My inclination
15 is going to be to leave that answer in the record.

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16 (The documents referred to were
17 marked Applicant's
18 Exhibits 122 thru 125,
19 respectively, for identification.)
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1 BY MR. GOLDBERG:

bwi 2 Q Mr. Firestone, what theorem is satisfied by the
S3 3 relationship between the frequency function and the distribution
4 function?

5 CHAIRMAN RIGLER: May I hear that again?

6 (Whereupon, the reporter read the pending
7 question, as requested.)

8 MR. ZAHLER: I object. I don't believe this
9 is proper voir dire, but is more in the nature of cross-
10 examination.

11 MR. GOLDBERG: Mr. Chairman, the Witness said
12 that he considered himself an expert in certain parts of
13 probability techniques. This question is aimed at a
14 very fundamental concept of probability techniques.

15 I think the answer that the Witness gives will
16 further establish whether or not he, indeed, is an expert
17 in some field of probability techniques.

18 MR. ZAHLER: I'm not denying the right of
19 Mr. Goldberg to cross-examine the witness on it. The question
20 is whether or not this is proper voir dire examination of
21 the Witness.

22 (The Board confers.)

23 CHAIRMAN RIGLER: The objection is going to be
24 sustained.

25 The question might be appropriate for

bw2 1 cross-examination going to the weight to be given to the
2 witness' answers.

3 MR. GOLDBERG: I think it might be appropriate
4 to have the Witness excused now.

5 CHAIRMAN RIGLER: All right.

6 (Witness temporarily excused.)

7 MR. GOLDBERG: Mr. Chairman, I believe there is
8 a sound basis for not admitting Mr. Firestone's testimony
9 in its entirety.

10 I think by the answers Mr. Firestone has given
11 to the questions this morning and by his testimony itself,
12 he has demonstrated that he is not qualified to give expert
13 testimony on probability test ques, as applied to allocating
14 capacity or reserve requirements.

15 However, Mr. Firestone is apparently the best
16 vehicle through which the Staff can demonstrate that the
17 CAPCO method of allocating reserves contains internal
18 inconsistencies and is inherently biased against small
19 systems.

20 Therefore, I will not move to strike all of
21 Mr. Firestone's testimony. I will, however, move to strike
22 that portion of his testimony which begins on page 9, line 15,
23 and goes through page 17, line 3.

24 The basis for that --

25 CHAIRMAN RIGLER: Page 9, line 15?

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MR. GOLDBERG: Through page 17, line 3.

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The basis of my motion to strike this portion of Mr. Firestone's testimony is that it is factual testimony and not expert testimony.

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It is not any testimony on which Mr. Firestone bases any opinion, conclusion or inference. It is testimony concerning the CAPCO agreements which speak for themselves. These same facts that are contained in this portion of Mr. Firestone's testimony are available more reliably from documents which are already in evidence.

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Federal Rule of Evidence 1002, the best evidence rule, requires that the original writing or a duplicate under Rule 1003, be received into evidence with respect to the contents of the writing.

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Now, this motion has the exact same basis for the motion that was made by Applicants with respect to portions of Dr. Guy's testimony.

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The objection there was there were certain portions of his testimony which were factual and did not form the basis of an opinion, conclusion or inference.

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I argued against that objection on the basis that the Applicants had an opportunity to cross-examine him all they wanted on those portions of his testimony which contained factual material, and the Board sustained Applicants' objection, because that material was not the basis

1 of an opinion, conclusion or inference.

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2 I think the same notion and same argument applies
3 with respect to this portion of Mr. Firestone's testimony.

4 MR. ZAHLEF: Do I understand that to be all of the
5 objections the Staff has?

6 MR. GOLDBERG: That is correct, at this time.

7 MR. ZAHLER: Mr. Chairman, assuming for the
8 moment that we consider this as fact testimony, I do not
9 understand the basis for excluding it from the testimony of
10 Mr. Firestone. The difference between Dr. Guy's
11 testimony and Mr. Firestone's testimony was that Dr. Guy
12 had no first-hand knowledge on the fact he was testifying
13 about. It was on that basis that the Board excluded portions
14 of Dr. Guy's testimony.

15 Mr. Firestone's testimony goes beyond the documents
16 themselves.

17 The documents are in evidence. They meet the
18 best evidence rule.

19 The best evidence rule does not deal with how
20 CAPCO operates under those documents.

21 The agreements are complicated. The Board on
22 a number of occasions has asked for explanation. We
23 proffer Mr. Firestone to give the explanation, so the
24 other side can cross-examine, and we are faced by an objection
25 that this is inappropriate, and that the evidence is more

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1 reliable from the documents. Mr. Firestone testify as to
2 how CAPCO operates under the documents on pages 9 through
3 17.

4 There is no reason to assume Mr. Firestone's
5 testimony is at odds with the document and, if the Staff
6 believes it so, they can cross-examine him to that effect.

7 I object to the approach of the Staff, which is
8 to ask Mr. Firestone questions as to the expert testimony,
9 castigate the expertise, not raise an objection, and then
10 raise objection to the expertise of his testimony.

11 CHAIRMAN RIGLER: These are separate.

12 MR. ZAHLER: I did not understand that they were
13 offering objection on the inexpertise of Mr. Firestone.

14 If that is the case, I don't understand the
15 comment of Mr. Goldberg on Mr. Firestone's expertise.

16 CHAIRMAN RIGLER: Do you have a page reference
17 on your ruling on Dr. Guy's testimony?

18 MR. GOLDBERG: 3013 to 3012. In respect to
19 Mr. Zahler's comments, I would urge the Board to examine
20 the argument made there by Applicants, and the argument I
21 made there, and to examine Mr. Firestone's testimony between
22 pages 9 and 17.

23 It is not true he only testifies there, as
24 Mr. Zahler asserts^d, about the way CAPCO operates under the
25 agreements.

1 CHAIRMAN RIGLER: Let's assume he does two
bw6 2 things in that testimony, as I take a hasty look at it.
3 That he discusses the content of the agreements which
4 relates to your objection that the agreements speak for
5 themselves and also that he describes some of the operating
6 techniques of the companies under those agreements.

7 Does the Staff see any prejudice in leaving
8 in that part of his testimony in which he describes in
9 summary form the nature of the agreements?

10 MR. GOLDBERG: Yes, the appropriate time for
ES3 11 Mr. Firestone to testify to that is when he appears
S4 12 here as a fact witness. It should not be raised to the
13 level of expert testimony. It has nothing whatsoever
14 to do with the rest of his testimony.

15 I claim it is inappropriate to introduce
16 this material as part of his expert testimony.

17 CHAIRMAN RIGLER: How about the day-to-day
18 operation of CAPCO, pursuant to these agreements?

19 MR. GOLDBERG: I think that is more appropriate
20 for his appearance as a fact witness.

21 He can describe how, factually, they operate under
22 them on a day-to-day basis.

23 CHAIRMAN RIGLER: If this will be his testimony
24 as a fact witness, don't we save time by having it here in
25 clean, concise form in preprinted testimony?

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1 MR. GOLDBERG: I think it could be stricken
2 now, and when he comes back this same material could be
3 introduced, when he appears as a fact witness.

4 The important thing he does not base opinions,
5 conclusions and inferences on that and, therefore, it is
6 inappropriate as expert testimony.

7 MR. ZAHLER: I would point out when Mr. Firestone
8 is returning, he will be testifying on behalf of Ohio
9 Edison as a fact witness.

10 The statement Mr. Firestone testifies to within
11 8 and 17 deals with CAPCO agreements, and he is
12 testifying on behalf of all Applicants. To follow the
13 procedure Mr. Goldberg suggests, it would require
14 Mr. Firestone to testify and then each of the Applicants
15 to testify one after the other. I don't see the reason
16 for that at all.

17 CHAIRMAN RIGLER: We will take five minutes.

18 (Recess.)

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S5 1 MR. ZAHLER: I had a chance during the break
bwl 2 to review the argument with respect to Dr. Guy and I particularly
3 point to page 3031, where the Board ruled, and where they
4 overrule the objection, it was on the basis that Dr. Guy
5 conducted interviews and had no personal knowledge as to it.

6 The Chairman commented on lines 18 and 19, page 3028,
7 the problem of using an expert in this fashion is that it
8 avoids giving the other side cross-examination on this
9 issue. Mr. Firestone has direct knowledge and the other
10 side can clearly cross-examine as to his testimony.

11 In short, there is no basis for the Staff's
12 motion in this regard.

13 CHAIRMAN RIGLER: The Board is inclined to agree
14 with the observations you made with respect to the Guy
15 ruling.

16 During the intervals we have reviewed that
17 portion of the transcript, and we have reviewed pages
18 8 through 17, Mr. Firestone's testimony.

19 Commencing on page 9, moving through 10 and 11
20 and 12, it is reasonably apparent that, although there is
21 discussion of materials set forth in the CAPCO
22 agreements, there also are conclusions drawn with respect
23 to those agreements, as, for example, on page 10, line 7, in
24 which Mr. Firestone testifies with respect to certain necessities.
25 That, it seems to me, goes beyond the terms of the

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1 themselves.

2 Continuing over to page 11, line 2 and 3, he talks
3 about recognition within those agreements. Once again it
4 seems to me he is drawing conclusions that may go beyond
5 the scope of the actual language of the agreements.

6 Again, on line 6 there is talk of
7 recognition. On 7 there is talk of necessity.

8 Continuing to lines 15 through 20, he goes
9 beyond the agreement in describing factual matters which
10 appear to result from his direct personal knowledge as to the
11 establishment of certain economies.

12 Continuing on page 11, line 24, he talks about
13 the intent of the agreement, which clearly is conclusionary
14 and would be within the realm of expert testimony.

15 On page 12 he singles out what he considers to be
16 an unusual feature of the agreement. Up to that point it
17 seems the mixture of that testimony and expert opinion
18 are sufficiently related, so that the motion should be
19 overruled.

20 Commencing on page 13 and running over to page 16
21 17, we appreciate Mr. Goldberg's point that
22 this testimony does not truly relate to the announced
23 scope of the expert testimony being proffered today. It
24 looks as if he has made a departure and begins to testify
25 with respect to facts relating to the actual operation of the

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1 CAPCO agreement.

2 And, as we take a look at the letters
3 announcing the intended area of testimony of the witnesses,
4 in one sense I think it could be argued that this testimony
5 falls into the category of the Firestone fact testimony
6 and perhaps properly does not belong in the realm of
7 expert testimony.

8 Having agreed with Mr Goldberg, we, nonetheless,
9 think there is some merit to Mr. Zahler's comment that the
10 net result of upholding the objection would be merely to perhaps
11 necessitate hearing additional witnesses from each company
12 to reiterate what Mr. Firestone might be expected to say,
13 testifying later this week in a more factual context.

14 Since the testimony on pages 13 through 17, even
15 though it might be considered fact testimony, somewhat
16 apart from the area of expert testimony, is being proffered
17 and supported by all of the experts, it seems to us that
18 expedition and common sense might indicate that we receive
19 it now.

20 In thinking along those lines, we also have
21 in mind the question of possible prejudice to the opposition
22 parties, and since they have had this testimony available
23 for several months, it seems to us that there would be
24 no prejudice, and there is no reason why they should not
25 be prepared to cross-examine with respect to this area today.

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1 So that it is the type of testimony the Board
2 independently might desire to receive at this time. We think
3 it might make more sense in the overall context and flow of
4 the hearings to overrule the objection, notwithstanding our
5 appreciation of its technical merits. Perhaps the Staff
6 would wish to confer for a minute to see if they don't
7 agree with the Board in this area.

8 MR. GOLDBERG: The only comment I would like to
9 make in light of your ruling is the Staff's concern that that
10 portion of the testimony on which you have basically agreed
11 with the Staff's position, does not rise to the level of
12 expert testimony, when it comes to writing proposed findings
13 of fact and conclusions of law.

14 CHAIRMAN RIGLER: I think it is safe to say we
15 would consider pages 13 through 17 more in the nature of fact
16 testimony which is made possible by Mr. Firestone's
17 direct day-to-day involvement in CAPCO operations.

18 Wouldn't that be fair?

19 MR. ZAHNER: Yes. I must confess that Applicants
20 are confused when the Staff talks about "rise to the level
21 of expert testimony." I didn't think there was a difference
22 in the level of fact and expert testimony. It just addresses
23 two different issues.

24 CHAIRMAN RIGLER: I think we are in agreement
25 substantially. The Board's ruling is plain, and we will

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1 recall Mr. Firestone and examine him with respect to all
2 of the testimony.

3 Whereupon,

4 LYNN FIRESTONE

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

7 MR. ZAHLER: If there are no other objections,
8 I again renew the motions to move into evidence
9 Plaintiffs Exhibits 122 through 125 at this time.

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1 CHAIRMAN RIGLER: Hearing no other objections,
2 we will receive Applicant's Exhibits 122 through 125 into
3 evidence.

4 (The documents heretofore
5 marked Applicant's Exhibits
6 122 through 125 for identifica-
7 tion, were received in evidence.)

8 MR. ZAHLER: Mr. Firestone is available for
9 cross-examination.

10 CROSS-EXAMINATION

11 BY MR. GOLDBERG:

12 Q Mr. Firestone, on page 5 of your testimony,
13 lines 2 to 8, you state that the Federal Power Commission's
14 1964 National Power Survey encouraged the industry to
15 engage in these latter type transactions in order for the
16 City to do all it could to reduce electric power costs.
17 The FPC specifically suggested as a means to accomplish that
18 end the installation of larger and lower installed reserves.

19 In addition, you go on to state that there was
20 attention given to improved reliability. If the
21 Applicants interconnected and engaged in pooling transactions
22 with nonApplicant CCOE entities so the nonapplicant CCOE
23 entities reduced their costs and passed on these reduced
24 costs to consumers, wouldn't this be consistent with
25 what the National Power Survey of '64 encouraged?

1 MR. ZAHLER: Could Mr. Goldberg define CCCT?

2 MR. GOLDBERG:

3 Q Do you know what that term means?

4 A No, I don't.

5 Q You have filed expert testimony on behalf of
6 all Applicants, I understand. You mean to tell me you
7 do not understand what CCCT means?

8 MR. ZAHLER: I object. I don't understand the
9 relevance of the question. CCCT is an acronym that I have
10 been told the lawyers invented for this proceeding. What
11 relevance it has as to the witness' knowledge is beyond me.

12 CHAIRMAN RIGLER: The witness can indicate if
13 he has heard the term.

14 THE WITNESS: No, I don't know what the acronym
15 stands for.

16 BY MR. GOLDBERG:

17 Q Do you know what the combined CAPCO territory is?

18 CHAIRMAN RIGLER: I think you should tell him
19 what it means.

20 THE WITNESS: I think now I know what it means.

21 BY MR. GOLDBERG:

22 Q Do you recall the question understanding CCCT
23 to mean combined CAPCO territory?

24 A No. Would you read it back?

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

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1 THE WITNESS: I would think that it would be,
2 although I think that the nonapplicant entities with which
3 I'm familiar within the Ohio Edison territory enjoy
4 those benefits already, or those advantages, which are
5 encouraged by the Federal power survey.

6 MR. GOLDBERG: I move to strike the answer after
7 "I think it would."

8 CHAIRMAN RIGLER: Sustained.

9 BY MR. GOLDBERG:

10 Q If nonapplicant CCCT entities interconnected
11 with Applicant and others engaged in pooling transactions
12 with Applicants, and as a result improved the nonapplicant's
13 reliability, wouldn't that also be consistent with what
14 was encouraged by the National Power Survey of '64?

15 A Yes, I think it would.

16 Q On page 5, line 23 of your testimony, you were
17 asked the question, are there certain basic concepts
18 which must underlie any coordinating arrangement between
19 or among interconnecting utilities? Your answer was yes.

20 What is your understanding of the words "basic
21 concepts"?

22 A Concepts which are fundamental to achieving the
23 purposes intended.

24 Q Would they therefore be necessary in every
25 instance?

1 A It is not necessary if there are several basic
2 concepts. Perhaps it would not be necessary that each
3 concept would be satisfied in each instance.

4 Q Could you give us an idea of approximately how
5 many coordinating arrangements you have analyzed in your
6 career?

7 A I have personally participated in negotiating
8 coordination arrangements or interconnections on behalf of
9 our company with neighboring companies on a number of
10 instances.

11 Q They have all involved Ohio Edison as one of the
12 parties?

13 A Yes, they have.

14 Q You have never analyzed a coordinating arrangement
15 which involved parties other than Ohio Edison?

16 A I have never had access really to the detailed
17 papers that would be necessary to review in order to thoroughly
18 analyze a coordinating arrangement of someone else.

19 Q Have you read Mr. Slemmer's prepared direct
20 testimony?

21 A Yes, I have.

22 Q Would you please compare and contrast the meaning
23 of the term "mutuality" you use on page 6, line 1, to the
24 term "reciprocity" which is used in Mr. Slemmer's testimony
25 on page 13 of his testimony?

1 I would be glad to give you a copy of his
2 testimony if you would like to look at it.

3 CHAIRMAN RIGLER: I think that is a good idea.

4 MR. SAHLER: Could Mr. Firestone also have some
5 time to read the testimony?

6 MR. GOLDBERG: Sure.

7 THE WITNESS: Reciprocity on page --

8 MR. GOLDBERG: Page 13, where he begins his
9 discussion of reciprocity. It begins on the bottom of page 13.

10 THE WITNESS: I think generally speaking the
11 two words could be used interchangeably as this is being
12 used in his testimony as compared to mine.

13 BY MR. GOLDBERG:

14 Q On page 6, line 6 of your testimony, you use
15 the phrase "in somewhat similar fashion." What do you mean
16 by the use of that phrase?

17 A Well, we are speaking of an interconnection
18 arrangement which has the concept of mutuality attendant to
19 it.

20 Therefore, the obligations that each party will
21 undertake are somewhat similar. And the benefits that
22 each party hopes to derive will be somewhat similar.

23 Q You would agree then, wouldn't you, that they
24 don't have to be identical?

25 A Yes, I would.

1 Q When did you first come across the concept of
2 mutuality?

3 A I really can't identify that with any precision.

4 Q Did you ever see that term in an engineering
5 textbook?

6 A I suspect that I have, but I can't identify
7 the time or the reference with precision.

8 Q Would you call that concept an engineering
9 concept or some kind of subjective concept?

10 MR. REYNOLDS: Could I have the question back?

11 (Whereupon, the reporter read the pending
12 question, as requested.)

13 THE WITNESS: I would classify it more as a
14 subjective concept than as an engineering concept.

15 BY MR. GOLDBERG:

16 Q Are you familiar with the New England Power Pool?

17 A Other than I know there is such a pool, I am
18 unfamiliar with it.

19 Q Then you would not know whether or not the
20 concept of mutuality is basic to the New England Power
21 Pool, would you?

22 A I would not.

23 Q On page 6, line 1, you say the concept of
24 mutuality is basic to any coordination transaction con-
25 templated by interconnecting utilities. In light of your

1 previous answer, wouldn't you have to qualify that statement?

2 A That is a statement of my belief, that any
3 coordinating transaction which hopes to be a successful
4 transaction must incorporate the concept of actuality.

5 Whether the New England Pool incorporates it or
6 not, I do not know.

7 Q How did you determine that belief, Mr. Firestone?

8 A Well, I have arrived at that belief through long
9 years of experience in working on behalf of my company
10 with companies in working out interconnection arrangements,
11 and through 10 long years of experience working in our
12 CAPCO group organization and working with reliability
13 organizations that exist in the industry.

14 Q Your experience is limited to the CAPCO pool, is
15 it not?

16 A No, it is not. I have personal experience in
17 working out interconnection arrangements with other parties
18 that precede the coming into being of CAPCO. Would you
19 like me to recite some of those?

20 Q That is not necessary.

21 They all involved Ohio Edison, don't they?

22 A Other than my participation within ECAR, the
23 East Central Area Reliability group where I functioned on a
24 committee or a task force that addressed itself to questions
25 of this type, my total experience, yes, has to do with

1 working on behalf of Ohio Edison and working out interconnec-
2 tion agreements with other parties.

3 CHAIRMAN RIGLER: I would be interested in
4 hearing a recitation of what those other agreements might be.

5 THE WITNESS: Somewhat chronological, my recolliec-
6 tion is starting in 1956, I participated working out
7 interconnection agreement with the Columbus and Southern
8 Ohio Electric Company. Somewhat following that, I worked
9 out an interconnection agreement with Dayton Power &
10 Light Company.

11 Later I worked on agreements that resulted in
12 interconnection arrangements between the Cleveland Electric
13 Illuminating Company and ourself.

14 On another occasion I worked on an agreement
15 that resulted in an interconnection between -- a three-
16 party interconnection arrangement among Ohio Edison, American
17 Electric Power, and the Allegheny Power System.

18 On other occasions I worked on agreements that
19 resulted in an Ohio Power-Ohio Edison interconnection
20 agreement in connection with what is now known as the Buckeye
21 Rural Electric Cooperative group.

22 I have worked over the years on interconnection
23 arrangements involving the Ohio Valley Electric Corporation
24 of which Ohio Edison is a sponsoring company.

25 At the moment that is all that comes to mind.

1 BY MR. GOLDBERG:

2 Q Mr. Firestone, would you please describe in a
3 little more detail the nature of the task force with respect
4 to ECAR?

5 A Yes, I will try.

6 Following what is now known as the Northeast
7 blackout, which occurred in 1965, there was great emphasis
8 on the need to take steps that would assure in the future
9 increased levels of reliability would be achieved by the
10 bulk power supply systems in this country. The companies
11 within the part of the country where Ohio Edison is
12 located, organized ECAR which covers all or parts of eight
13 states, Michigan, Ohio, part of western Pennsylvania,
14 Kentucky, Indiana, West Virginia, some of Virginia, and some
15 of Tennessee.

16 The purpose of this group was to establish
17 rules or procedures that in total would assure bulk power
18 system reliability within this area.

19 One of the subcommittees that were structured
20 within that group was a group identified as the system
21 reliability advisory panel. There were several panels of
22 this type and the purpose of each of these panels was to
23 be comprised first of all of individuals that were
24 knowledgeable and expert within their given field and that
25 would undertake to study potential problems or steps that

1 might be taken to assure reliability. I functioned
2 on this system reliability advisory panel from the
3 inception of the ECAR organization and for a period of, I
4 believe, roughly seven years.

5 There were six other representatives in addition
6 to myself. These individuals were chosen because of their
7 expertise and because of the geographic distribution somewhat
8 of the companies that they were employed by.

9 During the course of those seven years, this
10 group explored many, many avenues, searching -- in
11 connection with installed generating capacity requirements,
12 searched for rules of good practice or good conduct
13 which if the members of ECAR were to follow would in the
14 aggregate assure adequate and reliable installed generating
15 capacity within the confines of ECAR.

16 BY MR. GOLDBERG:

17 Q Based on your answer to the Chairman's question,
18 a few moments ago, am I correct in concluding that all your
19 experience is with major, private electric utilities?

20 A Well, that is not totally correct. My answer
21 centers around the definition, I believe, of an interconnec-
22 tion arrangement or interconnection contract. I have had
23 experience in negotiating or working with rural electric
24 suppliers of electricity and with municipal suppliers of
25 electricity who Ohio Edison wholesales power to.

1 Q Was that work done on behalf of Ohio Edison?

2 A My participation in that work was on behalf of Ohio
3 Edison, yes.

4 CHAIRMAN RIGLER: Mr. Firestone, going back to that
5 list of companies where you worked on the interconnection
6 agreement; did any of those bulk power transactions
7 involve individual contracts for sale, for resale of firm
8 power or emergency power for sale for resale of either
9 firm power or emergency power?

10 THE WITNESS: The answer to your question is yes,
11 they did. I would have to elaborate what, though. Our
12 company has several interconnections with certain of our
13 neighboring companies and the first interconnection
14 that would be established between our company and an
15 adjacent company would, of course, require a facilities
16 agreement setting forth the responsibilities for providing
17 the facilities and it would also require the consummation
18 of an interconnection agreement which would set forth the
19 services that we expect would be provided by way of the
20 interconnecting facility.

21 Normally under such an agreement, various
22 classes of services would be spelled out and the
23 appropriate charges for those services would be defined.
24 Emergency power, the exchange of emergency power would be a
25 normal component of such an interconnection agreement.

1 The sale of a specific block of unit power would
2 be an unusual situation, although again it comes to mind
3 that some years back Ohio Edison and Cleveland Electric
4 Illuminating worked out a staggered construction arrangement
5 which in effect amounted to Cleveland buying unit power from
6 an Ohio Edison unit for a period of time following which
7 there was a mutual back-up provision spelled out.

8 CHAIRMAN RIGLER: Is unit power different from
9 firm electric power, or do you use them synonymously?

10 THE WITNESS: No, we do not use them synonymously.
11 The definitions would be different. The unit power would be
12 power generated from a specific unit. That power would be
13 available only when the specific unit would be available,
14 and be restricted to the extent that unit's capability
15 might be restricted.

16 Firm power would be contemplated as being a
17 delivery of power having the same degree of firmness as
18 power we could supply to our retail customers.

19 CHAIRMAN RIGLER: Except that it would be wholesale
20 power?

21 THE WITNESS: Well, the rate would be a matter
22 of determination.

23 CHAIRMAN RIGLER: But it would be wholesale
24 power?

25 THE WITNESS: I can't address myself to what the

1 rate would be.

2 CHAIRMAN RIGLER: I wasn't asking about the rate.

3 THE WITNESS: Well, I interpret your use of the
4 word "wholesale" as going to the rate.

5 BY MR. GOLDBERG:

6 Q A little while ago in response to my question
7 on the phrase "in somewhat similar fashion," you indicated
8 it didn't have to be in identical fashion.

9 In order for your concept of mutuality to be
10 satisfied, is it necessary that the benefits derived from
11 coordination by each of the two utilities be identical?

12 A It is not necessary that either the benefits
13 nor the obligations be identical. It is highly desirable
14 that they be identical, but living in a practical world, I
15 think it is too optimistic to think that identical benefits
16 and identical sets of responsibilities can be achieved.

17 These arrangements are still necessary, even
18 though it is, in my judgment, impossible to achieve an
19 identical situation on both sides of the arrangement.

20 The closer one could come to having an identical
21 condition, the more desirable, the more perfect the
22 arrangement would be, in my judgment.

end 6

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1 Q Why is it more desirable for them to be
2 identical?

3 A Well, if I could go back some and answer that by
4 way of reciting how I think the interconnected system that
5 exists in this country or in the part of the country
6 where Ohio Edison operates evolved, I believe I can answer
7 that question.

8 The Ohio Edison system is interconnected with nearly
9 all or all of the surrounding electric companies that are
10 contiguous to it.

11 They, in turn, are interconnected with the companies
12 that are contiguous to them.

13 So that we, in fact, find our power system
14 operating in an interconnected environment.

15 An environment in which we really have no control.
16 We influence the environment, but we cannot control it. So
17 and again the nature of electricity being, as it is, it
18 flows through the path of least resistance.

19 So you find that it is possible for a
20 person living in such an environment or operating a power
21 system in such an environment to burden that and
22 environment by taking advantage of it. This, of course is
23 undesirable. If that occurs, to me that represents a bad
24 situation and a problem.

25 If all of the neighbors in this environment

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1 shouldered their responsibilities and got benefits
2 that were somewhat commensurate with one another, it would
3 not be necessary to have a formal framework of rules, in
4 my judgment.

5 But, once again, I believe that is too idealistic
6 to hope for and, therefore, in my judgment, the way to assure
7 that this environment will continue to be adequate and be
8 reliable electrically-speaking, and that people will not
9 take undue advantage of the environment, is to structure
10 a set of rules governing obligations that one has to this
11 environment. And, if each individual discharges his
12 obligations, then the environment in total will be healthy,
13 will be reliable, and these benefits will glow.

14 Q Beginning on the bottom of page 8 and going
15 to the top of page 9 of your testimony, you are talking
16 about mutuality further. You mention common objectives
17 would be an alternative to quantifying total benefits
18 and then prescribing a basis for sharing is to establish
19 common objectives at the outset.

20 What type of objectives do you have in mind
21 there?

22 A Well, the matter of the proper amount of installed
23 generating capacity that is necessary to assure an adequate
24 level of reliability, in my judgment, is the most important
25 common objective to be considered and to be established.

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1 Q Then, do large and small systems oftentimes
2 have common objectives?

3 A Perhaps in the general sense they have common
4 objectives. Whether they have formalised common objectives
5 under a contractual agreement, is another matter.

6 Q I mean in the same sense that you use that phrase
7 in your testimony.

8 A Of course, I'm using the phrase as -- in connection
9 with structuring of a formal pool.

10 And, to me, one of the duties that arises in
11 the structuring or rules for a formal pool begins in that
12 these rules sometimes are based on a sharing of the benefits.

13 I'm trying to make the point here that determination
14 of benefits is an extremely subjective matter and that,
15 as time passes, it becomes more and more subjective.

16 So to correct that difficulty, it is more
17 appropriate, in my judgment, to base the pool rules on
18 responsibilities rather than on benefits.

19 And, if each man discharges his responsibilities,
20 then one can be assured the common objective will be
21 reached, and one can be reasonably sure the benefits will
22 be there, and it is up to each participant to continue to
23 convince himself that he is or is not enjoying sufficient
24 benefits that will cause him to want to continue to
25 participate in the pool.

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1 Q Couldn't Buckeye Power supply facilities be
2 planned on a one-system basis if one or more nonApplicant
3 CCCT entities were a member of the CAPCO Pool?

4 MR. ZANLER: Could I have the question again?
5 (Whereupon, the Reporter read the pending
6 question, as requested.)

7 THE WITNESS: In the purest sense, as far as
8 I'm aware, there is no limit to the number of entities that
9 could come together and commit themselves to planning a
10 system on a one-system basis to accommodate the needs of
11 all.

12 I would say, though, that the more participants,
13 the greater would be the difficulty in reaching agreements,
14 as to what constitutes the one-system plan.

15 BY MR. GOLDBERG:

16 Q Do the CAPCO agreements result in a competitive
17 advantage to the CAPCO companies vis-a-vis the nonCAPCO
18 entities in the area?

19 MR. REYNOLDS: Let me have that back.

20 (Whereupon, the reporter read the pending
21 question, as requested.)

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1 THE WITNESS: If I could, I would like to ask you
2 to be a little more specific. That is extremely broad and
3 extremely general. I have trouble concentrating on anything
4 specific in that question.

5 BY MR. GOLDBERG:

6 Q As far as the CAPCO companies being a competitor
7 in their area, do they have an advantage over the nonCAPCO
8 companies as a result of your entering into the CAPCO
9 agreements?

10 A Well, let me say that the CAPCO companies
11 state as one of their objectives to achieve such economies
12 of scale as may be available to them. I believe that each
13 of the CAPCO parties enjoys lower total costs as a
14 consequence of utilizing larger generating units by virtue
15 of being in CAPCO than each company could utilize by
16 itself.

17 Q What are the reasons for CAPCO's denial of
18 membership to nonapplicant CCCT entities?

19 MR. ZAHLER: Objection. There is no support
20 in the record or that this witness has testified as to any
21 denials of membership. Nor has the witness testified as to
22 denials of membership.

23 MR. GOLDBERG: There is in the record testimony
24 as to denials of membership to CAPCO. This witness testifies
25 as an expert witness on behalf of all Applicants in the CCCT

1 area is testifying with respect to the CAPCO agreements, and
2 I think it is perfectly reasonable to ask him the reasons
3 for not allowing others to become members of CAPCO.

4 CHAIRMAN RIGLER: First, you have to establish
5 that they haven't allowed others.

6 MR. ZAHLER: I have no objection to Mr. Goldberg
7 asking the question in a hypothetical form. If, as this
8 witness' testimony is, I object to the form of the question.

9 CHAIRMAN RIGLER: I think you need some
10 foundation.

11 BY MR. GOLDBERG:

12 Q What would be the reasons, Mr. Firestone,
13 for CAPCO denying membership to other entities in the CCGT
14 area?

15 MR. ZAHLER: Objection. I think Mr. Goldberg
16 rephrased the question again and it still suffers from the
17 same problems as before.

18 CHAIRMAN RIGLER: Sustained.

19 BY MR. GOLDBERG:

20 Q Are there any reasons why CAPCO would not want
21 any other members other than the ones that are already
22 participating in CAPCO?

23 MR. ZAHLER: When Mr. Goldberg is referring to
24 CAPCO, does he mean the CAPCO Members, or does he mean entity
25 known as CAPCO?

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1 MR. GOLDBERG: The CAPCO pool.

2 MR. ZAHLER: I'm not sure what Mr. Goldberg
3 means by the CAPCO pool now. The CAPCO pool is composed
4 of the CAPCO members.

5 MR. GOLDBERG: Right.

6 MR. ZAHLER: Then do you mean the CAPCO members?

7 CHAIRMAN RIGLER: I think the witness can
8 answer it.

9 THE WITNESS: Well, there are perhaps two natural
10 phenomena or fundamental phenomena which in my judgment
11 tend to define the proper size of a pooling group. One
12 we touched on earlier. That is the decisionmaking process.

13 CAPCO pool consists of members that are there
14 through their own choice and there are, of course, provisions
15 for withdrawal so that if at any time one of the members
16 is unhappy with the decision that must be made, or in
17 disagreement with it, that is his recourse. He may withdraw.

18 The more entities that come into existence,
19 the more difficult it is to make a decision. That
20 would encourage you to have fewer participants rather than
21 more.

22 The second fundamental in my judgment goes
23 to the economy of scale. That is one of the compelling
24 reasons that we in CAPCO have put this group together and
25 have worked diligently on making the progress we have.

1 We have tried to use equipment that is suitable
2 for the group, but really is too large for each of us to
3 use by ourselves.

4 Now in pursuing that, we bump into the frontier of
5 technology. Once again, when you have achieved the size
6 of the group, proper composition of the group that you are
7 capable of utilizing the largest piece of equipment that
8 technology knows how to provide, you have exhausted the
9 economy of scale avenue.

10 CHAIRMAN RIGLER: Would the nuclear units that
11 are involved in these proceedings be an example of the
12 generating units that are too large for each of the companies
13 to use by itself?

14 THE WITNESS: Yes, it would. And the economy of
15 scale is very definitely a factor there. Nuclear units
16 of the 1200 megawatt size which are being planned by the
17 CAPCO group are too large for one of the entities to use
18 by itself, absent some sort of an arrangement with a partner.

19 Of course, the economy, dollars per kilowatt for
20 nuclear capacity proves itself in at 1200 megawatt size
21 unit as compared to alternate forms of energy at a lower
22 size unit, 400 or 500 megawatt unit, I think the reverse
23 would be true.

24 The nuclear unit would not have the competitive
25 advantage at that size.

1 CHAIRMAN RIGLER: In your answer, you mention
2 the possibility of withdrawal from CAPCO. Explain what
3 is involved should a member decide to withdraw, particularly
4 in terms of how long it would take, and what financial
5 commitment it would involve.

6 THE WITNESS: The commitments, of course, go to
7 the construction of additional generating capacity.
8 Currently the CAPCO capacity addition program extends
9 through 1986.

10 The lead time required for nuclear units
11 particularly seems to be ever increasing, but currently
12 CAPCO planners feel that six to 10 years of lead time is a
13 must.

14 Therefore, we have a capacity program, as I say,
15 that carries us through 1986. If a party were to announce
16 today that he intended to withdraw, he would have to
17 perform on the obligations that arise from this construction
18 program that carries through 1986.

19 He would not be involved in any additions beyond
20 that program.

21 In addition to that responsibility or that
22 obligation, he would also have back-up obligations that
23 would exist throughout the life of the generating units
24 that had been committed while he was an active member of
25 the group.

1 CHAIRMAN RIGLER: There is no provision for
2 his selling those shares to other members, as a matter of
3 right?
4

5 THE WITNESS: The shares in the units that are
6 now committed, but not yet in operation.

7 CHAIRMAN RIGLER: Or even the units that are in
8 operation? In other words, is there a contractual provisions
9 which requires remaining members to buy out existing members?

10 THE WITNESS: No, there is not. There are contractual
11 provisions that any arrangement that one of us would undertake
12 with a nonCAPCO party subsequent to the signing of the
13 CAPCO agreement, must not conflict with the obligations
14 that we undertook under the CAPCO agreement.

15 But I can't answer your question precisely.
16 A party is free to do whathe would want to do with
17 an outside party, provided it does not conflict nor undercut
18 his responsibilities to the CAPCO partners.

19 CHAIRMAN RIGLER: I was looking for a situation
20 in which a member wishes to withdraw, but has these ongoing
21 responsibilities with respect to future generation you
22 have described, and also owns its proportionate share in
23 certain existing units.

24 I was wondering if there was some
25 mandatory provision whereby the other members of CAPCO
would buy back a portion of the CAPCO generating capacity, so

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1 that the withdrawing member could obtain its generation
2 elsewhere?

3 THE WITNESS: There is no such provision with
4 respect to buy-back. If one of the parties should choose
5 to withdraw, it obviously would be a very traumatic
6 experience for the remaining partners. The target reliability
7 of the remaining pool would have to be investigated and
8 appropriate revisions of the responsibility or appropriate
9 responsibilities would have to be determined, depending
10 on the circumstances.

11 CHAIRMAN RIGLER: Would it be an equally traumatic
12 experience for the withdrawing partner, as for the
13 remaining partners?

14 THE WITNESS: I would think not. Otherwise the
15 partner would not choose to withdraw. Again, depending
16 on the circumstances, it probably would be -- using my
17 word "mutuality" -- it would be traumatic to the withdrawing
18 party, as well as to the parties that remain.

19 CHAIRMAN RIGLER: What would be the effect of
20 withdrawal with respect to the transmission agreement, as
21 far as the withdrawing party goes?

22 THE WITNESS: Once again, the withdrawing
23 party would have to honor the obligations he undertook
24 while he was a member of the group and, of course, would
25 be entitled to the rights that he achieved from those

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1 transmission facilities, and then he would be excused from
2 participating in or benefiting from transmission agreements
3 that come into being after his withdrawal.

4 CHAIRMAN RIGLER: Do you have any estimate as to the
5 length of time that would be required for one of the
6 CAPCO members to effectively associate itself with CAPCO
7 company operations?

8 THE WITNESS: Well, if I were to announce today
9 the intention to withdraw from CAPCO, I would have ongoing
10 responsibilities for the construction of generating units
11 through 1986. And thereafter I would have ongoing
12 responsibilities for sharing reserve backup or providing
13 backup throughout the life of the CAPCO units that have
14 been committed, had been committed prior to today. So it would
15 be a long process.

16 CHAIRMAN RIGLER: So as a practical matter, with-
17 drawal would be a very serious and unlikely event, except
18 in a really major occasion with respect to some company?

19 THE WITNESS: Yes, it would.

20 BY MR. GOLDBERG:

21 Q Is transmission essential to a reliable
22 bulk power supply?

23 A As I think of bulk power supply, and as the
24 world exists today, I would say, yes, it is. In the purest
25 idealistic sense, it is not. It is conceivable that each

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1 residence in this country could have a source of electricity
2 in the basement. If that were the case, widespread cascading
3 outages would be nonexistent.

4 Q That is not the fact, though, is it?

5 A No, it is not. It is too idealistic.

6 Q Is the CAPCO basic operating agreement in effect
7 today?

8 A CAPCO basic operating agreement? Yes, it is.

9 Q Mr. Firestone, I would like you to take a look at
10 the CAPCO basic operating agreement which is marked as
11 NRC Staff Exhibit 202, NRC Document Number 233.

12 Would you please tell me the basis for your
13 answer that the CAPCO basic operating agreement is in effect
14 today?

15 A We had for some period of time operated under party-
16 to-party bilateral interconnection agreements which predated
17 the CAPCO basic operating agreement.

18 A great deal of effort was expended on developing
19 this agreement.

20 I can't find the date when it was first adopted.
21 It has been in force a little over a year, and it is my
22 understanding that it has been extended by its terms to
23 March of 1977.

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1 Q I would like to direct your attention to
2 Article 21, which appears on page 40 of this agreement.

3 A Yes.

4 Q Is it still your testimony that this agreement
5 is in effect today?

6 A Yes, it is. There is a supplemental agreement
7 that has modified Article 21 to extend the life of this
8 agreement until, I believe it is, March 1, 1977.

9 Q Does that also contain the phrase "or such time
10 as the parties execute the generating agreement, whichever
11 is the earlier"?

12 A I would have to see the extension agreement to
13 answer that with certainty.

14 I believe it in effect picks up this same
15 language and just changes the date to 1977.

16 Q Have you executed the generating agreement?

17 A No, we have not.

18 Q On page 11, beginning on line 23 of your
19 testimony, you state that the CAPCO basic operating agreement
20 is the document that is intended to supersede the respective
21 bilateral contracts by and between CAPCO parties which were
22 in existence prior to the agreement.

23 What do you mean by "respective bilateral
24 contracts by and between CAPCO parties that were in
25 existence prior to the agreement"?

1 A Each of the companies has or had in
2 existence an agreement with any neighboring company
3 with whom it had an interconnection.

4 In the case of Ohio Edison, as I mentioned earlier,
5 we have interconnections with Columbus and Southern Ohio
6 Electric Company. We have a bilateral agreement with them.

7 We have interconnections with Dayton Power
8 and Light, and bilateral agreement with them.

9 We have interconnections agreement with Ohio
10 Power, subsidiary of American Electric Power, and bilateral
11 agreements with them.

12 Interconnection with Cleveland Electric Illuminating
13 Allegheny Power, West Penn Power, and bilateral agreements
14 covering all of them.

15 Interconnection with Toledo Edison and bilateral
16 agreement covering that.

17 Q Would you please point to the language in the
18 basic operating agreement which states that the agreement
19 supersedes the respective bilateral contracts by and
20 between the CAPCO parties which were in existence prior to
21 the agreement?

22 Perhaps I could help. Article 20 on page 40. Would
23 that be what you are relying on when you testified about
24 the CAPCO agreements superseding the respective bilateral
25 contracts?

1 A Yes.

2 Q That is the provision of the basic operating
3 agreement on which you base your answer?

4 A To the best of my recollection. I don't claim
5 to recall what each section of this agreement goes to,
6 but it seems to me, just reading it now, that, yes, this
7 section accomplishes what I have said.

8 Not being a lawyer, that is an engineer's
9 interpretation.

10 Q Are there any CAPCO agreements which were
11 executed before the basic operating agreement?

12 A CAPCO agreements meaning agreements among
13 the CAPCO parties?

14 Q Yes.

15 A Yes. I believe there were. The memorandum of
16 understanding which was signed in 1967 was to the best
17 of my recollection the first so-called CAPCO agreement.

18 Subsequent to that, there has been a transmission
19 agreement consummated and an administration agreement
20 consummated.

21 There have been various, less formal, or lesser
22 agreements consummated.

23 Q Is the memorandum of understanding affected
24 by Article 20 of the CAPCO basic operating agreement?

25 A Well, it is affected in that Article 20, I would

1 judge implements one of the goals or statements of
2 purpose that was -- that is incorporated in the original
3 memorandum of understanding.

4 CHAIRMAN RIGLER: Mr. Fixstone, when you have been
5 describing interconnection agreements, I didn't hear you
6 mention any between Ohio Edison and Pennsylvania Power.
7 Was that an oversight?

8 THE WITNESS: There was an oversight.
9 And after I finished, it occurred to me I didn't mention
10 an interconnection between Ohio Edison and Duquesne Light.

11 Pennsylvania Power is a wholly-owned subsidiary
12 of Ohio Edison. We have planned the transmission facilities
13 for Ohio Edison, corporate, Pennsylvania Power, on a one-
14 system concept.

15 It is inherent in my thinking that it is one
16 system. There are certainly interconnections between the two
17 as we have interconnections between the Ohio Edison system
18 and Duquesne Light.

19 MR. SMITH: Mr. Fixstone, I'm not sure I under-
20 stood your testimony correctly, but did I understand you to
21 state that the basic operating agreement supersedes bilateral
22 contracts between CAPCO parties and nonCAPCO parties?

23 THE WITNESS: If that is what I said, I didn't
24 intend to say that. It is intended that the basic operating
25 agreement supersedes the bilateral agreements that exist

1 among the CAPCO parties. It is intended that the bilateral
2 agreements between CAPCO parties and nonCAPCO parties
3 remain in effect, but that we operate under those agreements
4 in a manner that would not conflict with the basic operating
5 agreement to the extent that we can.

6 There may have been agreements made prior to the
7 CAPCO agreement coming into being, between a CAPCO
8 party and a nonCAPCO party that would take precedence
9 over the CAPCO agreement.

10 CHAIRMAN RIGLER: Why don't we take a 10-minute
11 break?

12 (Recess.)

13 BY MR. GOLDBERG:

14 Q Mr. Firestone, on page 8, line 14 of your
15 testimony, you state the definition of equitable sharing
16 is extremely difficult and largely subjective.

17 Then on page 19, line 21, you answer very
18 definitely not in response to the question, in your opinion
19 would the equal percentage of peak load method of sharing
20 reserves in most situations be an equitable basis on which
21 coordinating utilities could share reserves? If equitable
22 sharing is subjective, what engineering expertise do you
23 apply in determining what is a good or bad method of
24 equitable sharing?

25 A When I speak of equitable sharing being largely

1 subjective, I'm speaking of shares of benefits. My
2 approach to solving that problem is to really develop
3 rules that don't rest on the need to quantify benefits
4 in the sharing of them, but to move to a definition of
5 responsibilities.

6 Unfortunately, when it comes to installed reserve
7 capacity, the reliability analysis gives one the vehicle
8 for defining responsibilities and avoiding the need to
9 look at benefits.

10 Q These rules which you have developed, are they
11 your rules?

12 A Certainly not. I would like to think that I have
13 played a fairly substantial role in developing the rules
14 that we have, but by no means are they my rules.

15 Q Well, if it is largely subjective, and the method
16 does not require quantifying items, would you please explain
17 how you can be so certain in your answer very definitely
18 not?

19 MR. ZAHLER: I request I have the question read
20 back.

21 (Whereupon, the reporter read the pending
22 question, as requested.)

23 MR. ZAHLER: Could I ask Mr. Goldberg what it is
24 in his question?

25 MR. GOLDBERG: The method of determining whether

1 or not you have a good or bad method of equitable sharing.

2 MR. ZAHLER: Could I have that repeated again,
3 please?

4 (Whereupon, the reporter re-read the pending
5 question, as requested.)

6 MR. ZAHLER: Now I'm slightly confused with what
7 the use of the word "method" is. It is used later on in the
8 question Mr. Goldberg asked, and I'm not sure it is being
9 used the same way both times.

10 Maybe it would be helpful if the question could
11 be rephrased.

12 MR. GOLDBERG: Could you please re-read
13 the question I asked Mr. Firestone?

14 (Whereupon, the reporter again re-read the
15 pending question, as requested.)

16 THE WITNESS: I'm confused. Where am I?

17 MR. GOLDBERG: You are answering the question
18 which was just read.

19 CHAIRMAN RIGLER: Mr. Zahler asked you if you
20 wanted to rephrase it.

21 MR. GOLDBERG: No, I don't.

22 THE WITNESS: I'm not totally certain I have
23 understood your question, but the method, as you put it,
24 that I advocate is not a subjective method. It is a very
25 objective method. It does require quantification rather

1 than no quantification.

2 The method I advocate is based on reliability
3 analysis, not on evaluation of benefits.

4 Having founded the method on reliability and
5 the stated objective that an equitable sharing of reserve
6 responsibility is achieved when each party contributes
7 to the combined reserve position in the same proportion as he
8 expects to receive help from it, that is my definition of
9 equity.

10 And then the method that achieves that, in my
11 judgment, is an equitable method. Any other method that
12 falls short of achieving that, in my judgment, is not an
13 equitable method.

14 I have attempted to demonstrate here with an
15 example that percent reserve falls far short of
16 achieving the goal I have stated.

17 BY MR. GOLDBERG:

18 Q I understand your method and we will get into
19 that later.

20 For now I'm trying to square your testimony on
21 page 8, line 14, where you say the definition of equitable
22 sharing is extremely difficult and largely subjective and how
23 in light of that you can be so certain of your answer on
24 page 19, beginning on line 21, that the equal percentage
25 method is very definitely not equitable and is extremely

1 poor.

2 A The phrase you select on page 8 is there within
3 the context of a discussion of cost reductions or benefits.
4 I'm saying that equitable sharing of benefits is largely a
5 subjective matter.

6 Now we move to page 19, and I'm speaking of a
7 method for assigning responsibilities.

8 Q So when you use the phrase "equitable sharing"
9 on page 8, you are limiting that phrase to cost reductions;
10 is that correct?

11 A Again I haven't read all of page 8, but I believe
12 that that answer on page 8 is directed toward benefits
13 arising from pooling of which cost reduction is one.

14 Q Well, then, please describe just how broad
15 the phrase "equitable sharing" is as you have used it on
16 page 8, if it includes something other than cost reductions?

17 A I have attempted to use it in the context that if
18 one attempts to, on a continuing basis, evaluate the
19 benefits that one is enjoying by being a party to the pool,
20 and then use that evaluation as a basis for determining
21 whether equitable sharing is being achieved or not, that
22 you are moving into an area that is largely subjective,
23 and that one of the areas of benefit is cost reduction,
24 but there are others.

25 Q Isn't one of the benefits from participating in a

1 pool, the sharing of nuclear power?

2 A Well, the nuclear power has nothing magical
3 about it. If it proves to be more reliable or lower in
4 cost than some other form of generation, then those are
5 benefits.

6 Q If in fact a pool has decided to build nuclear
7 units, then isn't the sharing of the nuclear power one of
8 the benefits that are obtained from participation in the
9 pool?

10 A Well, maybe we are getting hung up on words.
11 The decision by the CAPCO pool to use nuclear power rests
12 on the expectation that it will be lower in cost than
13 power from coal. And if that expectation is realized, that is
14 a benefit.

15 Q So there certainly is a direct connection between
16 the sharing of nuclear power and cost reductions?

17 A I guess, yes.

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1 Q And it is true, is it not, that some of the
2 reserves of the CAPCO companies will come from these
3 nuclear units?

4 A Yes, that is true.

5 Q On page 21, line 18, of your testimony, you
6 use the phrase "common denominator."

7 Are you using that phrase in a mathematical
8 sense or only as a figure of speech there?

9 A As a figure of speech.

10 Q What do you mean by capacity responsibility on
11 line 19 of page 21?

12 A Well, it is contemplated under the CAPCO arrangement
13 that each party will be given an assignment of responsibility
14 to pay the costs associated with certain capacity.

15 That assignment of responsibility may be
16 coincident with that party's ownership interest, or it may not
17 be.

18 MR. SMITH: Mr. Goldberg, before you continue,
19 several questions ago I think your question was, some of the
20 reserves will be from CAPCO Units?

21 MR. GOLDBERG: CAPCO nuclear units.

22 MR. SMITH: And your answer was, yes?

23 THE WITNESS: That is correct.

24 MR. SMITH: This will be operating reserves
25 and installed reserves?

b72 1 THE WITNESS: This will be both.

2 Really, it is difficult or impossible to
3 identify a particular block of capacity and say, now that is
4 reserve capacity and this over here is some other kind of
5 capacity.

6 We have a complement of capacity that we construct
7 to serve a given load.

8 Of course, we are forecasting the load. I'm
9 speaking now on a planning basis. We forecast the load. We
10 plan then a complement of capacity to serve this forecast
11 load and to achieve a given level of reliability.

12 Now, only time will tell what equipment will break,
13 what equipment will be late in coming into service, things
14 of this nature.

15 We expect to use all of the capacity resources
16 we have, as needed to supply this load, in order to get the
17 desired level of reliability.

18 We would contemplate normally to operate the most
19 efficient, lowest operating cost-type of capacity.

20 We would expect to load that as heavily as we
21 can, so that the nuclear capacity is what we would call
22 baseloaded.

23 Above it would be the next higher cost, operating
24 cost of capacity and then above it would be the highest
25 operating cost of capacity, so that on a day-to-day basis, now,

bw3 1 on an operating basis, you would expect your reserve to be
2 made up of the capacity that has the highest operating
3 cost. And, unless you are experiencing heavy breakage of
4 equipment, your reserve would be sitting, not operating,
5 but ready to operate.

6 But if, for some unforeseen reason, the higher
7 cost capacity is broken, then it is conceivable that some
8 of your reserve is made up of your nuclear capacity.

9 You can't flatly designate one piece is going to do
10 this and nothing else, and so on.

11 Have I answered your question?

12 MR. SMITH: Yes.

13 CHAIRMAN RIGLER: But your basic program or your
14 intention is to use the nuclear capacity as baseload?

15 THE WITNESS: Our basic goal is to try to
16 buy and install a complement of capacity that will serve this
17 load at a given level of reliability and incur the lowest
18 overall costs. The nuclear capacity, of course, has the highest
19 fixed charges, has the highest capital costs and the lowest
20 operating costs.

21 You try to utilize that capacity for your
22 baseload service. Your oil-fired so-called peaking capacity
23 has the lowest fixed cost with highest operating costs.

24 You try to install that really to take care of
25 the reserve.

1 CHAIRMAN RIGLER: In answering Mr. Smith's question,
2 you used the word "we" several times. Did you mean CAPACO
3 operating as a unified system, when you said "we," or did
4 you mean Ohio Edison and Pennsylvania Power?

5 THE WITNESS: I can't recall the specific places
6 I used "we."

7 It would be applicable to both. Ohio Edison
8 and CAPCO. This would be a common objective that I think
9 power supply planners would try to achieve the objectives
10 I have stated.

11 CHAIRMAN RIGLER: Thank you.

12 BY MR. GOLDBERG:

13 Q On page 21, line 20, you use the phrase
14 "expected ability." Are you using that in the mathematical
15 sense or as a figure of speech?

16 A I'm using that in the mathematical sense, in
17 that these are prospective calculations.

18 Q Would you please explain what "expected
19 ability" is? With emphasis on the word "expected" in the
20 mathematical sense?

21 A As I was saying a moment ago, in the planning
22 process, we forecast load that we think will require
23 serving. We plan then a complement of capacity to supply that
24 load.

25 And then in our reliability analysis, we merge the

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1 mathematical model of the capacity complement with the
2 mathematical model of the load to compute what we call
3 capacity margins. And this calculation is done really on a
4 day-by-day basis and for all combinations of load and
5 capacity that can exist.

6 A margin where the available capacity exceeds
7 the to be served, we call a positive margin. The sum of all
8 such positive margins we identify as a measure of a party's
9 ability to provide help to someone else.

10 We also quantify negative margins, days on which
11 the available capacity is expected to be less than the
12 load requirement, and then the quantification of that negative
13 margin is an indication of a party's need for help.

14 These are all on a prospective basis, before the
15 fact.

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1 Q Yes, but what I'm after is basically a simple
2 definition or explanation of what is meant by the word
3 "expected" in mathematics.

4 A "Expected" means as it is used here, means that
5 it is a forecast. It is your expectation of something that
6 only time will tell will reveal the facts.

7 Q If you have a set of data, what would be the
8 expected value of that set?

9 A I'm afraid I don't understand that question.

10 Q Is there a phrase which ordinary laymen are
11 familiar with, which has the same meaning as expected value?

12 A Well, I could say to you that I expect it is
13 going to rain tomorrow. And if it rains tomorrow, then I
14 could say then I was right. If it doesn't rain, then I say,
15 well, I was wrong.

16 Q Is that your mathematical definition then?

17 A I'm trying to convey to you what I'm meaning
18 when I use the word "expected." That is a calculation or
19 estimate of the future occurrence to the greatest degree
20 of precision that I can accomplish. But again I wouldn't
21 know with certainty whether this ability to help is
22 actually there or not until after the fact.

23 Q I understood you to say, however, in response
24 to my initial question about this phrase that you were using
25 that in the mathematical sense. Doesn't expected value have

1 a precise mathematical definition?

2 A What was your phrase again?

3 Q Expected ability is the phrase you use on page
4 21, line 20.

5 My original question was is that the mathematical
6 sense or just a figure of speech, and your answer was that
7 it was in the mathematical sense in which you were using
8 that.

9 What I'm trying to get from you is a precise
10 definition of expected value. It has a precise mathematical
11 definition, does it not?

12 MR. ZAHLER: I did not mean to interrupt. Objec-
13 tion. Asked and answered. The witness testified as to what
14 his understanding of expected value means. That has been
15 asked a number of times already.

16 MR. GOLDBERG: I'm trying to find out if he is
17 aware of the fact it has a precise mathematical definition.

18 MR. ZAHLER: The witness testified about it.
19 The language he used in his testimony was not expected
20 value, but expected ability. He testified in what sense
21 he used that phrase.

22 Mr. Goldberg asked what expected value meant,
23 and he testified as to his understanding of that, and
24 we are now going over it again.

25 MR. GOLDBERG: Ability is one of the things Mr.

1 Firestone is talking about in measuring and predicting.
2 The ability has, I submit, an expected value. I'm trying
3 to find out the mathematical definition of expected value
4 with respect to the ability.

5 That is how he used the term "expected." He said
6 he was using it in the mathematical sense. I don't think
7 he has given us a mathematical definition of it yet.

8 CHAIRMAN RIGLER: I will give him one more chance.

9 THE WITNESS: When I said I interpreted it as
10 being used, or I have used it in the mathematical sense,
11 the mathematical sense to me is a distinction between being
12 able to state something that has happened and state that
13 with certainty as contrasted to stating a predicted event
14 which does have some uncertainty associated with it.

15 CHAIRMAN RIGLER: Mr. Goldberg, you indicated
16 in one of your questions that there was a phrase that
17 would occur to the layman.

18 MR. GOLDBERG: I'm about to get to that.

19 BY MR. GOLDBERG:

20 Q Have you ever read or heard that the definition
21 of expected value is being the same as average?

22 A I don't believe -- I couldn't say I have never
23 heard that. If I have heard it, it didn't have any
24 particular significance to me.

25 MR. ZAHLER: Could I ask Mr. Goldberg what he

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1 means by average? If he uses it in the mathematical sense,
2 there are a number of definitions.

3 Does he mean the median, mode, or the mean?

4 MR. GOLDBERG: The mean is the same as average,
5 which is the same as expected ability.

6 I will let Mr. Firestone testify as to that and he
7 can give a precise definition of average.

8 MR. ZAHLER: I object to that. I don't know
9 what relevance it has to the testimony.

10 CHAIRMAN RIGLER: Sustained.

11 BY MR. GOLDBERG:

12 Q A little while ago, Mr. Firestone, in describing what
13 you thought was -- what you meant by the term "expected
14 ability," you said your CAPCO method analyzes all combinations
15 of load and capacity that can exist. Do you recall that?

16 A I don't know if I said those precise words, but,
17 yes, I said something very similar to that.

18 Q Isn't it true that there are an infinite number
19 of possibilities of loads and capacity that can exist?

20 A The statement that I made was in connection with
21 merging a mathematical model of our forecast load with a
22 mathematical model of our capacity. There are not an infinite
23 number of combinations in the merging of those two models.

24 We quantify all combinations that can exist in the
25 merging of those two models.

1 Q All the combinations that can exist?

2 A Yes.

3 Q You say there are a finite number of them and
4 only a finite number?

5 A Yes, that is what I'm saying. That is what I
6 say.

7 Q On page 21, line 17 through 22, you testified
8 that CAPCO utilizes a probability analysis to
9 proportion total capacity responsibility among the CAPCO
10 parties such that each party's expected ability to provide
11 help to the others is proportional to its potential need
12 to help from others.

13 Is it correct to say you purposely developed
14 or designed this CAPCO probability method so that its
15 application to the parties would result in each party's
16 expected ability to provide help to others being
17 proportional to its potential need to help from others?

18 MR. REYNOLDS: Could I have that question back?

19 (Whereupon, the reporter read the pending
20 question, as requested.)

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1 MR. REYNOLDS: He left a phrase out of the
2 quotation which may be inadvertent.

3 I believe you misspoke, if you are quoting his
4 answer. You left out the phrase "with reliability
5 as the common denominator," which would be relevant in
6 terms of what you were answering.

7 MR. GOLDBERG: I didn't leave anything out.
8 I am referring to simply that portion which says that --
9 after the "such that." The result that he is after in
10 this method.

11 MR. REYNOLDS: I'm sorry.

12 MR. GOLDBERG: If you want to include, I don't
13 mind reading the whole thing. I didn't intentionally do it.

14 In the context of the whole quote.

15 THE WITNESS: Your statement is an accurate
16 statement of our intent.

17 Let me add that the assignment of those
18 responsibilities is conditioned on the fact that the total
19 amount of capacity that is to be provided is determined
20 under a reliability rule, and then it is the responsibility
21 for that amount of capacity that is assigned under the rule
22 or under the concept, as I have described.

23 BY MR. GOLDBERG:

24 Q What I would like to know, however, is if you
25 purposely developed and designed this method, so that that

1 result would be reached?

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2 A The method evolved from years of work in
3 trying to find a basis for affirming individual responsibilities
4 that was equitable to each individual and assured achievement
5 of the reliability goal, and this was the method that evolved
6 from that analysis and, therefore, was designed specifically
7 to achieve that purposes, yes.

8 Q Why, in your opinion, is it desirable for the
9 expected ability to help others, to be proportional to the
10 expected need for help from others?

11 A This rule or analysis of that type enables
12 a variety of systems or individuals, ones having quite
13 divergent characterizations with respect to their load and
14 their capability to get together and undertake a common
15 objective of achieving unstalled capacity, reliability,
16 and setting forth their responsibilities that are equitable
17 among the individual parties.

18 Q Is that true of no other method but yours?

19 A I can't answer that.

20 Q What is magical about those two concepts,
21 expected ability to help ourselves and potential need of
22 help from others being proportional?

23 A It seems entirely equitable to me that a person
24 who expects to be helped by drawing from this pool of
25 installed reserves would find it acceptable that he ought to

1 contribute to that pool of reserves in proportion to the manner
2 in which he expects to be helped by that pool.

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3 To me that is a statement of fundamental
4 equity.

5 Q Perhaps I better asked another question then.

6 Are you using the term "proportional" in the
7 mathematical sense or as a figure of speech?

8 A It is in the mathematical sense.

9 Q Would you please define what it means for "Y"
10 to be proportional to "X"?

11 A "Y" to be proportional to "X"?

12 Q Yes.

13 A "Y" would have to consist of a series of values,
14 each of which would bear the same relationship to a correspond-
15 ing under the series that you have identified as the "other
16 variable."

17 I forgot which it was.

18 Q Isn't what you just said of any single
19 value function?

20 A We are not speaking of a single value function.
21 We are speaking of a quantification of a contribution to a
22 common reserve position for four systems, and we are
23 speaking of a calculation of an expected dependence
24 on a common reserve position by four entities.

25 So we have -- in each variable here we have four

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1 Q Yet, but you just stated you were using proportional
2 in the mathematical sense, and now I want to know if you know
3 what the mathematical definition of proportional is?

4 A Maybe I should state I don't purport to be
5 a mathematical expert nor have I made the mathematical
6 laws. I have used the laws in the analysis we are
7 making here, and I am expert in applying those laws.

8 Proportionality is one of them.

9 Q What you are saying, then, is that you used
10 proportional in the mathematical sense, but you really
11 don't know what it means?

12 MR. ZAHLER: Objection. I think he is
13 quarreling with the Witness in this point. That is not an
14 accurate characterization of Mr. Firestone's testimony.

15 CHAIRMAN RIGLER: Sustained.

16 BY MR. GOLDBERG:

17 Q would you explain to me how you cannot be an
18 expert in mathematics and at the same time use probability
19 techniques to develop a method of sharing capacity and
20 reserves?

21 A I would liken it to a person who is expert in
22 the use of a large-scaled electronic digital computer
23 as contrasted to the man who designs and builds the computer.

24 It is not necessary to know how to design and
25 build a digital computer, in order to use it effectively.

1 I submit it is not necessary for me to discover all
2 the laws of mathematics, in order to apply the laws of
3 mathematics.
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arl 1 Q You don't think it is necessary to know
2 what the mathematical definition of proportional is
3 to use concepts which are designed to be proportional?

4 MR. ZAHLER: Objection.

5 MR. GOLDBERG: I think it is a perfectly fair
6 question.

7 CHAIRMAN RIGLER: Let's hear the objection.

8 MR. ZAHLER: I think we are going over the same
9 ground again. The witness testified as to his knowledge
10 and the application of the law of mathematics. Mr. Goldberg
11 is quarreling with whatever the witness is testifying to.

12 CHAIRMAN RIGLER: Overruled.

13 MR. REYNOLDS: I would like to hear the question
14 read back.

15 (Whereupon, the reporter read the pending
16 question, as requested.)

17 THE WITNESS: No, I don't think it is necessary
18 for me to know the textbook definition of proportional
19 in order to use it. I think it is sufficient for me to assure
20 you and to know that in our methods, where the ability
21 to provide help has been quantified rigorously, and
22 has been identified as 100 percent, that if I as a participant
23 provide 10 percent of that pool of potential help, then
24 in the quantification of the potential need for help, if
25 that pool or entire requirement is 100 percent, if once again

1 my expected dependence on that pool is 46 percent, and if
2 you are a participant in this and you are contributing 20
3 percent to the resources and expect to utilize or draw
4 on the pool for half percent of the time or to the
5 extent of 20 percent, this is proportional and this is the
6 basis I'm using the word, and this is the measure of the
7 fundamental equity of the technique.

8 BY MR. GOLDBERG:

9 Q If your concept of proportional is not what
10 is in fact the mathematical definition, then will you
11 simply say you are not using that term in the mathematical
12 sense?

13 A No.

14 MR. ZAHLER: Objection.

15 CHAIRMAN RIGLER: The Board is having trouble
16 with this line, Mr. Goldberg.

17 To begin with, it seems predicated on the
18 assumption that there is a universal textbook definition of
19 proportional.

20 MR. GOLDBERG: There certainly is, Mr. Chairman.
21 I can introduce evidence to that effect.

22 CHAIRMAN RIGLER: Are you saying in each mathematics
23 handbook that definition would be the same?

24 MR. GOLDBERG: Yes. As a matter of fact, my
25 next question was to try to refresh Mr. Firestone's

1 recollection from the past math courses he has taken, if
2 he recalls a particular definition of proportional.

3 CHAIRMAN RIGLER: I'm skeptical, frankly, that
4 you would find that in each mathematics handbook or course
5 book that proportional would be defined in exactly the
6 same way, even though the concept may be uniform.

7 It seems to me each author might treat the
8 definition slightly differently.

9 MR. GOLDBERG: I respectfully disagree, Mr.
10 Chairman. There is a single precise definition. There
11 is a particular kind of function which has one definition
12 and the definition, although the symbols may be different,
13 are identical in every book I have looked at.

14 MR. ZAHLER: If Mr. Goldberg thinks it is
15 important, the way to proceed would be to give Mr. Firestone
16 the definition and ask if his understanding of the word
17 "proportion" as used in the CAPCO formulas comports with
18 that definition.

19 BY MR. GOLDBERG:

20 Q Mr. Firestone, if I gave you the following
21 definition of what it means for the quantity Y to be
22 proportional to the quantity X, I would appreciate your
23 telling me if that refreshes your recollection as to the
24 mathematical definition of proportion.

25 Y is proportional to X if Y is equal to a constant

1 times X.

2 A No, that doesn't refresh my recollection.

3 MR. SMITH: Mr. Firestone, have you been using
4 the word "proportional" in the sense of equal ratios?

5 THE WITNESS: Yes.

6 MR. ZAHLER: Mr. Smith, I point out given the
7 definition of Mr. Goldberg, equal ratios would be the same
8 as what Mr. Goldberg said.

9 BY MR. GOLDBERG:

10 Q If Y is equal to X, where K is a constant, isn't
11 the ratio Y divided by X equal to the constant K?

12 A I would have to rely on you for that. You asked
13 me if you refreshed my recollection of the definition.
14 You did not. If you want to run through some mathematical
15 exercise, I would be glad to do it and we will see how it
16 turns out.

17 Q Definition aside, if Y is equal to a constant times
18 X, isn't the ratio of Y to X equal to the constant?

19 MR. ZAHLER: I don't think there is a difference
20 between what Mr. Goldberg is asking and what Mr. Firestone
21 is testifying to?

22 MR. GOLDBERG: I'm trying to get Mr. Firestone
23 to verify what you and I agree to. He is supposedly the expert
24 in this field. Proportionality is, one, the basic concepts
25 of this method.

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1 MR. ZAWLER: Mr. Smith asked the question
2 and he gave the answer. I don't know why we are going
3 over this again. I don't think it is relevant to see that
4 X equals Y over X .

5 THE WITNESS: If X times X equals X , then X equals
6 Y over X .

7 BY MR. COLDBERG:

8 Q You state that the mathematical process consists
9 of analyzing each party as though it were operating
10 completely in isolation. What do you mean by party?

11 A Each of the parties to the CAPCO agreement as
12 defined in the CAPCO agreement. There are four parties,
13 Ohio Edison system, Cleveland Electric Illuminating,
14 Duquesne Light and Toledo Edison.

15 Q Are you including Ohio Edison and Pennsylvania
16 Power as one party?

17 A The two taken together comprise one party, yes.

18 Q Isn't it true that if in fact a party is not
19 operating completely in isolation that its expected ability
20 to help others and its potential need for help from others
21 is different from the hypothetical case of a party operating
22 completely in isolation?

23 THE WITNESS: May I have that read back?

24 (Whereupon, the reporter read the pending
25 question, as requested.)

1 THE WITNESS: In my analysis and my use of those
2 words, I'm speaking of a party's ability to provide help
3 from the capacity resources that that party has. That by
4 definition excludes capacity resources that others might have.

5 BY MR. GOLDBERG:

6 Q How about purchases of firm power?

7 A Any capacity resource that a party has that
8 as a firm resource or as a resource is quantified as part
9 of that party's capacity resources.

10 Q Considering that party operating completely in
11 isolation?

12 A Certainly. The in isolation goes to the fact
13 that you are measuring the capacity resources of that party
14 against the load requirements of that party, and if included
15 in the capacity resources of that party is some firm
16 purchase from another system that is identified as one of
17 his capacity resources.

18 The converse of that, if he has a sale to some
19 other system, firm sale that is quantified as a load obligation.

20 Q What about purchases of power which are not firm?

21 A I'm tempted to ask you what about them. You
22 certainly cannot quantify as a capacity resource a resource
23 that is not under a firm contract.

24 Q You take it into account in your probability
25 analysis the type and location of the generators?

1 A In our probability analysis. We take the type
2 into consideration to the extent that the maintenance
3 requirement and the forced outage rates might be associated
4 with the type, but I think unless you are asking that
5 question, the answer is no, the location and type of
6 capacity really has no impact on the reliability analysis.

7 Q Do you take into account the size, characteristics,
8 and location of loads?

9 A We certainly take into account the size and
10 characteristics. The location would not be a factor.

11 Q Do you take into account transmission facilities
12 including transmission line configurations?

13 A Again do we take transmission into account in
14 doing what?

15 Q In your probability technique.

16 A In the quantification of the ability of a group
17 of generators or complement of generators to serve a load
18 requirement, the assumption is inherent that the
19 transmission facilities will exist to enable power to
20 flow from any generator to any load as required.

21 But there is no mathematical quantification of
22 that.

23 CHAIRMAN RIGLER: Mr. Firestone, you said
24 you take into account the characteristics of the load?

25 THE WITNESS: Yes.

1 CHAIRMAN RIGLER: What would those
2 characteristics be?

3 THE WITNESS: Well, we model the load by forecasting
4 252 hourly loads, representing the maximum load on each of
5 252 days throughout the year. The highest load would be
6 the 100 percent load. It is conceivable the other 251 days
7 you could have a 50 percent load.

8 So the distribution really of loads from the
9 highest to the lowest is a characteristic. We at one
10 time included what we call load verification within the
11 hour, the load value that we record is an integrated value.
12 As you know, electricity is generated and utilized in the
13 same instant.

14 It is an instant type of situation. The
15 electrical load this instant may be at one level, and an
16 instant later, it may be at another level. In our metering
17 we integrate this impact over a clock hour and that
18 results in the value that we record.

19 It may well be that a load having an integrated
20 value of 100 percent may for five minutes within that hour
21 have a value of 110 percent. It is, of course, necessary
22 to have capacity to supply the 110 percent.

23 At one time we introduced that characteristic
24 into the load model. At this time we have taken that out.
25 We are using the integrated value for the load. However,

1 there is a condition adjustment to the generating
2 capacity that to some extent recognizes this characteristic
3 of the load.

4 CHAIRMAN RIGLER: You spoke of variations?

5 THE WITNESS: Yes.

6 CHAIRMAN RIGLER: As one characteristic. What
7 other characteristics did you recognize?

8 THE WITNESS: It really -- variations identifies,
9 I believe, all the characteristics. There would be day-to-
10 day variations, seasonal variations and so on.

11 It is variation in magnitude of the load.

12 BY MR. GOLDBERG:

13 Q Excuse me, Mr. Firestone. I would like you to
14 refresh my recollection as to what your testimony was with
15 respect to my question as to whether or not you would
16 take into account in your probability technique the
17 transmission facilities.

18 A The assumption is there that transmission
19 capability will exist to enable electrical energy to get
20 from the point where it is being generated to the load as
21 required.

22 But in the strictest sense, mathematically
23 transmission capability does not enter the computation at all.

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1 Q So, basically, there is an assumption, but it
2 doesn't enter into the analysis?

3 A Well, if that is the way you interpret what I
4 said.

5 Q I would like you to correct me, if I'm wrong.
6 I'm trying to understand what you said.

7 A We are merging capacity. Mathematical capacity
8 model with a mathematical load model. And the assumption
9 is made that the capability will exist to allow electricity to
10 get from any generator or within this model to any load within
11 the load model.

12 In order to accomplish that the transmission
13 facility has to exist to accomplish that.

14 In fact, we have that capability. In fact,
15 we intend to plan to see to it, that we always have that
16 capability.

17 Therefore, it is unnecessary to make any
18 mathematical simulation of that in our calculations.

19 Q In analyzing the reliability of an electrical system,
20 would you take into account the transmission facilities in
21 your analysis?

22 A The the extent that I have just described,
23 I would.

24 Q I would like to refer you now to Mr. Slemmer's
25 testimony again on page 23.

1 A Yes.

2 Q Beginning on line 6, Mr. Slemmer states
3 that an accurate assessment of reliability requires
4 probability or another type of analysis which takes into
5 account among other things and then, skipping a few phrases,
6 transmission facilities.

7 Do you agree with that?

8 A Well, I think what he has reference to, would
9 be -- let me start over. In the case of the CAPCO
10 method, we quantify a residual dependence on resources
11 of others, after we have utilized all of our own resources.

12 You were getting to this earlier, the use of
13 interconnections with nonCAPCO companies.

14 We identify the residual risk that remains
15 after we have utilized our own resources to the fullest
16 in supplying our own loads.

17 We then expect to utilize the resources of others
18 by way of our contracts with other parties, to cover that
19 residual risk. It is, of course, necessary to have
20 transmission facilities with others, between CAPCO and others
21 to enable that power to flow.

22 MR. CHARNO: Could I have the question back,
23 please?

24 (Whereupon, the Reporter read the pending
25 question, as requested.)

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THE WITNESS: If I could continue, maybe I can remove the doubt that I think exists.

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In the CAPCO method of assessing the pool reliability, we quantify a risk number which identifies the dependence we expect to place on facilities of others, or saying it another way, it would be the use of interconnections to nonCAPCO parties.

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We identify the dependence on the resources of others.

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Now, some pools and some companies, when they make a reliability assessment, they work to a value that they describe as a less-of-load probability.

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They identify the ability of their own resources to meet the needs of their own loads, and then they identify an amount of help that they can expect to flow into their loads by way of their interconnections, and then after that resource is exhausted, if there is a deficiency in capacity, then the only recourse is to interrupt load.

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They are working to a loss in loading figure. We, in CAPCO are working with a figure that identifies residual dependence on the resources of others.

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When Mr. Slemmer says an accurate assessment of reliability and so on, and he includes transmission facilities, I'm reasonably sure he is pointing

bwé 1 to the need to look at the interconnection capability
2 between the group that is being planned and then the
3 resources of the outside world.

4 We, of course, do this in our CBP&CO planning
5 as a part of the transmission planning, not a part of
6 the generating capacity planning?

7 CHAIRMAN RITTER: Mr. Slemmer was testifying
8 to reliability.

9 I'm still not sure you grappled directly with
10 the question as posed.

11 I'm not sure, as I understood the question
12 Mr. Goldberg put to you, it was necessary to consider
13 outside systems, and your answer seems to have involved the
14 extent to which you do consider outside systems.

15 The question really was, do you agree with
16 that portion of the Slemmer testimony which Mr. Goldberg
17 read to you?

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arl 1 THE WITNESS: I think I do, in that transmission
2 it is certainly a factor in assessing the overall
3 reliability of power system. Yes, I do.

4 BY MR. GOLDBERG:

5 Q Now you stated you analyzed each party as though
6 it were operating in isolation and you explained a little
7 what you meant by operating completely in isolation.

8 Before we pursue that any further, I would like
9 to ask you if it wouldn't be more logical and scientific
10 to divide a system into separate generator areas and
11 allocate reserve requirements according to each generator
12 area, rather than allocating according to parties as you
13 have stated your method to us.

14 A No, I think it would not be. Again our
15 concept started from the stated intent that collectively we
16 are going to install generating capacity resources to
17 achieve a certain level of reliability.

18 That analysis is done under the concept of one-
19 system operation. Then the portion that you are referring
20 to really is an allocation process which uses reliability
21 analysis as a means to get figures, as a means to get to
22 an equitable assignment of capacity responsibility.

23 But the first step, the analysis of these
24 parties combined as one system, that is the true evaluation
25 of the total reliability of the group.

1 Q Yes, and when you allocate capacity from,
2 for example, nuclear units, isn't it correct that the way
3 you do it is to say so much for the CBE party, so much
4 for Toledo Edison, and so much and so forth?

5 A Basically, but I think that needs some
6 explanation. Each party has a certain amount of generating
7 capacity that it had before the formation of CAPCO. And
8 then each party has ownership interests in these jointly-
9 committed units. In the allocation process, we measure
10 each party's capacity against each party's load requirements
11 and, of course, we arrive then at a statement of resources
12 vs. potential needs for each party, and we make the ratio
13 of those two numbers for each party.

14 If that ratio is not constant for each party,
15 then it is necessary to shift some capacity from one
16 party to the other. That shifting --

17 Q What you end up with is determination that
18 Party A shall get so much capacity and Party B shall get
19 so much capacity and party is defined in terms of
20 corporate structure; correct?

21 A Essentially, yes.

22 Q Now, from an engineering point of view, from a
23 scientific point of view, wouldn't it be more
24 reasonable to consider the four parties which you have
25 defined as being the participants in CAPCO as having one

1 big system. They have generators in certain locations
2 and -- and looking at areas which surround the generators
3 in determining what capacity should be assigned to this
4 particular generator area, apart from the question of which
5 corporation owns that generator?

6 A No, I can't see the logic in that.

7 MR. SMITH: Mr. Firestone, when the GSPCO companies
8 plan a unit, don't they take into consideration the
9 market, the load when they determine the location of the
10 unit?

11 THE WITNESS: Yes, they do. In determining the
12 location of the unit, they have definitely the concentration
13 of load as compared to the availability of generating sites
14 and the transportation facilities for getting fuel to the
15 site as measured against the transmission requirements, all
16 of these things are put together in determining the
17 preferred location for additional generating units.
18 You are quite right.

19 That has nothing to do with the measurement of
20 the overall pool reliability nor the measurement of the
21 individual assignments of capacity responsibility.

22 It has quite a lot to do with the location of
23 the specific unit.

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BY MR. GOLDBERG:

Q Isn't it true, Mr. Firestone, that all five of the Perry and Davis-Besse Nuclear Units will be shared by at least -- each one of the five units will be shared by at least two Applicants?

A Yes, that is true.

Q From a scientific and engineering standpoint, how can you justify combining Ohio Edison and Pennsylvania Power as one party for the purpose of our P over K calculations?

A I don't think it is necessary to justify it from an engineering or scientific standpoint. The fact of the matter is that Ohio Edison and Penn Power operate as one entity, and that is controlling.

MR. ZAMLER: Would this be a good time to take lunch?

MR. GOLDBERG: It may be.

I may have one further question in this line.

BY MR. GOLDBERG:

Q Mr. Firestone, does your probability analysis assume that one party's share of one of these five nuclear units from Davis-Besse or the Perry Plants can be forced out without having an affect on the other participants in that nuclear unit?

MR. REYNOLDS: Could I have the question back?

(Whereupon, the Reporter read the pending

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1 question, as requested.)

2 MR. CHARNO: Could I ask what Counsel means
3 by forced out also?

4 MR. GOLDBERG: If there were an outage on one of
5 the units, does his method assume that it would affect
6 one party's share, but not another party's share?

7 MR. ZAHLER: Could we still have the question read
8 back?

9 (Whereupon, the Reporter reread the
10 pending question, as requested.)

11 THE WITNESS: I'm not totally sure I understand --

12 CHAIRMAN RIGLER: We are going to read it.

13 (Whereupon, the Reporter again reread
14 the pending question, as requested.)

15 THE WITNESS: I'm not certain I understand
16 your question. To the extent I think I understand it, no,
17 it is not true.

18 When the unit is out, it is out, and all pieces
19 if it are out.

20 BY MR. GOLDBERG:

21 A. But I understood your testimony
22 to state that you analyzed each party as though it were
23 operating completely in isolation. With the brief
24 explanation you have given of the phrase "completely in
25 isolation," it seems your answer to my last question is
inconsistent with your statement that each party was operating

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1 completely in isolation.

2 Can you explain?

3 A. I don't believe it is consistent. If you
4 go back to our discussion earlier, the party would include
5 in its capacity resources its portion of those units
6 you are speaking of.

7 that would be factored in as one of its
8 capacity resources.

9 Now, if in the probability evaluation, there were
10 some occurrences that forces the entire unit out, then the
11 portion of that unit that is being accounted for as one of
12 our capacity resources, would also be out of service,
13 or it would be treated as though it were out of service.

14 Q. If "A" and "B" are sharing power from a particular
15 nuclear unit, and we are analyzing "A" as though it were
16 operating completely in isolation, isn't it true
17 that something "B" could do could affect "A" system,
18 because "A" and "B" are sharing power from the same nuclear
19 unit?

20 A. That is an awfully broad question. I suspect the
21 answer to that is, yes, but again, I don't know what the
22 significance of that is.

23 MR. GOLDBERG: Thank you.

24 This would be an appropriate place for lunch.
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CHAIRMAN RIGLER: All right.

(Whereupon, at 1:10 p. m., the hearing was recessed, to be reconvened at 2:00 p. m., this same day.)

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AFTERNOON SESSION

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(2:05 p.m.)

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Whereupon,

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LYNN FIRESTONE

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resumed the stand as a witness on behalf of Applicants and,

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having been previously duly sworn, was examined and testified

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further as follows:

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CROSS-EXAMINATION (Continued)

9

BY MR. GOLDBERG:

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Q I would like to ask you questions now about

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the CAPCO group probability technique paper which was

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admitted into evidence this morning.

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Isn't it a fact that the reliability of one system

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depends on the reliability of all of the systems with which

15

it is interconnected?

16

A Yes, the absolute reliability does.

17

Q Then isn't it true that the reliability of

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one system depends on the activities, policies, and conduct

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of the other systems with which it is interconnected?

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A Yes, it is true that to some extent, it depends

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on that.

22

Q Suppose we consider a small municipal system and

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a large system which surround or is adjacent to that

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small system. If the small system is a full requirements

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customer of the large system and the large system does

1 not depend upon the small system at all for capacity
2 because the large system generates all of its own power
3 or purchases it elsewhere, then isn't it true that the
4 reliability of that small system depends on the reliability
5 activities, conduct, and policies of the large system,
6 but the reliability of the large system does not depend
7 on the reliability, activity, conduct and policies of the
8 small system?

9 MR. ZAHLER: Could I have the question repeated?

10 (Whereupon, the reporter read the pending
11 question, as requested.)

12 THE WITNESS: If I understand your question, you
13 have identified the small system as a total requirements
14 customer of the large system, so therefore whatever reliability
15 the small system enjoys, it would enjoy that in the same
16 fashion as any load being placed upon the large system.

17 If the small system is a total requirements
18 customer, I interpret that it has no generating resources
19 whatsoever. So from the standpoint of reliability of
20 generating capacity vs. load requirements, the small
21 system again plays no role whatever in that evaluation.
22 He has no generation resource with which to supply load.

23 BY MR. GOLDBERG:

24 Q What about the reliability of the small system
25 supplying its customers' needs?

1 A Again my testimony and my remarks which are
2 addressed to reliability really go to the reliability
3 of the installed complement of generating capacity to
4 serve load. And whatever reliability the large system
5 provides to its customers would also flow to this small system.

6 Q Suppose that small system were a partial require-
7 ments customer of the large system. Isn't it true that
8 in that case also the reliability of the small system is --
9 depends upon the reliability, activities, conduct, and
10 policies of the large system?

11 A Again if -- I'm not certain I understand what
12 you mean by partial requirements customer, but I would
13 interpret that to mean that a portion of the small system's
14 load is being supplied by the large system, and once again
15 that portion of the load would enjoy the same level of
16 reliability as all of the other loads of the large system.

17 Q Well, in light of these answers, how can you
18 justify using the method of allocating capacity which
19 treats each system as though it were operating completely
20 in isolation?

21 A Well, once again the allocation process only
22 flows to the parties that are participating in the pool
23 arrangement and that have stated as their common objective
24 the achievement of a certain level of reliability. The
25 assignment of capacity responsibility or the allocation

1 process is a hypothetical process, and I think there is
2 some confusion between the use of the word "isolation."

3 The analysis is made treating each party as
4 removed from the total group. Nevertheless, any capacity
5 resource that one party might have that is external to its
6 own frontier is included in the so-called isolated
7 evaluation.

8 So the allocation process does recognize all of
9 the capacity resources that each party might have, even
10 though those resources may be located external to the
11 party's service area or his frontier.

12 Q When you analyse a party in isolation, isn't one
13 of the factors the reliability of that party theoretically
14 operating in isolation?

15 A Not really. The reliability of that party, in
16 fact, is and will be the reliability of the entire group.

end 13

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1 Q We are talking now about analyzing a party
2 completely in isolation for the purpose of determining
3 how the capacity is allocated. Now that is what I
4 want to focus on.

5 Not the group, but the analysis of the party
6 operating in isolation.

7 A Yes.

8 Q Isn't one of the factors that goes into that
9 analysis the reliability of that system as though it were
10 completely in isolation?

11 A Not, it is not.

12 Q Don't you take into account the outage record
13 of that system?

14 A We utilize the same mathematical processes and
15 the same data treatment in making that computation that
16 we use in making the reliability computation for the
17 entire group.

18 The processes are the same.

19 But the absolute level of reliability that you
20 compute for a party when you are making an allocation
21 process in itself has no significance at all.

22 MR. SMITH: Mr. Firestone, as the CAPACO's
23 apply this method in the future and allocate capacity
24 responsibilities, aren't they moving in the direction, and
25 wouldn't they ultimately attain reserve allocation based

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1 on percent of peak load?

2 THE WITNESS: Well, basically, I believe
3 the answer to your question is, yes, but I would like to explain
4 somewhat.

5 The allocation process, the PW allocation process
6 which quantifies a person's potential contribution and
7 his potential use, has the ability to evaluate the impact
8 on reliability that stems from the generating unit
9 size, generating unit availability characterizes the
10 individual load characterizations of the parties, their
11 maintenance practices and so on.

12 Now, it is conceivable, and I think I have never
13 run a calculations to verify this point, but I think as time
14 passes, and the pool continues to function and continues
15 to pick up ownership shares in jointly committed units,
16 more and more their capacity characterizations
17 will become common and to the extent their load characteriza-
18 tions are common or very similar, we will arrive at the point
19 that you described, that "X" years down the road, it might
20 be that the probability of analysis, the one negative
21 day standard, the satisfaction of that for the pool, would
22 produce a percent reserve in a given year like 25 percent,
23 and then the allocation process following the contributions
24 use principles and quantifying the characterizations of each
25 party's portion of the total would produce a reserve

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1 assignment to each party, also, of 25 percent.

2 I think that given enough time for these
3 principles to operate, that will be the end point.

4 And, of course, at that point in time, then the systems are
5 proportionately identical.

6 BY MR. GOLDBERG:

7 Q Mr. Firestone, I don't believe I got a direct
8 answer to my question as to whether or not in analysing
9 each part in isolation, you consider the outage record
10 of that party.

11 A Yes, we do consider the outage record of that
12 party.

13 Q Isn't it true that a neighboring system can have
14 an effect on the outage record of that party?

15 A It is difficult for me to visualize that
16 circumstances.

17 Do you have something in mind?

18 Q Yes.

19 Let's assume that there is a small system, which
20 is the system being analyzed under your method.

21 It has a generator which has a fairly bad outage
22 record, because it hasn't been maintained in a proper
23 fashion. Let's assume that the small system could shut
24 down that generator and maintain it in a proper fashion,
25 so that it did not have such a poor outage record,

1 if that small system could get power wheeled to it through
2 a surrounding system.

3 In that circumstances, isn't it true that that
4 surrounding system's policies, conduct and activity affect
5 the outage record of the small system?

6 A I think not.

7 There are other alternatives. If that small
8 system had installed what I would consider to be an
9 adequate complement of generating capacity that complement
10 of capacity would enable that small system to perform
11 maintenance in a proper fashion.

arl 1 Q Suppose there were no other alternatives at a
2 particular point in time, but getting power wheeled to it
3 through the transmission system of the surrounding entity.
4 Wouldn't that entity affect the outage record of the small
5 system?

6 A I am unwilling to make that assumption.

7 Q You are unwilling to assume there may be an entity
8 which has no alternatives but to get power wheeled to it
9 through a surrounding system's transmission system?

10 A I think living in the real world, if a party
11 large or small undertakes to provide generating capacity to
12 serve load, then a party of that undertaking has the
13 obligation to provide enough generating capacity to enable
14 that system to do the necessary preventative maintenance.

15 Q Can't the policies of this large surrounding
16 system affect the ability of the small system to even
17 have the proper generating facilities?

18 A I fail to see how.

19 CHAIRMAN RIGLER: You said that outage rate
20 was one of the considerations you took into account in
21 determining the reliability?

22 THE WITNESS: Yes.

23 CHAIRMAN RIGLER: How do you give weight to
24 the outage rate?

25 THE WITNESS: In constructing the mathematical

1 model of the capacity complement, each generating unit
2 is represented as a block of megawatts of capability and
3 then attached to that block of megawatts is a probability
4 number that reflects the forced outage rate experience of
5 that specific unit. So the probability computation comes
6 into play in computing the expectation, that a given
7 block of capacity will be available for service, or that
8 it will be unavailable for service.

9 In our case, for existing units, we record
10 the performance record of the units one by one, and we
11 record the forced outage rate and as a matter of input data,
12 we use the most recent five years experience to develop
13 an average forced outage rate for that period of time, and
14 that is the number that gets input for a particular unit
15 in our analysis.

16 CHAIRMAN RIGLER: Where is that input made?

17 THE WITNESS: Well, in the constructing the capacity
18 model, for instance, there might be a 50 megawatt generating
19 unit. And it might have a 5 percent forced outage rate.

20 So the simulation of that particular unit would
21 be input as 50 megawatts availability .95. Unavailability
22 .05.

23 There may be another generating unit just like
24 that. Then the computation is made that will
25 quantify the probability that one unit is available and

1 the other unit is unavailable.

2 Two units are both available, or two units
3 are both unavailable. It is just a matter of the
4 theory that we were discussing earlier to mathematically
5 describe these things.

6 The probability in the case I have described
7 that the 50 megawatt unit is available while the other 50
8 megawatt unit is unavailable is the product of .95 times
9 .05. That is the probability that that discrete capacity
10 situation will exist and no other.

11 Of course, we have hundreds of generating units
12 in CAPCO. It is necessary to construct a table of avail-
13 abilities like I have described to quantify each discrete
14 amount of capacity available, and then the discrete
15 probability number associated with that capacity.

16 Then that model is merged with the load model.
17 Maybe I'm going beyond your question.

18 CHAIRMAN RIGLER: No. As you have been answering,
19 I have been looking at Applicant's Exhibit 125 here,
20 the capacity allocation study. I was looking at I, assump-
21 tions, Part E, and also your table in which these assumed
22 forced outages rates were taken.

23 THE WITNESS: Again the numbers I have recorded
24 there in that forced outage rate table under item E are indica-
25 tive of what one would expect in the industry, as unit sizes

1 get larger, the experience indicates formally that
2 the forced outage rate also is increasing.

3 We have attempted to reflect that fact with our
4 assumption here in this analysis.

5 CHAIRMAN RICLER: You indicated at one point
6 that you determine the forced outage rate for each
7 individual unit by looking at its history over the past
8 five years?

9 THE WITNESS: Yes.

10 CHAIRMAN RICLER: In Part E, under assumptions
11 it says the assumed forced outage rate. Is that assumption
12 made from the five-year history, or how do you come by the
13 assumption?

14 THE WITNESS: For the units that have accrued
15 a five-year history, an operating history, we develop
16 the appropriate forced outage rate number by looking at its
17 history as I described.

18 The assumption then comes into play that projecting
19 that number to describe the future performance of this unit
20 is an assumption.

21 Only time will tell how it will perform.

22 In addition to that, we have units with less
23 than five years experience and we have units that are
24 under construction that have no experience. So it is
25 necessary for us then to research the operating record of

1 similar units if there is a record or to arrive at an
2 engineering judgment as to what an appropriate forced
3 outage rate assumption would be for a first-of-a-kind
4 type unit.

5 And this is done. Those judgments are made
6 and in total they constitute then an assumed forced
7 outage rate picture.

8 BY MR. GOLDBERG:

9 Q Mr. Firestone, in your paper on the second page
10 of your paper --

11 CHAIRMAN RIGLER: Which paper?

12 BY MR. GOLDBERG:

13 Q The CAPCO Group Probability Technique paper,
14 applicant's Exhibit No. 124, in the second paragraph
15 under the heading "elements of load, capacity situations,"
16 about in the middle of that paragraph, you say consideration
17 must be given to the extent to which a system depends
18 on capacity resources of other systems made available
19 through interconnections and to the dependence on the
20 emergency capacity of such systems.

21 A I think you misquoted that in the last -- and to
22 the dependence on the emergency capacity of its generating
23 units there.

24 Q We are not reading in the same place. If you look
25 at the second paragraph under "elements of load, capacity

1 situations," I believe it is the third sentence begins,
2 "Also, consideration must be given to the extent to which a
3 system depends on capacity resources of other systems made
4 available through interconnections and to the dependence
5 on the emergency capacity of such systems."

6 Are you with me now, Mr. Firestone?

7 A Yes, I'm with you. I must have a different
8 version. I have the copy of that paper as it was published
9 finally in the IEEE transactions. The words I read are
10 slightly different from what you are reading.

11 Q Let's work with the paper actually filed with
12 your testimony.

13 Do you see that sentence that I just quoted?

14 A Yes, and it is as you quoted it.

15 Q Thank you.

16 Could you please explain how you square that
17 statement with the statement in your testimony that the
18 mathematical process consists of analyzing each party as
19 though it were operating completely in isolation?

20 A Yes, I will try. The analysis of the adequacy
21 of capacity resources, generating capacity resources is
22 one planning function and one analysis that is pretty
23 much discrete to itself.

24 Then following that, or in conjunction with it,
25 analysis of the transmission needs is made.

1 Of course, the two have to be compatible, but
2 it is not in the arithmetic process of our analysis of
3 generating capacity to roll in some quantification of
4 the transmission capability or transmission requirements.

5 These are two separate steps, although they
6 are related. In our evaluation of the generating capacity
7 resources or the adequacy of generating capacity, the index
8 that we choose to use and the one that we have described
9 as the one negative today, is really the summation of
10 the probabilities associated with negative margins.

11 And the negative margin can be thought of
12 really as the dependence to be placed on the resources of
13 others.

14 Am I making myself clear? The generator analysis
15 takes all of the capacity resources that are under our
16 control whether they are internal to our frontier or external,
17 all of our capacity resources, and measures them against
18 all of our load requirements and then identifies a
19 residual need.

20 The likelihood that these resources will be
21 inadequate to supply the load requirements. That does not
22 mean that we are going to have to interrupt load during
23 those occasions. It means that that quantifies a dependence
24 that we may choose to place on the resources of others.

25 Of course, again, one has to analyze this factor

1 to determine the prudent level for the amount of dependence
2 you expect to place on the resources of others.

3 There is no assured way to compensate the others
4 for having these resources. But it is necessary if you are
5 going to place dependence on those resources to have a
6 transmission path that will enable you to tap
7 those resources wherever they are, which brings you to the
8 need to consider interconnections and the need to consider
9 transmission.

10 CHAIRMAN RICLER: How do you account for that
11 in your formula, though? I don't understand.

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1 THE WITNESS: Well, in the adoption of the
2 standard, the one negative day standard which mathematically
3 would be the fraction, $1/252$. The probability of the
4 association of all probabilities associated with negative
5 margins is the index which we use. We have set as a target the
6 planning standard that we will not allow that index to
7 exceed the one negative day or the one day out of the 252
8 heavy load days in the calendar year we analyze.

9 CHAIRMAN RIGLER: You indicated you analyze a system
10 by looking to its generating capability, but there is also
11 testimony in the record for CAPCO purposes, at least one
12 member company was allowed to treat as part of its
13 generating capability firm power from an outside system which
14 it was to receive pursuant to long-term contract. I was
15 asking how you gave weight to forced outage rate.

16 How can you account for the reliability of that
17 outside system the same as you would do, if that amount
18 of generating capacity were being supplied by a generator
19 internal to the system with a forced outage rate, which you
20 could draw from your table.

21 THE WITNESS: In all cases, you can't use the same
22 treatment as for an internal generator.

23 You are quite right that our methods do
24 envision giving people credit for the resources that they
25 have external to their frontier. And several types of those

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1 come to mind. Ohio Edison Company is a sponsor of OVEC
2 and under those arrangements Ohio Edison has an
3 entitlement to so-called surplus power.

4 this is evaluated as a capacity resource of
5 Ohio Edison's and we attempt to associate some availability
6 with that resource, depending on the unit performance of
7 the OVEC generators.

8 CHAIRMAN RIGLER: Suppose the contract is merely
9 with an outside power system. Suppose, for example, Duquesne
10 has a firm power purchase contract with Allegheny, so that
11 it is looking to the Allegheny System as a whole?

12 THE WITNESS: Yes.

13 In those instances we have viewed that as being
14 about as firm as power can be. That the intent of a
15 contract like that is that that outside resource is intended
16 to provide the same level of reliability to Duquesne as
17 that outside resource will supply to its own customers.

18 If we use Allegheny supplying its customers,
19 I would envision that type of an arrangement to place the
20 Duquesne sale in priority directly under the Allegheny
21 customers. Allegheny would choose to supply its customers.

22 Then the Duquesne sale and then whatever other
23 obligation it had.

24 If their resources become unavailable or
25 constricted, they would interrupt the sale to Duquesne

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1 before they interrupted their firm customers.

2 In our quantification of that type of an
3 arrangement, we assumed a 100 percent availability on that
4 capacity.

5 CHAIRMAN RIGLER: No, let's take a different
6 situation where Duquesne owns a power plant located some miles
7 from any load which it serves, and where the power from that
8 generating station is supplied pursuant to contract over
9 transmission lines which are owned by another system, let's
10 say, Allegheny.

11 Is there any reliability factor associated
12 with the fact that a nonmember company is responsible for
13 providing that transmission? A company over which
14 Duquesne has limited control?

15 THE WITNESS: Well, the source of the energy,
16 the unit itself, its characterizations would be a part of this
17 evaluation.

18 Certainly a transmission facility or contractual
19 or physical arrangement would have to exist to enable the
20 power to get from where it was being generated to the load
21 area.

22 We do not introduce any probability adjustment
23 to recognize the possibility that a transmission facility
24 may fall down during a lightning storm or in an instance
25 of that sort.

arl 1 BY MR. GOLDBERG:

2 Q I would like to now ask you questions on daily
3 capacity margins and for the purpose of answering some
4 questions on daily capacity margins, will you please look over
5 that portion of your paper which begins on page 2, at the
6 bottom of the first column, and is entitled "Frequency
7 Distribution of Daily Capacity Margins."

8 It goes on up to the second column of page 2,
9 up until the portion which is entitled "Calculation of
10 Frequency Distribution of Capacity Margins."

11 A I have read those two sections.

12 Q I would like to have marked for identification as
13 NRC Staff Exhibit 213 a paper entitled the "Daily
14 Capacity Margin Function."

15 (The document referred to was
16 marked NRC Staff Exhibit 213;
17 for identification.)

18 BY MR. GOLDBERG:

19 Q In that portion of your testimony to which I just
20 directed your attention, you use the phrase "daily capacity
21 margin;" is that correct?

22 A Yes.

23 Q Can we assign the symbol M to the phrase daily
24 capacity margin for the purpose of asking and answering
25 some questions?

1 A Yes.

2 Q You also use the phrase "load that exists
3 during a daily peak period."

4 Can we assign a symbol L to that concept?

5 A Right.

6 Q You use the phrase "operable capacity at that
7 time," at that time referring to the time when the load
8 exists during a daily peak period. Suppose we assign the
9 symbol C to that.

10 You also use the phrase "normal rating of
11 installed generating capacity adjusted for various
12 limitations;" is that correct?

13 A I believe it is.

14 Q Let's assign the symbol G to that.

15 Then you use the phrase "purchases of firm power
16 from other utilities;" is that correct?

17 A Right.

18 Q Suppose we denote that by P.

19 And you use the phrase "outages, both planned
20 and forced;" correct?

21 A Right.

22 Q Let's denote that by O.

23 Using M, C, and L, as we have defined them, is it
24 true that M can be expressed as a function of C and L as
25 expressed by the equation M equals C minus L in equation

1 one on Staff Exhibit for identification : 2137

2 A Yes, it is.

3 Q Just to clarify and make sure everyone is
4 clear on this, Mr. Firestone, you indicate that the daily
5 capacity margin is considered to be the difference
6 between the load that exists during a daily peak period
7 and the operable capacity at that time. We know for a fact
8 that it is C minus L and not L minus C, which you mean by
9 saying the difference between the two.

10 A It is the difference between the available capacity
11 and the load to be served. Yes, that's right.

12 Q Is it also true that the operable capacity, C,
13 can be expressed as a function of G, P, O, by the equation
14 C is equal to G plus P minus O as appears in equation 2?

15 A Yes.

16 Q Would you agree then by substituting equation 2
17 into equation 1, we get M expressed as a function of G, P,
18 O, L as appears in equation 3?

19 A Yes. Your mathematics seem to be correct.

20 MR. ZASLER: Could I ask Mr. Goldberg a question
21 what he means by the word "as a function of," since you
22 are not expressing the equations in functional notation?

23 MR. GOLDBERG: I disagree with Mr. Zahler's
24 statement that they are not expressed in functional
25 relationship. I have specified the particular function that

1 is involved here. It is simply linear equations.

2 MR. ZAHLER. Well, I am confused. You say as a
3 function of. I would have thought equation 3 should be
4 F of M is equal to since there is no algebraic relationship
5 between them since you talk in terms of function of.

6 MR. GOLDBERG: Mr. Firestone ---

7 MR. ZAHLER: I have no objection to this line
8 of questioning if Mr. Goldberg will not respond to this
9 question.

10 CHAIRMAN RIGLER: He did respond. He disagreed
11 with you as to the meaning of function, and the objection
12 is overruled.

13 MR. GOLDBERG: I would like at this time to
14 move into evidence Staff Exhibit 213.

15 MR. ZAHLER: I object. I don't understand the
16 basis for introducing this exhibit into evidence.

17 MR. GOLDBERG: The basis is that it will
18 provide all of the parties, as well as anyone who
19 reads the record, a clear example of the way in which
20 the CAPCO method operates and can be used to demonstrate
21 how certain factors affect certain other factors.

22 Mr. Firestone stated he agrees it is the
23 correct relationship among the quantities. It is merely a
24 vehicle through which I can ask Mr. Firestone some questions.
25 It is a lot simpler for everybody to be talking about the

1 same relationship and use these symbols rather than
2 speak about the phrases.

3 CHAIRMAN RIGLER: As it stands now, I don't see
4 that it would add anything to the record. If you intend to
5 pursue it by asking additional questions, it may be
6 appropriate to move for admission at that time.

7 For the moment, the request is denied.

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1 BY MR. GOLDBERG:

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2 Q Mr. Firestone, looking at Equation 3, isn't it
3 a fact that the smaller "G," the installed generating
4 capacity, for the small system that is going analysed, the greater
5 the large neighboring system's effect will be on the daily
6 capacity margin in the smaller system?

7 A I don't understand that question at all.

8 MR. REYNOLDS: Could I have the question back?

9 (Whereupon, the Reporter read the
10 pending question, as requested.)

11 MR. GOLDBERG: I'm sorry. There is some
12 additional material I would like to give the Witness.

13 BY MR. GOLDBERG:

14 Q Suppose we want to calculate the daily capacity
15 margin for a small system which purchases firm power from
16 a large neighboring system. Looking at Equation 3, isn't
17 it a fact that the small "G" is, for the small system,
18 the greater the large neighboring system's effect will
19 be on the daily capacity margin in the small system?

20 A It is a fact that the capacity resources influence
21 the resulting computation of the margins?

22 The origin of any particular resource has
23 no impact whatever on the resultant margin.

24 Q We have agreed, I think, today that the activities,
25 conduct, policies and activities of neighboring systems can

1 have an effect on another system?

2 MR. ZAHLER: Objection.

3 I think the record will speak for itself. I'm not
4 sure whether we agreed to what Mr. Goldberg said.

5 MR. GOLDBERG: Mr. Firestone said in response
6 to my question, that a neighboring system's conduct, policies
7 and activities can effect another neighboring
8 system.

9 CHAIRMAN RIGLER: Let's kind out.

10 Have you so stated?

11 THE WITNESS: I think I have so stated.

12 MR. ZAHLER: It is my understanding in some
13 instances he agreed with Mr. Goldberg and some instances
14 he disagreed as to that.

15 CHAIRMAN RIGLER: He clarified it, so let's move ahead.

16 BY MR. GOLDBERG:

17 Q My question is, looking at Equation 3, "X" is
18 a function of "G", "P", "O", "L."

19 I am asking, the smaller "G" is, then isn't it true
20 that the greater the effect will be of the neighboring
21 system's policy, conduct and activities?

22 MR. ZAHLER: Is that assuming all other variables
23 in that equation are constant?

24 MR. GOLDBERG: No, it does not.

25 THE WITNESS: I still have trouble with your question.

bw3 1 You are assuming a small system has internal
2 generating capacity "G," and it has some sort of an
3 arrangement with a large neighbor for "P"?

4 BY MR. GOLDBERG:

5 Q Yes.

6 A Assuming that that large neighbor discharges
7 whatever agreement it undertook in arranging "P," then
8 both parties should be satisfied with your formula and your
9 equation.

10 I fail to see where the question is.

11 Q I don't want to make the assumption you made. That
12 is, that the other party lives up to all its obligations.

13 A But I'm unwilling to make the assumption that
14 the other party will write an agreement and then not
15 live up to it.

16 Q If that other party, in fact, had an agreement,
17 but did not live up to it, wouldn't that affect "M" to a
18 larger extent when "G" is smaller?

19 A If a party had placed dependence on another
20 party for furnishing "P" and "P" is larger than "G" and the
21 party that was supposed to furnish, did not live up to it,
22 yes, that would have impact on "M."

23 Q If the large system could not supply "P,"
24 because of some catastrophe on its own system, wouldn't
25 that have a greater effect on "M" if "G" is small, than if

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1 "G" were large?

2 A I don't see that.

3 Q Generally speaking, which is better? A method
4 of calculating reserves for a group of utilities which
5 ignored the effective neighboring systems or a method which
6 included the negative neighboring systems?

7 MR. REYNOLDS: Let me have the question.

8 (Whereupon, the Reporter read the pending
9 question, as requested.)

10 THE WITNESS: If when you say a method for
11 calculating reserves, if you mean the calculation of the
12 reliability that a group of loads will enjoy, it would be
13 inappropriate to make that evaluation without taking account
14 of the help that might come from the neighboring systems.

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arl 1 BY MR. GOLDBERG:

2 Q So your answer then would be a method which
3 included the effective neighboring systems?

4 A Well, to the extent I have understood your
5 question, my answer is as I stated it.

6 MR. GOLDBERG: Could I have that answer re-
7 read, please?

8 MR. CHARNO: The last two.

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

11 BY MR. GOLDBERG:

12 Q On the third page of your paper, Applicant's
13 Exhibit 124, in the second column, midway through the
14 first full paragraph, you stated, "Expected occurrence of
15 negative margins would represent those occasions when
16 outside resources must be called upon because the
17 installed capacity remaining after outages and capacity
18 limitations of all sorts is less than the integrated hourly
19 load."

20 A I'm having trouble finding where you are.
21 Could you give me the heading, please?

22 Q It is the third page, first full paragraph,
23 midway down that first full paragraph is a sentence
24 which begins, "Expected occurrence. . ."

25 A I have it now.

1 Q Is installed capacity remaining after outages
2 and capacity limitations of all sorts the same thing as
3 operable capacity?

4 A I missed your first term. Would you give me
5 that again?

6 Q Is, and I'm quoting you now, "Is installed
7 capacity remaining after outages and capacity limitations
8 of all sorts" -- that is the phrase contained within
9 that sentence we just read -- I want to know if that is
10 the same as operable capacity?

11 A Yes, it is.

12 Q So that would include then purchase of firm
13 power, would it not?

14 A It would include all capacity resources that
15 were available at that particular time, including firm
16 purchases, yes.

17 Q Mr. Firestone, if we look at equation 3 on
18 Staff Exhibit 213, you have just testified that we can
19 expect a negative margin when the outside resources
20 must be called upon because the -- and now I will substitute
21 the phrase "operable capacity" for the phrase which you
22 just said it was identical to, because the operable
23 capacity is less than the integrated hourly load.

24 A Is that a question?

25 Q Is that correct?

1 A If at any time the operable capacity is less
2 than the then-existing demands of the load, you have
3 either two choices:

4 You can curtail load, or you can call on
5 capacity resources of others.

6 MR. CHARNO: Could I have the question and
7 answer back?

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

10 MR. GOLDBERG: Could you please read back the
11 question and Mr. Firestone's answer to the question as to
12 whether or not the outside resources include or excluded
13 purchases of firm power?

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

16 BY MR. GOLDBERG:

17 Q Mr. Firestone, how can you include purchases
18 of firm power in your phrase "outside resources, when you
19 already have accounted for purchases of firm power in the
20 definition of daily capacity margin?

21 MR. ZANLER: I object. I don't think Mr.
22 Firestone's testimony is that he include outside purchases
23 of firm power in the emergency power that would come from
24 outside the system.

25 CHAIRMAN RIGLER: That is the Board's impression,

1 Mr. Goldberg. Mr. Zahler is correctly stating the testimony.

2 MR. ZAHLER: I think we are getting all confused
3 here over something where there is no disagreement
4 between the witness and the questioner.

5 CHAIRMAN RIGLER: We agree.

6 BY MR. GOLDBERG:

7 Q Mr. Firestone, on the second page of your
8 paper, Applicant's Exhibit 124, in the first column of
9 the section entitled "Frequency Distribution of Daily
10 Capacity Margins," which type of frequency distribution
11 does that refer to?

12 A It refers to the tabular array that is generated
13 by this computation wherein the various megawatts margins
14 which can exist together with the associated probability
15 number is in the form of output from the analysis.

16 Q Would it be a continuous or discrete distribu-
17 tion?

18 A I haven't characterized it as either of those
19 things.

20 Q Which one is it?

21 A I would have to go to a textbook to answer that
22 question. I don't know.

23 Q On page 3 of this same paper, the next to the last
24 sentence on the page, says here the customer supply
25 contracts, the individual company policies, and the

1 agreement covering joint planning and operation all
2 support exclusion of interruptible loads from reserve
3 analysis.

4 Could you briefly explain what you mean by that?

5 A Yes. I will try. Again this paper was jointly
6 authored by three parties. There has been disagreement
7 among the CAPCO parties over a good many things, from the
8 first meeting to the present date.

9 One of these areas has to do with so-called
10 interruptible load or interruptible service. Certain of
11 the parties offer a class of service which is served under a
12 special rate and identified as an interruptible service.

13 Some of the other parties do not offer that
14 class of service. So there was some discussion as to the
15 proper simulation in the load model of a load that was
16 categorized as an interruptible load.

17 This is a fairly terse statement that attempts
18 to set the background, I would say, on some of those
19 discussions and explain the manner in which an interruptible
20 load is treated in this analysis is subject to these
21 types of considerations.

22 CHAIRMAN RIGLER: What was your page reference
23 again?

24 MR. GOLDBERG: Third page of his paper, down at
25 the very bottom of the second column, the last complete

1 sentence on the page, starting here, the customer
2 supply contracts.

3 CHAIRMAN RIGLER: Mr. Firestone, although there
4 may be disagreement within CAPCO, is there any disagreement
5 among or between the three authors of the paper that
6 is now Exhibit 124?

7 THE WITNESS: No, I think there is not. The
8 manner in which interruptible loads are treated in the load
9 model for this reliability analysis purpose was resolved
10 among the authors of this paper and there is no disagreement
11 between them.

12 CHAIRMAN RIGLER: I want to be sure that you
13 adopt this paper in its entirety with respect to the
14 expert nature of your testimony.

15 You are not disagreeing with anything within the
16 article itself?

17 THE WITNESS: No. That's correct.

18 If you would like me to go further into the back-
19 ground of our interruptible load conversations, I can do
20 that.

21 CHAIRMAN RIGLER: It is not necessary, but I
22 want to make sure that at some subsequent point there was
23 not a contention that these disagreements resulted in your
24 failure to adopt the paper in its entirety.

25 THE WITNESS: I support the paper as it is written.

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1 Having jointly authored it. I'm merely suggesting I didn't
2 get my way in all areas of controversy, but I support
3 the paper as it is written.

4 BY MR. GOLDBERG: The very next sentence in
5 your paper states, "There was no problem in handling
6 firm sales since no member company contemplated entering
7 into a sales agreement with a company external to the
8 group."

9 Is that the CAPCO pool?

10 A Well, this is not a statement of policy. It is
11 a statement of fact as it existed at the time. I don't want
12 to read anything more into it than that.

13 Q Is that fact still true today?

14 A I don't know what any of the parties -- I don't
15 know their thinking that closely. It may be in the minds of
16 some of the parties to attempt to work out a firm sale or firm
17 purchase contract with someone.

18 I might say that the CAPCO rules are structured
19 such that if such an agreement is to be contemplated or
20 consummated, now subsequent to the assigning or
21 implementation of the CAPCO rules, such an arrangement
22 would have to be structured so that it would not conflict
23 with the CAPCO rules.

25-26

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1 Q Would it have to meet with the approval of
2 the other CAPCO companies?

3 A If the arrangement --- if there was some element
4 of conflict in the proposed arrangement, yes, it certainly
5 would.

6 Q You said there was no problem in handling
7 firm sales, in case no member contemplated agreeing to
8 that. If it came to your attention that suddenly one of the
9 members did intend to enter into a sales agreement with
10 a company external to the group, would that then present a
11 problem?

12 A A sales agreement, meaning that one of the
13 members planned to export some capacity under its
14 responsibility to an external party?

15 Q I mean a firm sales contract or firm sales
16 agreement, as you use that in that sentence.

17 A I guess really I'm confused. It
18 depends on which side of the transaction you are sitting on,
19 whether it is a sale or a purchase. As it is stated here, it
20 seems to me it covers both ends of the transaction.

21 If one of the CAPCO parties would choose to
22 make a firm purchase from a non-CAPCO party, he has the
23 freedom to do that. He may or may not get credit for that
24 capacity resource in the calculation of reserve responsibilities
25 within CAPCO.

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1 If a party within CAPCO would choose to make a
2 sales agreement with an external party and propose to
3 export capacity from CAPCO, this would have to receive the
4 approval of the CAPCO parties in that that would have a
5 detrimental impact on the reliability of CAPCO.

6 Q When you say that he wouldn't get credit for
7 the purchase from an external source, could you say that
8 that is equivalent to penalizing that system for making that
9 purchase?

10 A No, I wouldn't say that. That is just a condition
11 that a party would have to consider in its deliberation
12 of whether it was prudent to make such an external arrange-
13 ment or not.

14 Q If, as I know this is a hypothetical, a small
15 municipal system joined CAPCO, wouldn't Applicants be expected
16 to provide help to that small system in much larger
17 magnitudes than the small system could provide help to
18 Applicants?

19 MR. ZAHLER: Could I have the question
20 repeated?

21 (Whereupon, the Reporter read the pending
22 question, as requested.)

23 MR. ZAHLER: Could I ask Mr. Goldberg by whom wouldn't
24 it be expected? Wouldn't it be expected by whom or under
25 what conditions?

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1 BY MR. GOLDBERG:

2 Q Mr. Firestone, do you understand that question?

3 A Yes, I think so.

4 Q Would you please answer it.

5 A I would first say that the small system or your
6 hypothetical would not have to be restricted to a small
7 municipal system. A small system would see the situation
8 you describe. In fact, in CAPCO we have four entities.
9 If you look across the spectrum of the largest to the
10 smallest, there is a broad range there.

11 In absolute magnitude, the small system could not
12 contribute a potential help to the group in as large a quantity
13 as the big system.

14 Converse to that, is a small system could be
15 expected -- well, in magnitude, the amount of help he would
16 likely require would not be as great as for the large
17 system.

18 This is the very reason that equity dictates you
19 get to a rule like our contributions' use rule, the PN rule
20 which places each fellow in precisely the proper balance
21 with the other fellow to recognize the point you are making.

22 Q Isn't it also true that a large system might require
23 help from others in much larger magnitudes than a smaller
24 system?

25 A Absolutely. That is what I just said, if you have

bw4

1 one system 100 megawatts and another system
2 5,000 megawatts, it is impossible for the 100 megawatt
3 system to have a need for help in the magnitude of the 5,000
4 megawatt.

5 It is possible for the big system to have that need.
6 Again, the converse of that, it is possible for the big
7 system to export power, probably in the order of 1000 megawatts
8 where the little fellow could not export help, probably
9 more than in the order of ten or 20 megawatts. Something
10 like that.

11 That is the very reason it is essential to arrive
12 at a rule as we have arrived at, the PN basis for measuring
13 participation and performance in this group with respect to
14 installed reserves.

15 CHAIRMAN RIGLER: Is this a good time for a
16 short break?

17 (Recess.)

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BY MR. GOLDBERG:

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Q Mr. Firestone, does ECAR use the P/N method of allocating capacity and reserves?

3

4

A ECAR has no method for allocating reserves, really.

5

Q Do they have a method for allocating operating reserves?

6

7

A There is an ECAR document, Document 2, I think it is, that sets forth some rules for each of the member companies to follow with respect to operating reserves and it does set forth some minimum guidelines.

8

9

10

11

Q It is not the P/N method, is it?

12

A No. It is operating reserve, not an installed reserve.

13

14

Q Apparently the paper which Applicant's Exhibit 124, which was submitted with Mr. Firestone's testimony, is different in some respects from the paper which he has with him today. I would request Applicant's counsel to supply me with a copy of the paper Mr. Firestone brought.

15

16

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19

MR. ZAHLER: Surely.

20

MR. GOLDBERG: Thank you.

21

BY MR. GOLDBERG:

22

Q Mr. Firestone, I would like to now ask you some questions on the study you conducted to compare and contrast the equal percentage of peak load method with the CAPCO method. For that purpose, I would direct your

23

24

25

1 attention to page 24 and 25 of your testimony.

2 On line 8 of page 25, you use the phrase "unit
3 configurations."

4 Could you please tell us what you mean by that?

5 A Well, in each case, it was necessary to assume a
6 capacity complement made up of discrete generating units and
7 the number of units and the size of units that we chose
8 to assume is what we meant by unit configuration.

9 Q What would the reliability categories be on lines
10 9 and 10?

11 A Well, we have identified here two types of system
12 with respect to reliability, very reliable and very unreliable.

13 We have a small system which we have identified as
14 very unreliable, and a large system we have identified as
15 very unreliable and we have used the same number of units
16 in each of those systems and proportionately the same
17 size except for the 10-to-1 scale factor.

18 In the pair of systems which are termed very
19 reliable, once again we have used the same number of
20 units for each of the two systems and sized them proportionately
21 in the same manner.

22 Again we have the 10-to-1 scale factor.

23 Q You say that the unit configurations are
24 identical within the respective reliability categories
25 except for the 10-to-1 scale factor. I want to know what you

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1 mean by reliability categories.

2 A Well, I have identified two types of systems,
3 a very reliable and very unreliable. Those are the two
4 categories.

5 Q Isn't the reliability of a system a function of
6 the reliability of the units of that system?

7 A It is certainly dependent on them, yes.

8 Q Isn't the reliability of each unit a function of
9 such things as the unit's capacity, size, maintenance
10 and schedule, random outage performance and seasonal and
11 Condition B rating of each unit?

12 A The reliability of each unit would be a function
13 of the scheduled maintenance, certainly. What were the
14 other items?

15 Q The unit capacity.

16 A Its reliability again would not be influenced
17 by its capacity other than the forced outage performance,
18 forced outage rate seems to increase as larger units are
19 utilized.

20 If one were fortunate enough to have the same
21 forced outage rate for a big unit as the small unit, you
22 would overcome that.

23 So the reliability is not impacted by the size
24 unit. The ability to carry load is, however.

25 Q Isn't it true that larger systems, generally

1 speaking, larger systems -- isn't it true that larger
2 units, generally speaking, have a larger outage rate
3 than smaller units?

4 A Generally speaking, that is true.

5 Q Therefore, couldn't you say that the reliability
6 of a unit depends upon its size?

7 A To the extent that the general case is true,
8 then what you have just said is true; right.

9 Q Doesn't the probability of a system having a
10 unit out of operation increase as the number of units
11 of that system increases?

12 A Yes, it does.

13 Q Mr. Firestone, on page 25 of your testimony,
14 beginning on line 3, you define the very reliable system
15 as having a number of individual generating units in the
16 10 to 15 percent of peak load size range; is that correct?

17 A Yes.

18 Q If we take a look at Applicant's Exhibit 125,
19 which is the capacity allocation study and the documents
20 referred to therein, on page 2, in looking at the very
21 reliable system, we see that for both the large and small
22 systems, they contain only four units in the 10 percent
23 range; is that correct?

24 A I think there is a misunderstanding or
25 perhaps my testimony is not clear with respect to the 10 to

1 15 percent range, what that means.

2 Q Would you explain what it means, then, please?

3 A I will try. I believe on my Exhibit 125, there
4 is a part of it, you will find a sheet or paper identified
5 as Exhibit 5.

6 Q Yes.

7 A You will notice there is a column headed by
8 the No. 2 or above the column is the No. 2, and it is
9 identified as peak load.

10 What we have done is assume in the existing
11 situation today there is a system having a peak load of
12 1000 megawatts.

13 We further assume that that system has
14 experienced a 7 percent annual compound growth rate in its
15 peak load.

16 So then we have computed the loads year by year
17 moving backwards from the present 1000 and established
18 this series of numbers you will see in the column peak
19 load.

20 To the left of that column, you will find a
21 column headed "years." So the assumption here is that
22 we are now in the 27th year of the history of this
23 system of capacity and we have the loads covering year 1
24 through year 27.

25 Now in the normal evolution of a power system,

1 it is customary to install new units every year or two and
2 size them somewhat in correlation with the annual load
3 growth.

4 It is also customary to retire units after a
5 lifetime of about 35 or 40 years. So we have tried
6 to simulate here with this hypothetical system the
7 typical functioning, the way the typical functioning power
8 system would have evolved.

9 10 to 15 percent goes to the unit size on the date
10 that it was installed, expressed as a percentage of the
11 peak load to be expected in that year.

12 And the column here headed with the number 4
13 expresses these percentages.

14 To the left of that column, the column headed 3,
15 tabulates the sequence of units that were assumed. You
16 notice starting in year 1, there is a 20 megawatt unit.

17 Another, another, another.

18 In year 8, there is a 30 megawatt unit, and
19 then a series of those until year 19, there is a move to
20 a 50 megawatt unit, and so on.

21 This tabulation had not been developed at the time
22 the 10 to 15 percent words were chosen, so it is obvious
23 that the numbers here don't -- percentage numbers don't
24 all fall within the 10 to 15 percent range.

25 The intent was to simulate a complement of

1 generating units in existence in this system that would
2 have evolved over the natural development of a large
3 power system. And I believe this is typical of the way many
4 or most large power systems have developed.

5 It is certainly typical of the way the Ohio
6 Edison system has developed.

7 Also on that same page, you can see we have a
8 column 5 and 6 headed with intermediate reliability system
9 and column 7 and 8 headed very unreliable system.

10 Those columns indicate the choice of unit size
11 and then that unit size expressed as a percentage of the
12 peak load in the year in which the unit would have been
13 installed.

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1 Q The problem I'm having, Mr. Fireston, is that your
2 testimony implies to me at least that all of the units were in
3 the ten to fifteen percent bracket, and then when we look at
4 details, we find out that that is not true, that only four
5 of them were in that range, and, as a matter of fact, none of
6 them were 15 percent, but all four were ten percent, and
7 the rest are all smaller.

8 I was curious why there was an apparent
9 discrepancy between your testimony and the details of
10 your study.

11 A Again, perhaps the words aren't as clear as
12 they should be.

13 The ten to 15 percent pertains to the
14 relationship on the date when the unit is first
15 installed.

16 That is used as a rule of thumb to arrive at a
17 selection of units. The important thing is that for the
18 very small system, or for the large system, we use the same
19 concepts to select the pattern of generating units.

20 The only difference being a scale factor of ten
21 to one.

22 CHAIRMAN RIGLER: Is that realistic, though?

23 THE WITNESS: It is realistic when you are
24 looking at a large system; when you are looking at the Ohio
25 Edison system, it is realistic.

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1 It is probably not realistic, when you are
2 looking at a very small system. If you move over to the --

3 CHAIRMAN RIGLER: Let's stay on the small
4 system. I'm looking at page 2 of Exhibit 125, your
5 capacity allocation study.

6 And I'm looking under your analysis of the very
7 reliable system, and when we look under the small system
8 column, there we have a series of very small units which
9 apparently represent your thinking that this would increase
10 reliability on that system.

11 Because the system, small system becomes increasingly
12 unreliable as its unit size goes up on your table. Now, the
13 problem I'm having is that this relegates the small u
14 system to very small units, in order to get that high
15 reliability.

16 Wouldn't it be true that the small system you
17 have described under very reliable would be the one that
18 incurred maximum costs of production for electricity?

19 THE WITNESS: Perhaps that is too strong a
20 statement.

21 The cost in dollars per kilowatt for these
22 units would be greater than if larger units had been used.

23 CHAIRMAN RIGLER: So that there is a financial
24 penalty, as I understand your example here, associated si
25 with achieving reliability that would produce some

1 regards under the CAPCO reserve allocation system?

bws 2 THE WITNESS: I think you mentioned the key
3 elements. Achieving reliability is not an inexpensive
4 objective.

5 If one is to achieve it, it costs money.

6 CHAIRMAN RIGLER: But looking from a public
7 policy point of view at the overall picture, it
8 seems to me what you are saying is in order to pool and
9 get the benefits of fair treatment under a formula you may
10 be stuck with these units that maximize your production
11 costs per unit of electricity.

12 And then if you tell me there has to be a trade-
13 off between reliability and production costs, I am still
14 not sure that this example you have given satisfies
15 the basic concept of equity which you introduced into
16 your testimony.

17 THE WITNESS: I think, because of the reasons
18 that you have cited, the small systems have attempted to
19 enjoy the economy of scale and move to larger units, and
20 they have done that to the extent that they have degraded
21 their reliability and have sacrificed their reliability.

22 So that while they were achieving economies,
23 they were allowing reliability to go unattended.

24 CHAIRMAN RIGLER: All right.

25 Let's go back over to page 26 of your original

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1 testimony. To your comparisons, there, which are
2 similar in nature to the cases on page two of Exhibit 125.
3 Looking at your example of the combination of the very
4 reliable large system, plus the unreliable small,
5 here we have the example of a small system trying to
6 increase its generating efficiencies by moving to larger
7 units.

8 THE WITNESS: It is trying to improve its
9 economy, yes.

10 CHAIRMAN RIGLER: If it has under your example two,
11 50 mw units and one 20 mw unit, then operating as an isolated
12 system, how much would it have to carry in the way of
13 reserves?

14 THE WITNESS: Again, in order to answer that I would
15 have to identify a reliability standard that the
16 system intends to meet.

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arl 1 CHAIRMAN RIGLER: Suppose they use the largest
2 single unit out standard. Is that a traditional standard
3 in the industry?

4 THE WITNESS: There are people that use that
5 standard. Again it does not address itself to quantitative
6 evaluation of reliability. It once again allows
7 reliability to wander.

8 CHAIRMAN RIGLER: Let's assume this system
9 uses the largest single unit out, that means operating
10 as an isolated system, it would have to carry 50 megawatts
11 of reserve; correct?

12 THE WITNESS: That's correct, yes.

13 CHAIRMAN RIGLER: If I look under that example
14 at the CAPCO method, I find that as it joins a pool, the
15 ostensible benefit of which is to increase reliability
16 and efficiency, and we can look to the CAPCO statement
17 of objectives for those answers, that its reserve requirements
18 balloon over what it would have to carry as an isolated
19 system.

20 That brings me full circle back to my trouble
21 with the thrust of your testimony that the pool be arranged
22 so as to do substantial equity to member parties.

23 THE WITNESS: I think the missing link in your
24 reasoning there is the level of reliability that is being
25 achieved under the various options you cited.

1 If the small system chooses to use a 50 megawatt
2 unit, which is 50 percent of its peak load and carry the
3 largest unit as reserve, 50 megawatt unit for reserve,
4 you can quantify in probability terms the level of reliability
5 that that will afford the customers.

6 If you buddy that system up with this large,
7 very reliable system, in addition to the reserve obligation,
8 ballooning, as you describe it, the reliability level
9 balloons.

10 The reliability level now that those customers
11 will enjoy will be much, much better than it was before.
12 If that is not a desirable goal or a desirable benefit,
13 then, of course, there is a problem.

14 CHAIRMAN RIGLER: What troubles me under the
15 percentage method column, it looks to me as if both
16 objectives could be achieved. It looks to me as if they could
17 have the benefits of greater reliability without the
18 sacrifice in economy or the purchase of economy reserve
19 capacity.

20 THE WITNESS: My attempt with this simple table
21 that is shown on page 26, is to illustrate that for these
22 three different combinations, a percent reserve
23 responsibility assignment method gives you the same
24 answer in all three situations.

25 Whereas the reliability analysis gives you quite

1 different answers in two situations, and the same in one.

2 And the different answers, shifting
3 responsibility dramatically from the one party to the
4 other.

5 Again depending on the relative going-in
6 positions of the parties with respect to reliability, and
7 the relative emerging positions of the total with
8 respect to reliability.

9 And if you go to the more expanded version
10 of the study, you can find those numbers that identify
11 the different levels of reliability that will be achieved
12 with these various options.

13 CHAIRMAN RIGLER: You still haven't satisfied
14 me as to the point of equity to the various members of
15 the pool.

16 If the small system comes in under any of our
17 examples and I will take just as examples what I am going
18 to call the penalty seems to me to be enormous under
19 the CAPCO method where they go to 88, where it would have been
20 50 under the largest single unit system as compared to the
21 corresponding penalty to the largest system which goes
22 from 200, to 218.

23 Do you see what I'm saying?

24 THE WITNESS: I think so.

25 Again I'm probably repeating myself, but starting

1 with the small system and planning as you outlined, 50
2 megawatt size unit, and the largest unit of reserve,
3 that type of system would achieve a very poor marginal
4 level of reliability. I would think that one of the compelling
5 reasons to want to put that system with the other system
6 you postulated, the large reliable system, would be to
7 improve the reliability of the system.

8 Again, in my concept, reliability is the common
9 denominator as I have described it. So if the two parties
10 can mutually agree on a stated level of reliability that
11 they want to achieve together, then to me it is
12 perfectly appropriate to work out the responsibilities
13 for the two so that the responsibilities are proportional.

14 Each fellow can expect now to receive help from
15 the aggregate in the same proportion he is going to provide
16 help to the aggregate.

17 That is where the equity arises. It is founded
18 on reliability. If you are unwilling to devote attention
19 to reliability and let it come and go as it will, then my
20 theories are not founded well.

21 CHAIRMAN RIGLER: Well, the point which is troubling
22 me is the equitable concept where the small system has
23 to increase its reserve capabilities so much greater on a
24 proportionate basis in order to get the benefits of pooling.

25 It seems to me that the systems, perhaps

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1 unintentionally, but the result of the system is to
2 rig it in favor of either inefficiencies in production
3 costs for the small system, or a sacrifice of reliability
4 because they can't afford to get into the pool on the CAPCO
5 method terms.

6 THE WITNESS: There is no attempt to do any
7 rigging. But there is an attempt to assure that an adequate
8 level of reliability in the aggregate will be achieved and
9 will be maintained.

10 Let's turn it around for a moment. The big very
11 reliable system that was the other half of this hypothesis
12 you set up, assume that system chose to plan from day one
13 under the same philosophy as the small system.

14 Now his reliability is marginal or is non-
15 existent and the two together will have marginal
16 reliability.

17 So someone has to embrace the more conservative
18 philosophy, the more reliable philosophy, and pay the costs
19 that are incurred in achieving that reliability. Someone
20 has to do that. That is the problem.

21 CHAIRMAN RIGLER: Even accepting that, you see,
22 I'm troubled by the fact that under the CAPCO method, under
23 your example, the large system would really, if it were very
24 unreliable, only have to increase its reserves in a magnitude
25 of about 2 percent.

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1 That would be 18 megawatts out of 1200 megawatts.
2 Whereas the little system would have to increase its reserve
3 by more than 50 percent more than what it would have to
4 maintain operating in isolation.

5 That gets me back to this sort of subjective
6 definition of equity that we started with.

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THE WITNESS: Well, I have a problem with using percentages as a measure of an installed reserve position. I have tried to convey in my writing here that I think that is a totally inadequate method for assessing a reserve position.

I have tried to illustrate one of the reasons why. Of course, you are pursuing percentages. You arrive at what appear to be very strange percentages which to me is a further illustration of the difficulty of using percentages. The small system here, for instance, his responsibility has moved from 20 megawatts down to two megawatts. That is a very dramatic change in his percentage.

But again, I think it is meaningless really. It is necessary to have reserves to cover the requirements for reserves, to cover your planned maintenance, forced outages, your seasonal B rates, your unforeseen variations in the load, this type of thing.

If you want to cover these things with some assurance you are going to be adequate, to me the most sensible analysis to make is the probability analysis which allows you to quantify the impact of each of these things.

The largest unit rule or the percent reserve rule are simple and quick rules of thumb but they allow reliability to go unattended. Again, reliability, the attainment of it costs money, lots of money. That is why rather

eak2 1 than try to sort out the benefits accruing from a
2 pool operation and write rules around that, to me it is
3 more sensible to write rules as to obligations which
4 if those obligations are carried out will assure the achievement
5 of objectives. One very important objective being
6 assurance that this power system in this country remains
7 at a very reliable level which, as I say, costs money and
8 if we are going to do this in a community fashion, it is
9 important to me that each member living in that community
10 shoulders his responsibility in an equitable way.

11 CHAIRMAN RIGLER: I thank you for your answers.
12 I am not sure you solved my problem but maybe I will let
13 your counsel develop it further or redirect if he feels it is
14 necessary.

15 BY MR. GOLDBERG:

16 Q So as to not have waived my right to ask further
17 questions on these particular figures here, I do have one
18 or two questions before I get into further questions along
19 a similar line which would be perhaps more satisfactory
20 to Mr. Firestone in that some of them don't use percentages
21 but look at actual magnitude and numbers.

22 Before I get to that and continue the line you have
23 pursued, I would like to ask a few other questions.

1 MR. GOLDBERG:

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2 Q If all the unit configurations of the system in your
3 example are identical within their respective reliability
4 categories, except for the ten to one scale factor, and if
5 the only other difference between the system is your
6 assumptions about the number of units and the percentage
7 of peak load, then isn't it true that your very reliable
8 system is actually less reliable than your very unreliable
9 system in the sense that the very reliable system has a
10 larger number of units than the very unreliable system and,
11 therefore, there is a greater probability that one of those
12 units will be out of operation?

13 A I think you are indulging in some
14 circular reasoning there. Certainly, if there are more units,
15 there is a greater likelihood that at any given time
16 a unit will be out of service. That does not mean that
17 that complement of generating capacity will have a lower
18 level of reliability in serving a given complement of load.

19 The fact that you do have more units, each of which
20 is a smaller portion of the total is a very compelling
21 factor in producing greater reliability rather than less.

22 MR. SMITH: Don't you arrive at the point where
23 you risk having more than one out?

24 THE WITNESS: Yes.

25 MR. SMITH: Sooner or later there has to be a

balance between proliferation and risk.

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2 THE WITNESS: The mathematical methods that
3 are involved compute all combinations of
4 capacity that can exist, and there is a possibility and
5 probability associated with it that if you have 27 units
6 in this system, that all 26 of them will be out of
7 service.

8 That is a very small probability, but it exists.
9 And then there is a probability that five of them will be out
10 at any one time or six or nine or that they will all be
11 available.

12 The mathematics recognizes all of these combinations
13 and then those combinations are measured against the various
14 loads that will be called upon to be served.

15 So all of this is put together to quantify,
16 then the resultant computed level of reliability that this
17 capacity complement will achieve in serving this load.

18 If you have the same total number of megawatts
19 in a capacity complement, but the total is made up of
20 fewer units and, therefore, larger units, then that
21 capacity complement serving a given load will achieve a
22 lower level of reliability than the capacity complement
23 that is made up of more and smaller units.

24 MR. SMITH: The ratio of reliability to number
25 of units in a system is not indefinitely inverse.

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1 Doesn't it level off at a point?

2 THE WITNESS: Yes, it does.

3 MR. SMITH: If that question doesn't make
4 sense, please feel free to acknowledge that.

5 THE WITNESS: This reliability and this analysis
6 of capacity serving load is certainly not a linear relationship,
7 and there are several significant parameters that
8 interact and sometimes one gets fooled and they act in a way
9 that you don't suspect.

10 If you were to set out to supply a given load
11 and all of the characterizations it has, with say, the
12 model I have assumed here, 27 generating units total
13 megawatts equal to 120 percent of this load, you would
14 achieve such and such a level of reliability.

15 If you would add a couple of more units here,
16 you would achieve a higher level of reliability, but not
17 much higher.

18 If you dropped off a couple of units from here, you
19 would achieve a lower level of reliability and the
20 degradation would probably be substantially greater than the
21 improvement you sought by swapping these units.

22 It is that sort of thing.

23 So you reach a point that if you add additional
24 units, they don't improve your reliability enough to justify
25 the cost of adding them. And this, of course, is the thing

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1 that you are searching for or the system planner is searching
2 for, to try to find the right number of megawatts of
3 reserve, and the proper packaging of those megawatts in
4 big units, little unit, what have you, to reach the economic
5 optimum, to achieve the reliability goal.

6 MR. SMITH: You want the largest units possible,
7 consisten with having enough units to assure adequate
8 reserve?

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THE WITNESS: Right. Again, there is another
2 compromise that comes in. The largest unit possible, the
3 larger you can move means the lower the cost in dollars
4 per kilowatt for that unit. It means as you tend to use larger
5 units, that you will have to buy more megawatts of reserve
6 in order to achieve a given level of reliability.

7 There is a race between the lower dollars per kilo-
8 watt and the more kilowatts it requires.

9 MR. SMITH: In CAPCO, didn't you take into
10 consideration in arriving at your method of allocation,
11 the relative size of the individual companies.

12 THE WITNESS: We took into consideration the
13 characteristics of the companies, the characteristics that
14 have impact on reliability. To the best of our ability,
15 we took into consideration all of such characteristics
16 or each of us and each of us as we came to the CAPCO group so
17 to speak, arrived with a certain set of operating philosophies,
18 a certain complement of existing generating equipment, certain
19 interconnection arrangements with outside parties that all had
20 impact upon the reliability picture.

21 All of these parameters are input into our evaluation.

22 MR. SMITH: Then, you certainly cannot sacrifice
23 economies of scale to reliability?

24 THE WITNESS: We think that we are achieving
25 some economy of scale by being able to use larger units in
a group than we could use by ourselves.

1 But we recognize that in order to achieve a given
2 level of reliability, while using those larger units
3 we have to buy more megawatts of installed capacity than
4 we would have to buy if we chose to use smaller units.

5 But taking those two competing factors, we have
6 tried to optimize that so we do achieve a net lowering
7 of our costs.

8 BY MR. GOLDBERG:

9 Q Mr. Firestone, before you testified that
10 generally speaking, large units have a higher outage rate
11 than smaller units, is that correct?

12 A Yes, I believe I testified to that.

13 Q What is 50 percent of the smaller system's annual
14 peak load, referring to your example.

15 CHAIRMAN RIGLER: Which one?

16 BY MR. GOLDBERG:

17 Q The example which begins on page 24 and over on to
18 25 and 26. It is Mr. Firestone's testimony.

19 A Yes, well, I postulated a small system having
20 an annual peak load of a hundred megawatts. So a 50-megawatt
21 unit would be 50 percent of that peak load.

22 Q What is ten percent of the larger systems annual
23 peak load?

24 A Ten percent of 1,000 megawatts would be 100 megawatts.

25 Q So, a unit equal to only ten percent of the larger

1 system's annual peak load is actually larger than 50 percent
2 of the smaller system's annual peak load?

3 A Yes, it is. I don't know if there was some
4 confusion. When you were reciting a while ago the differences
5 -hat we have in input in this study between the large system
6 and the small, you said the units were identical except
7 for the ten to one scale factor. We also utilized what we
8 felt to be the appropriate forced outage rate for the unit
9 depending on its size and megawatts. If we used a
10 ten megawatt unit in the small system, it might have associated
11 with it a one percent forced outage rate. The corresponding
12 unit in the large system would be a 100 megawatt unit and
13 it would have associated with it a two percent forced
14 outage rate.

15 The impact of higher forced outage rates with
16 larger units is being felt with this study.

17 Q You made those assumptions for the purposes
18 of this study, is that correct?

19 A Yes, although again we felt we were making
20 reasonable assumptions based on our knowledge of the way
21 units of this size seemed to be performing in the industry.

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1 arj Q In reality, they could differ from your assumptions?

2 A Yes, they could.

3 Q With respect to Exhibit 1 revised of
4 Applicant's Exhibit 125, it is my understanding that the
5 capital A appearing on four in parentheses refers to the
6 very reliable system; is that correct?

7 A Yes, that's correct.

8 Q Capital B refers to the intermediate system?

9 A Yes.

10 Q And C to the very unreliable system?

11 A Yes.

12 Q Looking at column 7, would you please explain why
13 the positive margin in decreases when going from the very
14 reliable to the intermediate system, but then increases when
15 you go from the intermediate to the very unreliable?

16 A Well, I have no explanation other than that is
17 the way these various parameters fall together to produce
18 the positive margin, megawatt day number.

19 Q Wouldn't you expect those positive margins to
20 be steadily increasing as we went from the very reliable
21 system to the intermediate system to the very unreliable
22 system?

23 A I think you mean the converse of that, don't you?
24 Positive margins represent ability to help others or really
25 are surpluses for the fellow that has them. In the first

1 brush you expect as you improve the reliability of the
2 systems that the positive margin would increase. These
3 numbers seem to belie that.

4 Again I just recite that this is a very complex
5 analysis and the forced outage rates associated with the
6 individual units here and the way these capacity conditions
7 can exist as measured against the load requirements
8 produces numbers like this.

9 Q Yes, I am sorry. I believe you are correct.
10 One would expect the positive margins to decrease as we go
11 from very reliable to intermediate to very unreliable; is
12 that correct?

13 A I think you said it the same way you said it the
14 first time.

15 Q I don't believe I did. As we go from very
16 reliable to very unreliable, let's make that long jump,
17 would you expect the positive margins to increase or
18 decrease?

19 A As we go from very reliable to very unreliable,
20 I would expect the positive margins to be decreasing.

21 Q And would you then explain why they increase?

22 A I thought I did before we got into the confusion
23 about which way they were going.

24 Q I believe your explanation was that it is very
25 complicated and that is just the way it turns out.

1 A Well, there are interacting factors, some of
2 which would be going one way and some another. It
3 depends on which factors is having the most impact that will
4 determine the answer.

5 And I'm saying that it is risky, short of
6 making this calculation, with a large digital computer to
7 try to forecast what the answer is going to be. I've
8 learned that from bitter experience.

9 Q This method is very dependent upon the output of
10 the computer and it may give you results as you see here
11 that you might not expect just from a qualitative analysis;
12 is that correct?

13 A If you are implying there is something lacking
14 about the use of the digital computer, I disagree.

15 Q I'm suggesting that this method is very dependent
16 on the particular program you are using and on the
17 particular output that you get from the computer in that it
18 gives you results which qualitatively you might not expect
19 to get?

20 A No, I would not agree that the output is very
21 dependent on the particular program and particular computer.

22 The mathematical processes are rigorous that are
23 used here.

24 Short of someone erring in inputting the data,
25 it is possible for independent parties to make this

1 calculation and arrive at the same output numbers or
2 the same answer.

3 In fact, we in CAPCO do that. Not this study,
4 but in practice when we are doing this to assign
5 capacity and responsibility in CAPCO, this is of such
6 importance to us that it is our practice to have two
7 parties independently make these calculations and then
8 we check our results to see if they agree, and if they
9 don't, we go back until we find the data error which has
10 produced the difference.

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11 Q Isn't it true that associated with the output of
12 all computers, no matter what type of numerical method is
13 used, that there is something called the round-off error?

14 A That is an awfully broad question. I'm not
15 acquainted with all computers and all uses and all outputs.
16 I can't answer that.

17 Q Do you know for a fact that when a problem is
18 solved on a computer, that the numbers which come out
19 represent the exact solution of that problem or only an
20 approximation to the solution of that problem?

21 A Well, in our use of digital computers, we
22 normally instruct the machine by way of the program to
23 carry the degree of mathematical accuracies we feel is
24 appropriate for the problem under study and if we feel that
25 significant
four/digits to the right of the decimal place is the type

1 of accuracy we require the computation will produce that
2 for us.

3 Q When you say accuracy, doesn't that imply there is
4 some error?

5 MR. ZAHLER: Objection. I think this is the
6 third time now.

7 CHAIRMAN RIGLER: Sustained.

8 BY MR. GOLDBERG:

9 Q I will give you an example. Suppose you wanted
10 to program the number $1/3$ on a computer. What decimal
11 equivalent is equal to $1/3$?

12 MR. ZAHLER: Objection. I'm not sure
13 this is very productive.

14 CHAIRMAN RIGLER: We appreciate your point.

15 BY MR. GOLDBERG:

16 Q If we look at System A, the very reliable system,
17 and look at your ratio of positive margins to negative
18 margins, the denominator of that ratio is .06; is that
19 correct?

20 A That's correct.

21 Q And when you compute the ratio of positive
22 margins to negative margins, you arrive at the figure
23 33,983.16, am I correct?

24 A That's correct.

25 Q Suppose instead of .06, the denominator were just

1 one one hundredth less, namely .05, can you tell me quickly
2 what the P/N ratio would be then?

3 A No, I can't, but the fact is the denominator
4 is .06 and not another number.

5 Q Mr. Firestone, could you do a calculation?
6 If P is equal to 5481.06, and N is equal to .05, what is the
7 ratio P/N?

8 MR. ZAHLER: I would object. If Mr. Goldberg
9 has done the calculation we will accept that. I'm not sure
10 the witness is in a position to carry that out or that it
11 is proper cross-examination.

12 CHAIRMAN RIGLER: It is in excess of 100,000.

13 BY MR. GOLDBERG:

14 Q Do you agree with that?

15 A Assume the denominator is .03, then it would be twice
16 the amount.

17 Q Assuming the denominator is .05 --

18 A If it were .05, it would be 20 times the numerator
19 or over 100,000.

20 Q With just a change of one one hundredth in
21 the denominator, we increase the denominator by well over
22 11,000; correct?

23 A I will accept your arithmetic.

24 Q It appears from these numbers in column 3 for the
25 negative margins and column 7 for the positive margins, that

1 they all go over two places to the right of the decimal
2 point.

3 Suppose the N in System A came out to be .056.
4 Would you use .05 or .06 as the denominator?

5 A Well, if these numbers had turned out to be
6 different --

7 MR. ZAHLER: Objection. The table speaks for
8 itself. Those are the numbers. We are talking now about
9 what if the numbers were different or this way or that
10 way. I'm not sure of the relevance.

11 Mr. Firestone computed the numbers and he put
12 them in the table. I don't see the relevance of the
13 questions if the numbers were different, what would the
14 result be.

15 CHAIRMAN RIGLER: I'm not sure. I will permit
16 him to ascertain the number would be different if the
17 numbers were different. That is proper cross-examination.

18 I'm beginning to wonder where you are going
19 since I can accept the fact that the ratio would change if
20 the negative margins are changed. Probably the witness
21 would agree with you on that, too.

22 Putting that to him as a fact, then where do you
23 want to go?

24 MR. GOLDBERG: Mr. Rigler, it may be appropriate in
25 my responding to that to have the witness excused, because I

1 think it is a little more than merely the ratio
2 changing when the denominator changes.

3 I have a response, but I wouldn't want to
4 influence the witness.

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1 CHAIRMAN RIGLER: We will excuse you,
2 Mr. Firestone, probably until tomorrow morning, in view
3 of the hour.

4 (Witness temporarily excused.)

5 CHAIRMAN RIGLER: I will hear Mr. Goldberg's
6 argument on that and then we will recess for the day.

7 MR. GOLDBERG: It is the Staff's contention
8 that this system is extremely sensitive to very small
9 fluctuations in the negative margin days.

10 Because inherently the system includes as it
11 necessarily must, with respect to any iterative process
12 or numerical technique, both of which were used by
13 Mr. Firestone in his method, inherently includes round-off
14 errors, truncation errors and, because of the errors, alone
15 the results can significantly differ from what they, in
16 fact, should be, if the exact figures were used.

17 Because the system is so sensitive to the
18 denominator when it is very small, as it is here, it
19 immediately, Staff submits, casts doubt on the reliability
20 of the system.

21 MR. ZAHLER: Mr. Chairman, if I can respond
22 to that for a second.

23 The argument Mr. Goldberg sets forth is plausible
24 under a whole set of assumptions that don't or haven't been
25 substantiated in the record. We know the digits are carried

1 to two significant places. There is no indication
2 how many significant places the computer program carried
3 the digits to. He talks about the change of .06 to .05
4 without indicating that is a 16 percent change.

5 We don't know what the level of accuracies
6 of the iterative program is, he is talking about, whether
7 it would pick up 16 percent change, although in absolute
8 magnitudes Mr. Goldberg might find the numbers very small.

9 Until that foundation is laid, I don't understand
10 the basis of the questioning.

11 CHAIRMAN RIGLER: Just looking at the table, it is
12 clear that in making the mathematical calculations, small
13 changes could produce changes in the ratio results.

14 Mr. Goldberg has characterized them as
15 significant. I suppose that is a point of debate as to
16 at what point they would become significant. Clearly, he
17 is right, if you affect the negative margin it is going
18 to have an influence on the answer; in the examples
19 used that ratio could change by ten thousand points.

20 Accepting that as true, I still don't understand
21 your point, Mr. Goldberg. You say this casts doubt on the
22 validity of the system, which apparently CAPCO is operating
23 under.

24 They, at least have not scrapped the
25 system thus far, because it produces results that are too

1 far beyond their expectations,

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2 MR. GOLDBERG: But also the system which
3 they would impose on other systems, if they were to join
4 CAPCO and the point which hopefully will be established at
5 the conclusion of Mr. Firestone's cross-examination is
6 that this method affects small systems to a very much
7 greater degree than it does affect large systems by virtue
8 of the magnitude of the numbers alone.

9 When the CAPCO method is applied to small systems,
10 I believe there are serious problems with it.

11 CHAIRMAN RIGLER: They might even concede
12 that point.

13 MR. ZAHLER: I may or may not. I have
14 a hard time understanding Mr. Goldberg's point.

15 CHAIRMAN RIGLER: Think about it overnight.

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1 MR. ZAHLER: The problem I have with Mr. Goldberg's
2 statement is that number don't look large or small to a
3 computer. You can carry out the iterative process to any
4 degree of accuracy you desire. It depends on the circumstances.
5 If you look at line 6 on the chart, with a negative margin
6 of 4358.33, a change of .01 would have a negligible
7 effect. He assumes that a change from .06 to .05 would take
8 place in the computer program and we don't know that.

9 MR. GOLDBERG: I asked him about the errors
10 associated with the methods that have been used. In his
11 testimony he states that an iterative process was used.
12 He states he used a computer program. I have tried
13 to ask about the errors associated with the
14 methods and he doesn't know anything about them.

15 I question his ability to come in as an expert
16 and testify on these figures when he does not know the
17 underlying techniques used to arrive at the figures.

18 One of the most important parts of numerical
19 analysis is the analysis of errors associated with the methods.

20 Some methods don't converge so they give you
21 absurd results. He knows nothing about the errors --

22 MR. ZAHLER: Mr. Goldberg hasn't asked those
23 questions.

24 MR. GOLDBERG: I will stand on the record on that.

25 MR. REYNOLDS: Could I ask the Staff a question

eak2 : since we are in a colloquy of counsel. I am curious
2 as to whether it is Staff's position that the small
3 systems should be in a position to come to CAPCO and change
4 the CAPCO system of operations as a condition of membership?
5 Is that what Staff is contending? The small systems
6 should be in a position to insist on the change in the event
7 they feel the sensitivity is not quite as tuned as the
8 small systems would want it to be?

9 MR. GOLDBERG: We don't have any comment on
10 that.

11 MR. REYNOLDS: It is relevant to the position
12 he is asserting, it seems to me.

13 CHAIRMAN RIGLER: That is something of interest
14 to the Board. I am not asking you to respond to Mr. Reynolds
15 but as I look at the record to date anyway, it is difficult
16 for me to conclude that the P/N system was designed to
17 have any effect on new member applicants to CAPCO. The
18 record suggests that CAPCO really was not contemplating
19 new members.

20 There may be a point on controversy whether this
21 was by design or merely accidental. Nonetheless, right now,
22 it does not appear there is any relationship between CAPCO's,
23 let's call it experimentation, with the new P/N system
24 of calculating reserves and any desire to affect the
25 competitive position of any non-member of CAPCO. Now,

eak3 1 if that is the present state of the record, then Mr.
2 Reynold's question becomes fairly interesting in the event
3 we did decide that there is a situation inconsistent with
4 the antitrust laws and we were examining the question of
5 relief.

6 I think it is a question which perhaps deserves
7 some thoughtful comment by the opposition parties.

8 You are asking, Mr. Reynolds, if a system which
9 was designed to be fair for the purposes for which it was
10 designed and without any anticompetitive intent, has to
11 be changed in order to accommodate new members who are
12 voluntary applicants to the system, is that correct?

13 MR. REYNOLDS: That is one way to frame the
14 question, yes.

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1 CHAIRMAN RIGLER: It seems that that is a fair
2 question. I will leave it with you overnight.

3 I can accept much of what you say that
4 small changes and fine-tuning of decimal points may affect
5 the results.

6 If I accept that, I still come to a "so what"
7 conclusion at this point.

8 MR. GOLDBERG: We are then at the point of relying
9 on what Mr. Firestone tells us and relying on the numbers
10 he gives us when apparently he doesn't understand very much
11 about the techniques that were used to arrive at those
12 numbers.

13 I think there is a serious question as to how
14 much we can rely on what Mr. Firestone tells us in light of
15 his own testimony about his background and use of probability
16 in mathematics.

17 CHAIRMAN RIGLER: I gather he is trying to tell
18 us there are no serious distortions within the CAPCO
19 systems as a result of the method they have chosen to
20 effect reserve-sharing capabilities.

21 Assuming there are various systems and various
22 formulas which could be used, and they are using this
23 one not for any anticompetitive intent, I wonder what
24 your burden may be in terms of relief to show they may be
25 forced to adopt some other system?

1 MR. GOLDBERG: Suppose the CAPCO group uses this
2 method as a requirement for participation in the CAPCO
3 pool, and they say we have computed everything and here
4 is the reserves you would be required to have or here is
5 the capacity you would be required to purchase from the
6 nuclear units.

7 Here are the figures and here are the megawatt
8 capacity you have to purchase, because this is the system or
9 technique we use.

10 Who is this system to go to, to find out
11 whether in fact those figures are correct?

12 They can't go to Mr. Firestone and he is the
13 man advanced as the expert on this method.

14 Who do they go to, to find out about the
15 underlying techniques and underlying error analysis?

16 If they have a better expert, I would like to
17 see him testify.

18 MR. ZAHLER: I would just object to the
19 characterization of Mr. Firestone's expertise here. The
20 question -- I don't think the record supports the statements
21 Mr. Goldberg is making as to what Mr. Firestone's expertise,
22 qualification or knowledge of the systems.

23 I don't understand the foundation for the
24 aspersions being cast on this record, really.

25 CHAIRMAN RIGLER: On that note, we will

1 conclude for the day and reflect on the colloquy of the
2 last five minutes.

3 When we resume tomorrow morning, I would like
4 the Applicants to reflect on -- the Board may rule
5 directly.

6 I was going to ask if you would stipulate
7 with respect to small changes in the column affecting
8 small systems. That may be more difficult than ruling
9 on it directly.

10 MR. REYNOLDS: Since we are on the record, I'm
11 not clear as to what you want us to reflect on.

12 CHAIRMAN RIGLER: I want you to reflect on the
13 answers to the questions the Board has raised primarily
14 with the opposition parties.

15 MR. REYNOLDS: I thought you indicated the Board
16 might rule on something relating to small changes in column
17 8 as they impact on column 9.

18 CHAIRMAN RIGLER: We have a pending objection
19 from Mr. Zahler which we are being asked to resolve, which
20 is why we were asked to excuse the witness.

21 MR. ZAELER: There is an objection pending.

22 MR. REYNOLDS: The question I'm raising, if the
23 Board intends to rule on something I want to be clear as to
24 what it is so we would have opportunity to speak to it.

25 CHAIRMAN RIGLER: It would be Mr. Zahler's last

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objection.

(Whereupon, at 4:30 p.m., the hearing
was adjourned, to reconvene at 9:30 a.m.,
Wednesday, May 12, 1975.)
